UNDP PROJECT DOCUMENT

Government of Argentina, India, Latvia, Lebanon, Philippines, Senegal, Kingdom of Tanzania and Vietnam

United Nations Development Programme

Global Environment Facility (GEF)
World Health Organization (WHO)
Health Care Without Harm (HCWH)

Demonstrating and Promoting Best Techniques and Practices for Reducing Health-Care Waste to Avoid Environmental Releases of Dioxins and Mercury

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BRIEF DESCRIPTION OF THE PROJECT

The overall objective of the full Project, implemented by the UNDP, is to demonstrate and promote best practices and techniques for health-care waste management in order to minimize or eliminate releases of persistent organic pollutants and mercury to the environment. The Project will demonstrate the effectiveness of non-burn health-care waste treatment technologies, waste management practices and other techniques to avoid environmental releases of dioxins and mercury in seven strategically selected countries – Argentina, India, Latvia, Lebanon, the Philippines, Senegal and Vietnam – representing a range of income and indebtedness classifications, four of the six official U.N. languages and all of the world's five development regions. In each participating country, the Project will develop best practice health-care waste management models through collaborations with at least one large hospital, as well as with an appropriate combination of smaller clinics, rural health and/or injection programs and pre-existing central treatment facilities. The selected model facilities and technologies represent a range of scenarios that serve to demonstrate the general applicability of the Project's approach to a diverse set of global conditions.

If replicated nationally and sustained, best practices and techniques initiated during the Project's implementation are expected to reduce the release of an estimated 187 g TEQ of dioxins and 2,910 kg of mercury to the environment each year from participating countries' health-care sectors. The Project will also lay the groundwork for sustainability, replicability and the scaling-up of best techniques and practices beyond the model facilities and the Project countries by establishing or enhancing national training programs, pursuing policy reform, developing replication toolkits and awareness-raising materials, and disseminating these materials nationally and globally. An additional component aimed at developing locally-produced, affordable, non-burn health-care waste treatment technologies will be executed in Tanzania. The Project's global objectives will reduce barriers to the implementation of the Stockholm Convention on POPs, the International Waters Global Programme of Action (GPA), the Strategic Approach to International Chemicals Management (SAICM), and the World Health Organization's policies on safe health-care waste management and on mercury in health-care. An ancillary benefit of this work will be the improvement of health-delivery systems through the fostering of good health-care waste management practices, thereby supporting the prerequisites for achieving the Millennium Development Goals. The Project's ultimate goal is the protection of public health and the global environment from the impacts of dioxin and mercury releases.

The Project will achieve: (1) the establishment of model facilities and programs to exemplify best practices in health-care waste management, and the development of materials to facilitate replication; (2) the deployment and evaluation of commercially-available, non-incineration health-care waste treatment technologies appropriate to the needs of each facility or cluster; (3) the development, testing, manufacture and deployment of affordable, small-scale non-incineration technologies for appropriate use in small and medium-size facilities in sub-Saharan Africa, and preparation and dissemination of manuals for their manufacture, installation, operation, maintenance and repair; (4) the introduction of mercury-free devices in model facilities, evaluation of their acceptability and efficacy, and development and dissemination of awareness-raising and educational materials related to mercury; (5) the establishment or enhancement of training programs to build capacity for implementation of best practices and appropriate technologies beyond the model facilities and programs; (6) the review of relevant policies, seeking of agreement by relevant authorities on recommended updates or reformulations if needed, seeking of agreement on an implementation plan, and if appropriate, assistance in holding a policy review conference for these purposes; (7) the distribution of Project results on best techniques and practices to relevant stakeholders, dissemination of materials, and holding of conferences or workshops to encourage replication; and (8) the making available of Project results on demonstrated best techniques and practices for dissemination and scaling-up regionally and globally. The majority of Project activities will be completed in the first three years of the Project.

The Project is consistent with the GEF Focal Area of Persistent Organic Pollutants (POPs) under Operational Program (OP) 14, and the GEF OP 10: the Contaminants-Based Operational Program of the International Waters Portfolio. Project activities consistent with OP 14 include: building capacity; strengthening policy and regulatory frameworks; strengthening monitoring capacity; developing capacity to assess technologies and management practices; developing and implementing public awareness, information and environmental education programs; facilitating dissemination of experiences and lessons learned and promoting information exchange; promoting access to, and the transfer of, clean and environmentally sound alternative technologies; and demonstrating viable and cost-effective alternatives to the processes and practices that lead to the release of POPs. OP 10 supports demonstration activities that prevent or reduce releases of mercury, in particular targeting technical demonstration and capacity-building projects to demonstrate alternatives to mercury-containing instruments and proper cleanup

and management of mercury wastes; and to help raise awareness and serve as a means for encouraging use of best practices and the formulation of policies for innovative institutional approaches.

The Project is structured so as to allow stakeholder involvement at different levels. Full Project implementation will be carried out under the guidance of a Global Project Steering Committee (GPSC) whose members include one representative from each of the following: UNDP, UNOPS, a senior level official designated by each of the Project participating Governments, one representative each from the World Health Organization (WHO) and the international NGO Health Care Without Harm (HCWH), as well as other major donors and partners. In each participating country, a National Project Steering Committee (NPSC) will assume oversight for national Full Project activities. Typically, the NPSC will include a designated senior representative from the Health and Environment Ministries and from the Ministry in which the GEF Operational Focal Point is located, a representative or a liaison from the authority responsible for Stockholm Convention NIP preparations and from the authority responsible for Basel Convention implementation. The NPSC will also include representation from the national health care sector, the country WHO and UNDP offices, as well as one or more appropriate representative from national NGOs with demonstrated concern and activity in matters associated with health-care waste management. In addition to the NPSC, broad stakeholder participation will also take place through the National Working Group (NWG), composed of individuals from appropriate ministries, agencies and stakeholder groups who have practical involvement or interest in day-to-day Project activities. The NWG may include representatives from UNDP Country Offices, WHO Country Offices, health, environment and other appropriate ministries, NGOs, training institutions, health-care facilities, medical and municipal waste service providers, and health-care related associations. The NWG will advise the NPSC and will assist the National Consultants by providing expertise and advice on project-related policy, economic, scientific and technical issues and by assisting in networking. During the implementation, the Global Expert Team (GET) will provide technical and policy expertise and will have joint responsibility to assure that Project activities are successfully implemented.

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ACRONYMS

AAMMA	Asociación Argentina de Médicos por el Medio Ambiente/Argentine Association of Doctors for the Environment
BAT	Best available techniques
BEP	Best environmental practices
BMW	Bio-medical waste
CTF	Central Treatment Facility
DANIDA	Danish Development Agency
GEF	The Global Environment Facility
GET	Global Expert Team
GLC	Great Lakes Center (Chicago Great Lakes Center for Environmental and Occupational Safety and Health)
GPA	Global Programme of Action
GPSC	Global Project Steering Committee
HBV	Hepatitis B Virus
HCB	Hexachlorobenzene
HCV	Hepatitis C Virus
HCW	Health-care waste
HCWM	Health-care waste management
HCWH	Health Care Without Harm
HIV/AIDS	Human Immunodeficiency Virus/Auto-Immune Deficiency Syndrome
ICN	International Council of Nurses
IGNOU	Indira Gandhi National Open University
ILO	International Labour Organization
JSI	John Snow International
M & E	Monitoring and evaluation
MOE	Ministry of Environment
MOEF	Ministry of Environment and Forests
MOH	Ministry of Health
MWI	Medical waste incinerator
NC	National Consultant
NGO	Non-governmental organization
NIP	National Implementation Plan
NPSC	National Project Steering Committee
NWG	National Working Group
OECD	Organisation for Economic Co-operation and Development
OP 10	GEF Operational Program 10: Contaminants-Based Operational Program of the International Waters Portfolio
OP 14	GEF Operational Program 14: Persistent Organic Pollutants (POPs)
PAHO	Pan American Health Organization
PCBs	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzo Dioxins
PCDF	Polychlorinated Dibenzo Furans
POPs	Persistent organic pollutants
PTS	Persistent toxic substances
R&DG	Research and Development Group at the University of Dar es Salaam
SAICM	Strategic Approach to International Chemicals Management
SEARO	South-East Asia Regional Office (of the World Health Organization)
SPCB	State Pollution Control Board
TDAC	Technology Development Advisory Committee
TDT	Technology Development Team
TDTC	Technology Development and Transfer Center, University of Dar es Salaam
TORs	Terms of Reference
UNDP	United Nations Development Programme

UNDP-GEF-HQ	United Nations Development Programme-Global Environment Facility Headquarters
UNEP	United Nations Environment Programme
UNOPS	United Nations Office of Program and Services
WFPHA	World Federation of Public Health Associations
WHO	World Health Organization

LIST OF DEFINITIONS

Alternative treatment technologies	For the purposes of this document, alternative treatment technologies are non-incineration technologies that are used to disinfect infectious health-care waste, while avoiding the formation and release of dioxins. Depending on the waste being treated, alternative treatment technologies may also render health-care waste unrecognizable, reduce its volume, eliminate the physical hazards of sharps, decompose pathological or anatomical waste and/or degrade chemotherapeutic waste.
Bloodborne pathogens	Infectious agents transmitted through exposure to blood or blood products.
Chemotherapeutic waste	Chemotherapeutic waste is waste, resulting from the treatment of cancer and other diseases, that contains chemical agents known to cause cancer, mutations and/or congenital disorders.
Dioxins	For the purpose of this document, dioxins refer generally to polychlorinated dibenzo-p-dioxins, polychlorinated dibenzo furans and other unintentional POPs discussed in Annex C of the Stockholm Convention.
Health-care waste	Health-care waste includes all the waste generated by health-care establishments, medical research facilities and bio-medical laboratories.
Infectious waste	Infectious waste is waste suspected to contain microorganisms such as bacteria, viruses, parasites or fungi in sufficient concentration or quantity to cause disease in susceptible hosts. (Infectious waste is synonymous with bio-medical and bio-hazardous waste.)
Nosocomial infections	Nosocomial infections, also called “hospital-acquired infections,” are infections acquired during hospital care that are not present or incubating upon admission.

LIST OF WEBSITES

Project website	http://www.gefmedwaste.org
World Health Organization	http://www.who.int/water_sanitation_health/medicalwaste/en/
Health Care Without Harm	http://www.noharm.org

SECTION I: ELABORATION OF THE NARRATIVE

PART I: SITUATION ANALYSIS

Context and Global Significance

Environmental contaminants of global concern enter the environment in significant quantities as a result of the activities of health-care facilities and services (e.g., hospitals, clinics, immunization campaigns, etc.) and the treatment and disposal of resulting wastes. As health systems are strengthened and health-care coverage expanded in developing countries through efforts to meet the Millennium Development Goals, the releases of persistent organic pollutants (POPs) and other persistent toxic substances (PTS) to the environment can increase substantially. This is often an unintended consequence of choices in materials and processes that seek to improve health outcomes.

The proposed Project is a global demonstration project that will work with seven countries to demonstrate and promote best practices and techniques for health-care waste management with the aim of minimizing or eliminating releases of POPs and mercury to the environment. The following countries will participate: Argentina, India, Latvia, Lebanon, the Philippines, Senegal and Vietnam. The Project has an additional component to be executed initially in Tanzania that will develop, test and disseminate affordable non-burn health-care waste treatment technologies that can be built and serviced in sub-Saharan African countries using locally available supplies and skills.

The contaminants to be addressed by this Project are the unintentionally produced POPs listed in Annex C of the Stockholm Convention (polychlorinated dibenzo-p-dioxins, dibenzofurans, PCBs and HCB) and mercury. These contaminants are transported globally on air currents and by other means; they are toxic in small quantities; they bioaccumulate up the food chain; and they have caused documented harm to public health and the environment at locations far from the original source of their release. (In this document, the term "dioxins" is used to refer generally to unintentional POPs listed in Annex C.)

Incineration and open burning of health-care waste are the main sources of dioxins in health care, and are major modes of transport for mercury. Mercury spills and the breakage or inappropriate disposal of mercury-containing devices, such as thermometers and sphygmomanometers, are the principal ways by which mercury from health facilities enters the environment. Little data are available quantifying releases of dioxins and mercury to the environment from health-care facilities in developing countries. To address this lack of data, estimations were made during the PDF B phase of the Project regarding present levels of dioxin and mercury releases from health-care delivery and services in participating Project countries. Projections of how those releases might increase in the future in the absence of the planned interventions of this Project were also prepared. (See Annex 3)

This Project falls primarily under the GEF's POPs Focal Area (OP 14). However, the Project's mercury component falls under GEF OP 10, the Contaminants-Based Operational Program of the International Waters Portfolio.

Unintentional POPs

The component of this Project addressing unintentional POPs responds directly to concerns raised in the Stockholm Convention. Annex C of the Stockholm Convention lists medical waste incinerators within its *Part II* source category of sources with the potential for comparatively high formation and release of unintentional POPs. Annex C additionally lists the open burning of waste and the burning of landfill sites within its *Part III* source category of sources that can unintentionally form and release POPs to the environment. Under Article 5 of the Stockholm Convention, Parties are obliged to require the use of best available techniques (BAT) for new facilities within the *Part II* source category; and are obliged to promote BAT and best environmental practices (BEP) for all new and existing sources within both *Part II* and *Part III* source categories. Annex C states:

> When considering proposals to construct new waste disposal facilities, consideration should be given to alternatives such as activities to minimize the generation of municipal and health-care waste, including resource recovery, reuse, recycling, waste separation and promoting products that generate less waste. Under this approach, public health concerns should be carefully considered.

Annex C additionally states that when Parties are considering proposals to construct new facilities using processes that release unintentional POPs (e.g., waste combustion processes), "priority consideration should be given to

alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of such chemicals."

At the Third Session of the Stockholm Convention Expert Group on BAT/BEP meeting in Tokyo on 11-16 October 2004, developing countries expressed concern regarding the difficulties in meeting BAT/BEP standards with regards to health-care waste management due to lack or inadequacy of capacity and technology. Direct reference was made to this Project:

> We note with interest the Global Environment Facility (GEF)/United Nations Development Programme/World Health Organization Medical Waste Management demonstration project under development, and we encourage the GEF, its implementing agencies and others to support and rapidly initiate much more work in this area. This would be greatly facilitated by developing countries making the related BAT/BEP issues an[] important part of their National Sustainable Development Strategies.[1]

The Project will demonstrate and replicate practices to minimize the generation of health-care wastes and to utilize less toxic materials as appropriate. It will also demonstrate the effectiveness of non-burn health-care waste treatment technologies that avoid the generation of unintentional POPs. Furthermore, the Project will support: the promulgation of effective policies; the institutionalization of training programs; and the dissemination of information nationally and internationally in order to promote sustainability, wider replicability and the scaling-up of best techniques and practices.

Mercury

The mercury component of this Project is not governed by the Stockholm Convention. Mercury, however, is considered to be a persistent toxic substance and a "global contaminant" because it is transported over long distances in the environment, causes harmful disruptions to the marine environment and harms the health of people who eat contaminated aquatic and marine organisms. The GEF already identified releases of mercury to the environment as a threat to international waters when it approved the Project: "Removal of Barriers to the Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies."

Mercury is widely used in health-care practice in thermometers, blood pressure measurement instruments and other devices. Substantial releases of mercury to the environment occur as a result of breakages, spills, improper disposal and other means. The mercury component of this Project is governed by the GEF's *Contaminant-Based Operational Program* (OP 10). Under OP 10, the GEF plays a catalytic role in demonstrating ways to overcome barriers to the adoption of best practices that minimize the contamination of International Waters. Pollution prevention is stressed in this operational program.

World Health Organization policy promotes the use of alternatives to mercury-containing thermometers and other medical instruments, toward the goal of their eventual phase-out. This policy is motivated by growing recognition of both workplace and environmental hazards associated with the mining and recycling of mercury, the manufacture of instruments containing mercury, instrument breakage, spills and releases of mercury to the workplace and the environment. In many OECD countries, the implementation of this policy has begun and is well underway. On February 21, 2006, the European Commission announced a proposal to the European Parliament to ban the marketing of mercury in new fever and room thermometers, barometers and blood pressure gauges, according to a statement by Guenter Verheugen, EU Commissioner for Enterprise and Industry.[2]

In developing countries, on the other hand, where there is pressure to rapidly expand health-care services, there is also a strong corresponding tendency to increase the total number of mercury-containing instruments used in health-care practice.

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[1] Annex II, Report of the Third Session of the Expert Group on Best Available Techniques and Best Environmental Practices, UNEP/POPS/EGB.3/3, Tokyo, Japan, 16 October 2004; available from: http://www.pops.int/documents/meetings/bat_bep/3rd_session/EGB_3_finalreport/egb3report.doc

[2] See: http://today.reuters.com/news/newsArticle.aspx?type=healthNews&storyID=2006-02-21T175904Z_01_L21722096_RTRUKOC_0_US-EU-MERCURY.xml

As many health-care institutions in industrialized countries are phasing out and retiring their own mercury-containing instruments, some manufacturers of these instruments are redirecting their marketing to health institutions in developing countries. Some of the major manufacturers of these instruments are now located in developing countries. Additionally, in some cases, when health-care institutions in industrialized countries retire their old mercury-containing instruments, these instruments are donated to health-care institutions in developing countries. In the absence of programs that promote the use of mercury-free medical instruments, and without management systems to assure both the proper clean-up of breakages and spills and proper final disposal, the total amount of mercury released to the environment by health-care institutions in developing countries is growing rapidly.

The Project will demonstrate and replicate practices that can, over time, virtually eliminate the use of mercury-containing instruments in health care, thereby practically eliminating mercury releases from health-care delivery activities. It will also demonstrate and replicate interim measures to properly manage mercury spills and the disposal of broken mercury instruments, with the goal of minimizing environmental releases while also protecting worker and patient health.

The Health-Care Context

There is growing international concern about health-care wastes as a source of bloodborne pathogens.[3] This Project will effectively make the connection between health-care waste management, environmental releases of dioxins and mercury, and wider issues in the health-care sector. In order to promote best practices for health-care waste management and to minimize dioxin and mercury releases, this Project recognizes and will address the urgent and pervasive problem of the spread of bloodborne pathogens associated with improper handling and disposal of health-care wastes. The Project will also address the concerns of health providers regarding the cost and quality of health-care service delivery, particularly as related to infection control.

A significant portion of the infections arising from bloodborne pathogens may be due to needle-stick injuries that result from improperly managed health-care wastes. At the facility level, nurses and auxiliary staff are generally at the greatest risk. As health-care wastes leave the facility, waste transporters and landfill workers, waste pickers, scavengers, recyclers, children and the community as a whole are also at risk. By dealing with these concerns, the Project will address a major issue in health-care waste management and will thereby gain the support and commitment of health-care facility and health ministry personnel.

The World Health Organization's policy on safe health-care waste management recognizes the risks of improperly managed health-care waste, and calls for a long-term strategy of "effective, scaled-up promotion of non-incineration technologies for the final disposal of health-care waste to prevent the disease burden from: (a) unsafe health-care waste management; and (b) exposures to dioxins and furans." The policy paper also lists among its guiding principles WHO support for the Stockholm and Basel Conventions.

Many health professionals have only limited awareness about toxic contaminants that enter the environment. They often have less than full knowledge about the public health and environmental impacts associated with mercury pollution, and often consider burning or incineration of health-care waste, even in devices without air pollution control systems, to be a positive public health measure. Few, if any, curricula in academic training programs for physicians, nurses, health specialists and administrators cover waste management or the impacts of waste treatment choices.

However, health-care professionals are generally very receptive to information about environmental contaminants and the harm they can cause. When made aware of this environmental health threat, most health-care professionals

[3] WHO has estimated that in 2000, injections with contaminated syringes caused:

- 21 million hepatitis B virus (HBV) infections (32% of all new infections);
- Two million hepatitis C virus (HCV) infections (40% of all new infections);
- 260,000 HIV infections (5% of all new infections).

Epidemiological studies indicate that a person who experiences one needle-stick injury from a needle used on an infected source patient has risks of 30%, 1.8%, and 0.3% respectively to become infected with HBV, HCV and HIV. In 2002, the results of a WHO assessment conducted in 22 developing countries showed that the proportion of healthcare facilities that do not use proper waste disposal methods ranges from 18% to 64%.

will support alternative waste management approaches that avoid generating and/or releasing toxic pollutants to the environment, as long as these alternatives are practical and do not compromise patient safety or care. Hence, the health sector is seen as a valuable ally in awareness-raising and advocacy with regard to minimizing or eliminating releases of dioxins and mercury to the environment.

Additionally, the education of health-care professionals that will be undertaken by this Project about the adverse health effects caused by POPs and other PTS can make an important contribution toward more general efforts at awareness-raising and public education concerning POPs, as called for in Article 10 of the Stockholm Convention.

Trends in the Use of Medical Waste Incinerators

The use of medical waste incinerators (MWIs) appears to be rapidly expanding in developing countries at the same time as dedicated MWI facilities are declining and being phased out in many industrialized countries for health and environmental reasons. In 1988, for example, the number of medical waste incinerators in the United States was estimated at 6,200. By 2004, the number had dropped to 111.[4] In Canada, the number of hospital incinerators dropped from 219 in 1995 to 120 in 2000; then, following the example of the province of British Columbia, the province of Ontario phased out all of its 56 medical waste incinerators in December 2003 further dropping the number of incinerators nationwide to 56.[5] In the Czech Republic, nearly half of medical waste incinerators have shut down since 2000.[6] In the past, Ireland incinerated about half of its health-care waste in approximately 150 incinerators; today, 95% of all health-care waste is treated using non-incineration technologies.[7] Similarly, Portugal treated all of its health-care waste in 40 incinerators in 1995; by 2004, 87% of waste was treated in steam-based units with only one incinerator remaining.[8] In Germany, all 554 on-site hospital-waste incinerators existing in 1984 were completely shut down by 2002; about a thousand autoclaves are now used on-site as well as in four central treatment facilities, leaving only one central hospital-waste incinerator and two mixed-waste incinerators in the country.[9] In Poland, about a hundred of 186 MWI facilities have closed down in recent years for environmental reasons.[10]

A related trend is the increase in the amount of waste generated by health-care facilities in developing countries due to the expansion of health-care systems and services. This development, combined with increased use of disposable (single-use) items and poor segregation practices, leads to increasingly large quantities of waste being burned. In response to immediate and pressing concerns about the spread of diseases caused by exposure to health-care wastes, many developing countries have opted for the combustion or incineration of health-care waste as a disposal method. Some facilities use open burning, while others have installed combustion devices ranging from "drum incinerators" to locally-constructed incinerators with no controls. Imported small-size or mid-size incinerators that have minimal controls and inadequately controlled large incinerators for central facilities are also increasing in number. International donors and agencies, reflecting growing concerns about the spread of infectious diseases, contribute to the construction or importation of large numbers of small- or mid-sized medical waste incinerators in developing countries, and support the construction or modification of large incinerators for central facilities. However, in many cases these new or upgraded facilities may still generate and release unintentional POPs at levels considerably higher than would be permitted in most donor countries.

In most cases, the incinerators used in developing countries – classified as falling under the Stockholm Convention *Part II* source category – release significant quantities of unintentional POPs and other hazardous pollutants to the environment through gaseous emissions and ash and occasionally through wastewater. Often, imported incinerators have a limited or nonexistent market in their countries of origin because they cannot satisfy domestic regulations related to air pollution (including the release of unintentional POPs). Many developing countries have little or no capacity to measure and monitor these POPs releases. Furthermore, due to the absence of expertise to maintain and

[4] "Hospital Waste Combustion Study—Data Gathering Phase," U.S. Environmental Protection Agency, December 1988; "HMIWI Facility and Emission Inventory—English Units (draft)," U.S. Environmental Protection Agency, January 1, 2004.
[5] "Dioxin and Furan Inventories: National and Regional Emissions of PCDD/PCDF," United Nations Environment Programme, Geneva, Switzerland, May 1999; B. Sibbald, *Canadian Medical Association Journal*, 164(4), February 20, 2001; and E. Lopes and S. Rossi, *Hospital News*, February 2003.
[6] Yearbook of the Czech Ministry of Environment for 2003, issued November 2004.
[7] "Ireland to Treat Medical Waste With Non-Burn Technology," press release, Health Care Without Harm, September 4, 2003.
[8] Source: Portuguese Health Ministry, personal communication with Ms. Isabel Abreu, November 18, 2005.
[9] "ETLog EnviroTech & Logistics," ETLog GmbH, Berlin, Germany, not dated.
[10] Pawel Gluszynski, personal communication based on Ministry of Environment information, February 18, 2006.

service these incinerators, the facilities do not meet recommended operating practices that are already unacceptably low. Rising concern over the fate of health-care wastes, along with the lack of strong regulatory and enforcement mechanisms, increases the possibility that small incinerators with poor designs and inadequate pollution controls will be used. However, the trend of transferring obsolete technologies is no longer an acceptable framework for developing countries.

Without this Project, both the amount of health-care waste generated and the amount of health-care waste combusted in dedicated medical waste incinerators (uncontrolled combustion units in many cases) will rapidly increase in participating countries, and environmental releases of unintentional POPs will rise correspondingly.

Threats, Root Causes and Barriers Analysis

The problem analysis tree in Figure 1 identifies the root causes of the problems and cause-and-effect relationships between different levels of challenges at the interface of health-care waste management and environmental issues. It begins with an existing undesirable situation: in a "business as usual" scenario, harm to the global environment from POPs and PTS pollution including cases of cancer, developmental disorders and other adverse health effects will increase as a result of greater releases of dioxins and mercury into the global environment from the health sector. These problems are inextricably linked to the spread of infectious diseases and occupational and environmental health impacts from exposures to biological and chemical hazards due to improper handling and disposal of health-care waste.

Several factors have been identified during the PDF B phase of this Project as underlying causes of the problems shown in Figure 1. Firstly, there is a general lack of awareness about the environmental health impacts of dioxins and mercury, and about the fact that inappropriate handling and disposal of health-care waste are significant sources of dioxin and mercury releases to the global environment.

Secondly, there is a general lack of knowledge about possible solutions and a misperception that there are no viable alternatives to the "business as usual" scenario. This includes a lack of background knowledge and technical capacity for implementing and sustaining pollution-prevention measures, waste minimization and segregation practices, and other elements of improved health-care waste management. The same is true with respect to mercury waste management. There is a lack of knowledge of, or access to, appropriate technologies, especially mercury-free devices and non-burn treatment technologies that do not generate dioxins. African countries, in particular, urgently need treatment technologies that are affordable, can be manufactured and serviced locally, require low-cost energy inputs, and are appropriate to conditions in urban and rural areas, including the need to operate at locations that may lack electricity and other utilities.

Thirdly, in many of these countries the foundations for institutionalizing and sustaining best techniques and practices for health-care waste management nationwide are often weak or nonexistent. Awareness-raising materials, technical information, toolkits and other resources in languages appropriate to different types of health workers are seldom available. Many countries have inadequate or no training programs at the local and national levels. Health-care waste management policies, guidelines and implementation plans are often ineffective or may not exist, as a low priority is placed on health-care waste management, and insufficient or no funds are allocated for this purpose. It should be noted that these problems are common and widespread among developing countries and countries with economies in transition.

A detailed analysis of barriers was conducted during the PDF B phase of this Project and the results are summarized in Table 7.

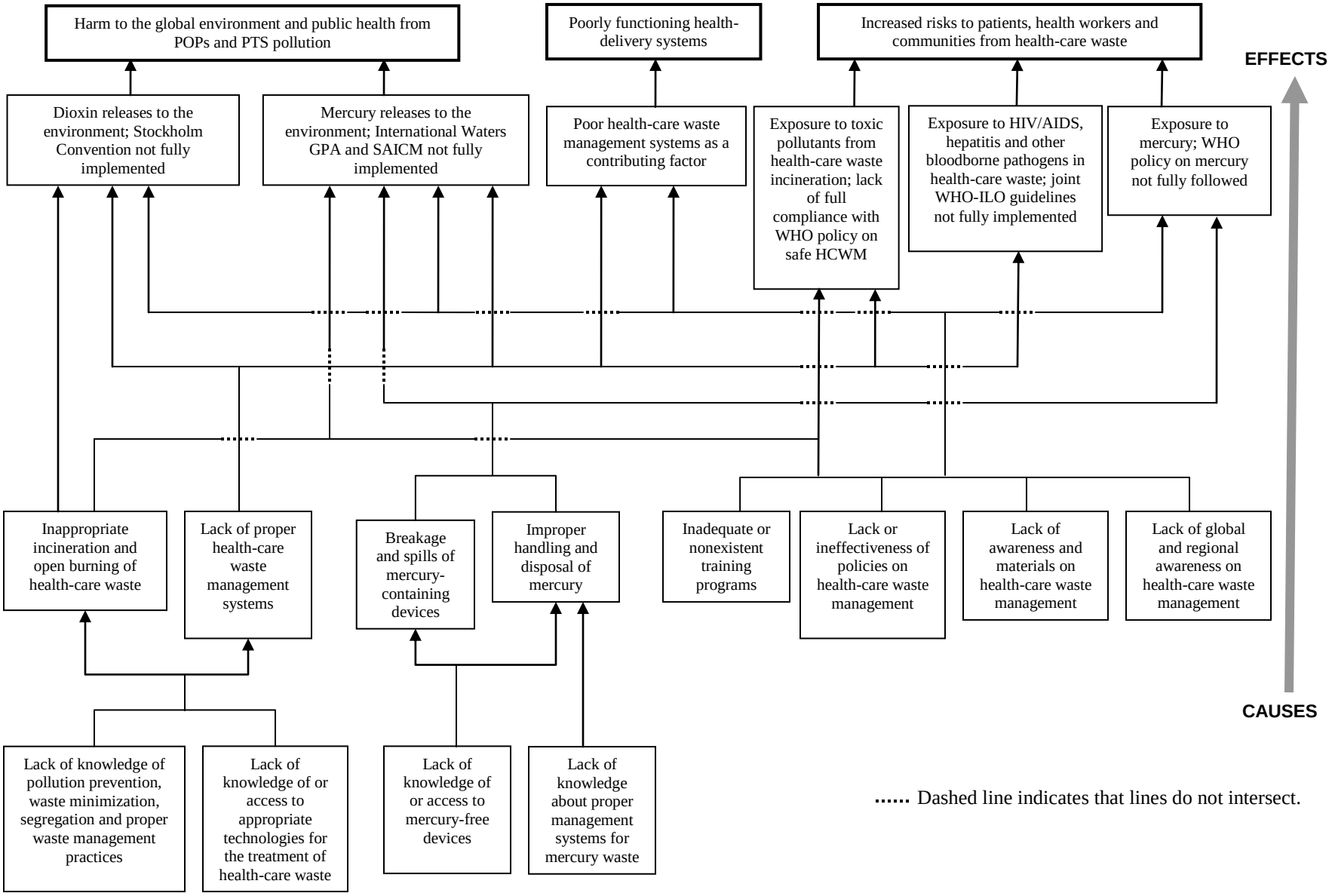


Figure 1. Problem Analysis Tree to Indicate Cause-Effect Relationships for Challenges Faced

Institutional, Sectoral and Policy Context

Relevant national laws and regulations in each participating country are described in detail in Annex 2. In all countries, laws or regulations that deal with the management of health-care waste either exist or are currently being drafted. Regulatory authority is generally vested on the ministries of health and/or the ministries of environment. Some regulations or guidelines provide detailed requirements for segregation, handling, storage, transport, and treatment, while others have minimal provisions. Compliance with regulations or guidelines by many health-care facilities remains a problem in all countries. Few regulations or guidelines promote waste minimization and pollution prevention. With regards to treatment, regulations or guidelines in some countries specify incineration as the preferred treatment option. The Philippines, Argentina and India have total or partial bans on medical waste incineration or limitations on the types of waste that can be burned. In these countries, both civil society and government authorities are concerned with dioxin releases. However, health-care facilities in the three countries face some difficulties in deploying non-incineration alternatives. Thus far, no participating country has laws dealing with mercury from health-care waste. All countries have ratified the Stockholm Convention.

The general trend in participating Project countries, as outlined in the *Baseline analysis* below, is growth in the total quantity of wastes that are generated by health-care activities and the combustion of increasingly large quantities of health-care waste by open burning and in poorly performing incinerators. Growing concerns about the spread of HIV, hepatitis and other infectious disease as a result of needle-stick injuries and other forms of contagion from infectious wastes has created an imperative on the part of WHO, national health ministries and donor agencies to promote systematic efforts to treat all potentially-infectious wastes. At the time this Project was entered into the GEF pipeline, the main emphasis in most developing countries and countries with economies in transition was to promote the combustion of infectious wastes in controlled incinerators where possible, but by open burning and locally built burners if necessary.

This Project will also demonstrate the effective removal of barriers to pollution-prevention approaches aimed at minimizing mercury releases to the environment from health-care activities. At present, mercury-containing thermometers, blood pressure cuffs and other medical devices are in widespread use. At the time the Project was entered into the GEF pipeline, few developing countries or countries with economies in transition – and none of the participating Project countries – had programs or policies in place to reduce mercury releases from health-care facilities. In August 2005, WHO adopted a policy[11] on mercury in health care that promotes the proper clean-up, handling and storage of mercury wastes in health-care settings, encourages the use of mercury-free medical devices, and supports an eventual ban on the use of mercury-containing medical devices. This Project will provide one of the first opportunities to demonstrate the implementation of the new WHO mercury policy in the developing and transition country setting.

Stakeholder Analysis

Stakeholder participation is essential to the full success of this Project. In each participating country, a wide range of stakeholders has been identified and engaged in the various design meetings and processes to produce the final Project document. In particular, the active cooperation and participation of the health-care sector is central to the Project's success. To achieve this, participation has been actively solicited at the national level from the Ministry of Health and national associations of hospitals, doctors, nurses and allied professions. Participation has been solicited at the facility level from administrative and professional staff, auxiliary staff and maintenance personnel. To fully achieve cooperation and buy-in, the Project's global environmental objectives have been linked to the dominant concerns of health providers, namely, improvement of the quality and effectiveness of the delivery of health services more broadly. Thus, it has been emphasized that best practices for health-care waste management also improve infection control and occupational safety and reduce nosocomial infections, and that the experience in many health-care facilities has shown that proper health-care waste management and minimization can reduce the overall cost of health-care delivery.

It should be noted that specific plans to maintain stakeholder participation through and beyond the Project period will be discussed as part of Project replicability and will not be repeated here. Table 18 provides an analysis of

[11] "Mercury in health care," policy paper, World Health Organization, Geneva, August 2005.

stakeholder participation and involvement, and Tables 17a – g lists specific stakeholders who have been involved and who are expected to continue to actively engage in the Project during full implementation.

The visual representation of formal stakeholder engagement in the Project is displayed in Figure 4, which is an organogram of management arrangements. This diagram shows the coordinated arrangements for stakeholder participation through the National Working Groups (NWGs), the National Project Steering Committees (NPSCs), the Global Project Steering Committee (GPSC) and the roles of the Global Expert Team (GET) and the National Consultants (NCs).

National Consultants play a critical role in coordinating and encouraging the flow of information and participation, especially of the NWG and NPSC. They work directly with the GET to channel assistance, to draw on the GET's technical expertise and to build and maintain networks that enhance stakeholder efforts. A key attribute of national consultants will be their ability to effectively engage stakeholders and coordinate their activities to be effective and appropriate in supporting the Project activities and goals. This is written into the Terms of Reference as a qualification for the national consultants.

The Project's success centers on the building of successful local models and translating that experience to other levels. The responsibility to accomplish this lies in the hands of stakeholders at the local and national levels who must cooperate and keep channels of communication open. Each level of stakeholder has a distinct role; the responsibility to build successful local models is solidly in the hands of local stakeholders, and the responsibility to "nationalize" that success rests squarely with national stakeholder partners who must be fully engaged and prepared to utilize the local results. Because of this, the project management arrangements were devised to ensure a constant two-way flow of information and support that is appropriate to each situation. These arrangements will provide appropriate connections to national and global expertise for local-level work, and will facilitate communicating local-level efforts to the national and international stakeholders. The local results are designed to contribute to an evidence-based body of information that will enable national stakeholders to confidently incorporate this information into national policy and decision-making.

Baseline Analysis

The baseline is a description of the present situation in participating Project countries and a projection of the expected trends in the absence of the interventions that this Project plans to undertake with support from the GEF. (See Annex 3 for a more detailed baseline analysis.)

The general trend in Project countries and elsewhere is growth in the total quantity of wastes that are generated by health-care activities. This growth is due to a significant increase in total health-care services delivered, as well as an increase in packaging and in the utilization of one-time use items. Another factor is the health requirement that all wastes that have come into contact with infectious materials must be treated as infectious wastes. Since most health-care facilities do not adequately segregate infectious or hazardous waste from ordinary domestic waste, the total quantity of waste classified as infectious and thus needing treatment is greater than would be expected from the increase in health-care waste alone.

Growing concerns about the spread of HIV, hepatitis and other infectious disease as a result of needle-stick injuries and other forms of contagion from infectious wastes have created an imperative on the part of WHO, national health ministries and donor agencies to promote systematic efforts to treat all potentially-infectious wastes. At the time this Project was entered into the GEF pipeline, the main emphasis in most developing countries and countries with economies in transition was to promote the combustion of infectious wastes in controlled incinerators where possible, but by open burning and locally built burners if necessary. This approach will lead to rapid increases in the combustion of health-care wastes under uncontrolled or poorly controlled conditions. In August 2004, the WHO policy[12] on safe health-care waste management recommended scaled-up promotion of effective non-incineration technologies as a long-term strategy. Meeting the provisions of the Stockholm Convention was among the reasons cited for this policy position.

[12] "Safe health-care waste management," policy paper, World Health Organization, Geneva, August 2004.

Even so, pressure to expand the burning and incineration of health-care wastes continues because of widespread insufficient understanding of the availability and efficacy of alternative approaches. The baseline, therefore, is a growing trend in developing and transition countries toward the combustion of increasingly large quantities of health-care waste by open burning and in poorly performing incinerators. This, in turn, increases the total generation and release of unintentional POPs to the global environment. In the absence of the outcomes and results to be demonstrated by this Project, this trend will continue and poses significant risks to human health and the environment.

The general trend outlined above also describes the situation in participating Project countries. As mentioned earlier, in some of these countries, notably Argentina, India and the Philippines, both civil society and government authorities are beginning to disfavor the incineration of health-care wastes. Their efforts are motivated in large part by concerns about dioxin releases – concerns that arose in the context of the negotiation of the Stockholm Convention. (These early efforts are also an important reason these countries were chosen to participate in the Project.) In all three countries, non-governmental organizations (NGOs) and civil society groups have cooperated with health-care institutions to assist their efforts to move away from use of incineration while still ensuring quality patient care and infection control. Nonetheless, health-care systems in all three countries continue to struggle in their efforts to move away from health-care waste incineration. In the absence of interventions such as those planned by this Project, the decisions made in those countries to move away from the incineration of health-care wastes would be difficult or impossible to sustain.

This Project will also demonstrate the effective removal of barriers to pollution-prevention approaches aimed at minimizing mercury releases to the environment from health-care activities. At present, mercury-containing thermometers, blood pressure cuffs and other medical devices are in widespread use. At the time the Project was entered into the GEF pipeline, few developing countries or countries with economies in transition – and none of the participating Project countries – had programs or policies in place to reduce mercury releases from health-care facilities. In August 2005, WHO adopted a policy[13] on mercury in health care that promotes the proper clean-up, handling and storage of mercury wastes in health-care settings, encourages the use of mercury-free medical devices, and supports an eventual ban on the use of mercury-containing medical devices. This Project will provide one of the first opportunities to demonstrate the implementation of the new WHO mercury policy in the developing and transition country setting.

PART II: STRATEGY

Project Rationale and Policy Conformity

This Project presents the GEF with a strategic opportunity to effectively reduce the transport of dioxins and mercury from the health sector to the global environment. It will accomplish this by demonstrating practices and technologies that limit the amount of health-care waste generated, eliminate the burning of health-care waste and reduce the quantity of broken mercury-containing devices improperly handled, discarded or burned. The Project will demonstrate an Alternative Systems Approach toward improving waste management, an important aspect of health-care delivery systems. In doing so, the Project will not only address the problem of global contaminants, but also the issue of poorly functioning health delivery systems and the risks that stem from exposures to toxic byproducts of health-care waste incineration and mercury disposal, and to blood-borne pathogens in health-care waste.

The Project objective is to demonstrate and promote best practices and techniques for health-care waste management. The rationale for the Project is based primarily on the Stockholm Convention, which encourages and gives priority consideration to the promotion of alternative processes, techniques and practices with similar usefulness over the construction and use of medical waste incinerators, thereby avoiding the formation and release of unintentional POPs. The Convention also suggests consideration of resource recovery, reuse, recycling, waste separation and the promotion of products that generate less waste, while cautioning that under this approach "public health concerns should be carefully considered."[14]

[13] "Mercury in health care," policy paper, World Health Organization, Geneva, August 2005.
[14] See Annex C, Part V A (f) of the Stockholm Convention.

The Project will demonstrate this approach in seven countries at different stages of development, in different regions and working in different UN languages. Additionally, the Project will demonstrate effective minimization of mercury releases to the environment resulting from health-care practice. This Project component is a barrier-reduction effort aimed at protecting International Waters from contamination by persistent toxic substances, as described in the GEF OP 10.

The Project supports objectives of the Strategic Approach to International Chemicals Management (SAICM) and can be considered an application of Paragraph 3 of the *Instrument for the Establishment of the Restructured Global Environment Facility,* which states: "The agreed incremental costs of activities to achieve global environmental benefits concerning chemicals management as they relate to the above focal areas [e.g. international waters and POPs] shall be eligible for funding."

This Project is primarily within the GEF's Operational Program on Persistent Organic Pollutants (OP 14). Project activities that are consistent with GEF-eligible activities under OP 14 include: building health-care waste management capabilities; strengthening policy and regulatory frameworks; strengthening monitoring capacity; developing capacity to assess technologies and management practices; developing and implementing public awareness, information and environmental education programs; facilitating dissemination of experiences and lessons learned and promoting information exchange; promoting access to, and the transfer of, clean and environmentally sound alternative technologies; and demonstrating viable and cost-effective alternatives to the processes and practices that lead to the release of POPs.

The Project's mercury component falls within GEF OP 10, the Contaminants-Based Operational Program of the International Waters Focal Area. The Operational Program supports demonstration activities that prevent or reduce releases of mercury, in particular targeting technical demonstration and capacity-building projects that help raise awareness and encourage use of best practices and the formulation of policies for innovative institutional approaches.

In addition to being consistent with the objectives and strategies of these global bodies, the Project will meet real needs in each of the participating countries in the improvement of health-care and environmental practices. Additionally, it will demonstrate approaches, practices and techniques for widespread dissemination and adoption in Project countries, and for scaling up to the regional and global levels.

Project Goal, Objective, Outcomes and Outputs/Activities

The overall Project objectives are to demonstrate and promote best techniques and practices for health-care waste management, thereby minimizing health-care waste and reducing or eliminating releases of dioxins and mercury into the environment. The Project aims to demonstrate the applicability of global best techniques and practices in seven countries in the world's five development regions, and also aims to lay the groundwork for sustainability and replicability beyond the model facilities and the Project countries. It aims to accomplish this last goal by establishing or enhancing national training programs, pursuing policy reform, developing replication toolkits and awareness-raising materials and disseminating these materials nationally and internationally.

Table 6 outlines the logical framework (log-frame) for the overall Project strategy. In order to achieve the objectives listed in the log-frame analysis, the Project will undertake activities under the following major components:

1. Establish model facilities and programs to exemplify best practices in health-care waste management, and develop materials to facilitate replication.
2. Deploy and evaluate commercially-available, non-incineration health-care waste treatment technologies appropriate to the needs of the facility or cluster.
3. Develop, test, manufacture and deploy affordable, small-scale non-incineration technologies for appropriate use in small- and medium-size facilities in sub-Saharan Africa, and prepare and disseminate manuals for their manufacture, installation, operation, maintenance and repair.
4. Introduce mercury-free devices in model facilities, evaluate their acceptability and efficacy, and develop and disseminate awareness-raising and educational materials related to mercury.
5. Establish or enhance training programs to build capacity for implementation of best practices and appropriate technologies beyond the model facilities and programs.

6. Review relevant national policies, seek agreement by relevant authorities on recommended updates or reformulations if needed, seek agreement on an implementation plan, and if appropriate, assist in holding a policy review conference for these purposes.
7. Distribute Project results on best techniques and practices to relevant stakeholders, disseminate materials and hold conferences or workshops to encourage replication.
8. Make Project results on demonstrated best techniques and practices available for dissemination and scaling-up regionally and globally.

Table 7 presents the specific activities under each of these main components including the national training programs. Country-specific descriptions providing information about the model facilities or programs, and the types of alternative treatment technologies to be deployed are given in Tables 1 and 2.

The Project is scheduled to be completed in four years, with the bulk of the work completed within three years. Tables 9 and 10 provide the timeline of activities. Fourth year activities include a continuation of monitoring and evaluation, final formal reviews by the National Project Steering Committees and National Working Groups, long-term monitoring of installed technologies, public awareness campaigns and dissemination of Project results, and activities to support the sustainability of the training programs.

In summary, the Project reduces barriers to the implementation of the Stockholm Convention on POPs, the Strategic Approach to International Chemicals Management, the International Waters Global Programme of Action, and the World Health Organization's policies on safe health-care waste management and on mercury in health care. An ancillary benefit of this work is the improvement of health-delivery systems through the fostering of good health-care waste management practices, thereby supporting the prerequisites for achieving the Millennium Development Goals. The project's ultimate goal is the protection of the global environment and public health, as well as patients, health-care workers, and communities., from the impacts of dioxin and mercury releases.

During the PDF B, consultations were undertaken with stakeholders including representatives of the public and private sectors, health professionals and other relevant groups within civil society at local, national and global levels. These have identified technical needs and provided open discussion of assumptions, potential risks and barriers to success. The participating countries (except Tanzania) have already created National Project Steering Committees and National Working Groups to facilitate Project implementation, and have effective ownership of the Project. The full involvement of stakeholders, supported by the creation and improvement of education and training systems, will help to ensure that the adoption of best health-care waste management practices and technologies achieved by the Project will be sustained and replicated after the Project is completed. In addition to each country's National Project Steering Committee and National Working Group, Project participation will also be facilitated through the Global Project Steering Committee (GPSC), the Global Expert Team (GET) and the National Consultants (NCs). Working collaboratively, these groups are tasked with identifying and solving any Project difficulties and ensuring institutionalization of the Project's gains.

The methods used during the Project will be replicable in other projects and other areas. The model of fostering local and national "champions" to ensure the sustainability and replicability of Project achievements long after official completion is one example of the Project's replicable methods. It should be noted that the Project is not an investment project to reduce nationwide releases of POPs, but rather is intended to demonstrate barrier-reduction leading to replication of best environmental practices and technologies in facilities nationwide. While facility-level implementation will result in reductions of dioxins and furans at the local level, the widespread replication and sustainability of these practices and techniques, through barrier-reduction strategies such as national training programs and information dissemination, have the potential of producing even greater decreases in dioxin and furan releases nationwide. For a full discussion of the Project's sustainability and replicability plans at the local, national, and global levels, please refer to the sections on Sustainability and Replicability in Section 1: Part II of this document.

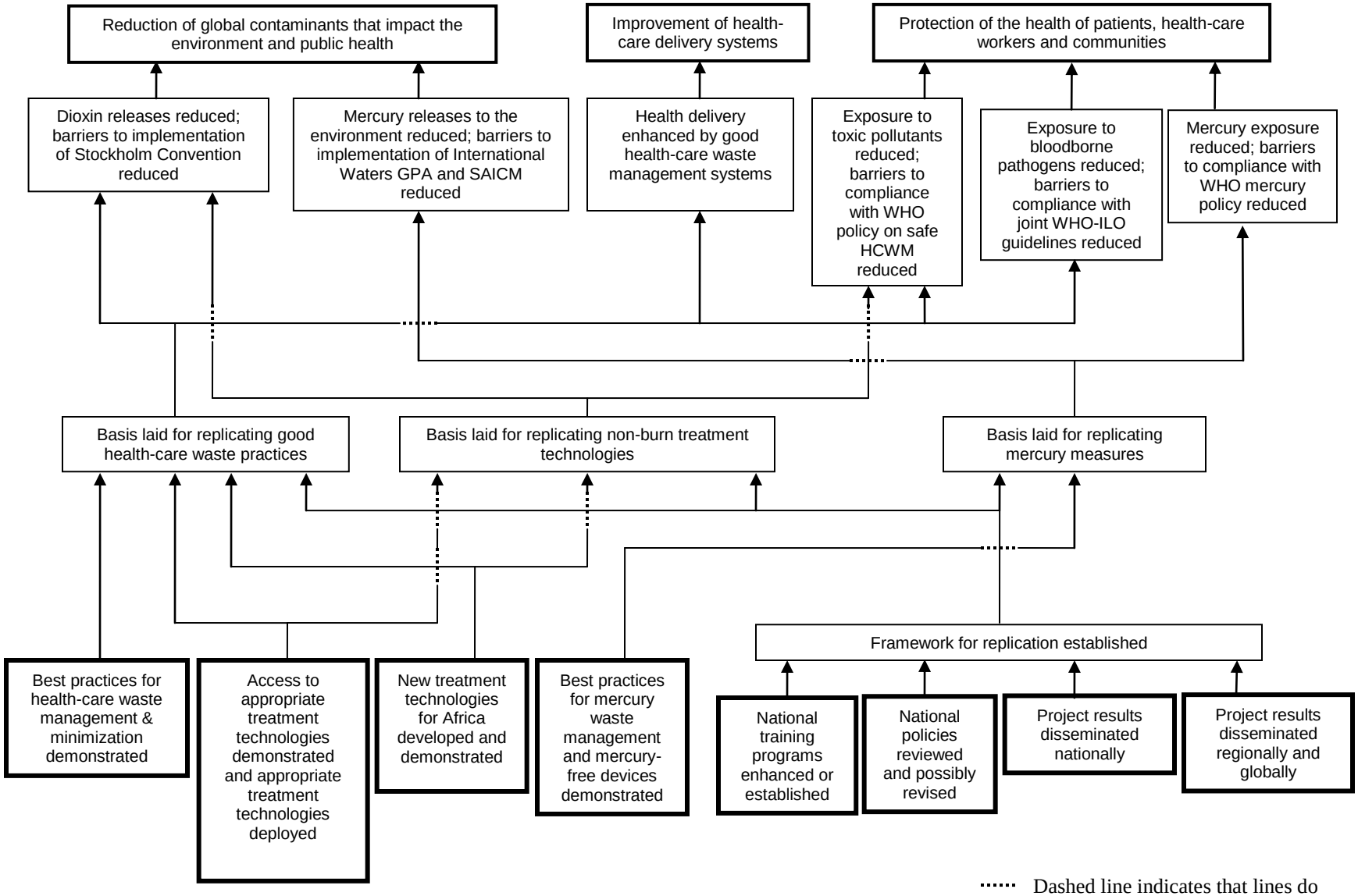


Figure 2. Solutions and Objectives Analysis Tree

Alternative Systems Approach

The problems in health-care waste management stem from a failure of both practice and technology. Adverse environmental and public health impacts of health-care waste management can be traced to both improper practices and use of environmentally unsound technologies. Lack of segregation, unsafe handling of waste, dumping of untreated waste, preferential procurement of toxic products, extensive use of disposable materials, inadequate procedures for clean-up and containment of spills, weak inventory controls of time-sensitive pharmaceuticals and reagents, and inappropriate classification of non-infectious waste as bio-hazardous waste are examples of poor practices that lead to high rates of health-care waste generation in health facilities. Attempts to solve the challenge of infectious waste disposal through burning and incineration have been less than fully satisfactory in many developing countries, even without considering the serious problems of dioxin formation and release. In many cases, the incinerators of choice: cause objectionable smoke and odors; break down frequently; are difficult to properly operate and maintain; produce toxic ash; and discourage efforts at segregation, recycling and waste minimization. The solution, therefore, must address both the practices and technologies used.

There is a growing understanding that proper treatment of infectious health-care waste must be part of a facility-wide systems approach to waste management. At the level of "on the ground" intervention, the approach must involve institutionalizing best environmental practices at health-care facilities in order to minimize the production of health-care waste. In addition, the systems approach entails the use of appropriate technologies that do not involve combustion of health-care waste. Together these components comprise an Alternative Systems Approach to health-care waste management that can effectively reduce and ultimately eliminate releases of dioxins and mercury. The Project's systems approach to health-care waste management will fully integrate the Project's global environmental objectives into more immediate efforts to improve the performance of health-care delivery systems and protect worker health and safety.

In general, good health-care waste management practices include all of the following components: pollution prevention; waste minimization; correct classification and segregation; proper containerization and color-coding; safe handling and collection of waste; labeling and signage; and proper storage, transport and final disposal of waste. Priority in this Project will be given to pollution prevention and waste minimization, the latter entailing environmentally preferable procurement practices, source reduction, material substitution, safe reuse, recycling and composting of waste where possible.

Hazardous health-care wastes (infectious, chemical and radiological wastes) typically comprise about 15% or less of the total waste generated by health-care facilities. A system of rigorous segregation as well as pollution prevention and waste minimization can greatly reduce the amount of waste that requires special treatment. Achieving this requires transforming a health-care facility through: changes in administrative policy; the development, with stakeholder participation, of effective plans with clear definitions of roles and responsibilities; followed by consistent and effective implementation of the agreed plan. Regular training at all levels of the facility and motivational programs to promote process change are of paramount importance. Monitoring, periodic evaluation, continuous program improvements and full consideration of occupational safety and personal protection are essential.

Many of the best practices used to minimize or eliminate dioxin releases are similar to those required for minimizing or eliminating mercury releases. Specifically, mercury waste management requires the development of a mercury reduction plan that considers critical opportunities for material substitution, training, spill response and recovery, personal protection, segregation, containment, long-term engineered storage and encapsulation or amalgamation.

Environmentally sound technologies are the other critical part of the Alternative Systems Approach. Alternative technologies suitable for the treatment of health-care waste include the following: autoclaves or retorts, with or without shredders to reduce waste volume and render health-care waste unrecognizable; advanced steam systems such as rotating autoclaves, combined pressurized steam-internal shredding units, hydroclaves, etc.; microwave systems; and alkaline hydrolysis to decompose tissues, anatomical and animal wastes, and possibly chemotherapeutic waste. (A brief description of these technologies is provided in Annex 4.) These technologies are well-established and have been in operation for at least a decade, or many decades in the case of standard autoclaves. They effectively decontaminate waste, but do so below temperatures at which combustion and dioxin formation take place. A number of other alternative technologies, such as chemical disinfection systems using

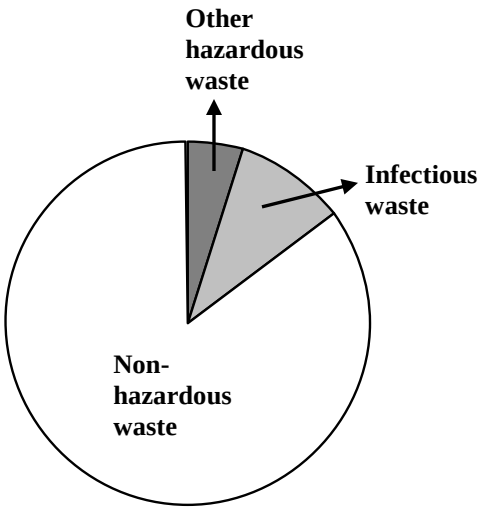
chlorine and emerging technologies such as irradiation and plasma pyrolysis, raise occupational safety or environmental issues including dioxin formation and are not considered in this Project.

Alternative technologies must be capable of meeting international standards on microbial inactivation, be easy to operate and maintain, and be affordable enough to gain acceptance by health facilities. Possible low-cost designs for resource-limited areas include locally made, small- to medium-scale pressure containers using electricity, gas, solar or other local fuels, as well as small manual and electrical shredders. These appropriate technologies will be developed for Africa as part of the Project.

Mercury-free technologies include digital, glass alcohol, galinstan and tympanic thermometers, as well as aneroid sphygmomanometers. Mercury-containing medical preservatives, fixatives and reagents can also be replaced with mercury-free substitutes that are now commercially available. As the demand for mercury-free products increases, the cost of these devices and mercury-free formulations will continue to decrease.

The overall approach of the Project is to demonstrate best techniques and practices by developing model facilities in seven countries, and to transfer knowledge and build technical capacity in the process. The countries participating in the Project involve different regions of the world, four of the six official UN languages and a range of income and indebtedness classifications. Furthermore, the selected model facilities and technologies represent a range of scenarios that demonstrate the general applicability of the Project's basic approach to a diverse set of global conditions, as shown in Tables 1 and 2.

As shown in Figure 2, the Project will cover the universe of health-care waste at the facility level with regards to minimization, segregation, storage, etc. For non-risk wastes, the Project at the facility level will also cover recovery, reuse, recycling and disposal as appropriate. For infectious waste, the Project will include alternative treatment and disposal. For chemotherapeutic waste, an alternative technology will be tested and demonstrated in Argentina. Treatment and disposal of hazardous chemical waste will depend on existing laws and the available infrastructure.



Non-hazardous waste			Infectious waste	Other hazardous waste	
Recyclable waste: Paper, cardboard, glass, aluminum, wood, plastics, etc.	**Compostable waste:** Kitchen waste, yard waste, other organic waste	**Non-recyclable municipal waste:** Other general waste that is not easily recyclable	**Bio-hazardous waste:** Sharps, materials contaminated with blood and bodily fluids, pathological waste, cultures and stocks, etc.	**Chemical waste:** Mercury, chemotherapeutic waste, laboratory solvents, expired drugs, cleaning and maintenance chemicals, etc.	**Radioactive waste:** Labeled compounds, nuclear medicine waste, etc.
Best management practices			**Best management Practices**	**Best management practices**	
Waste minimization, environmentally preferable purchasing, source reduction, sorting, segregation, storage, collection, materials recovery, recycling, reuse, composting or vermiculture (if appropriate), disposal, etc.			Minimization, classification, containerization, segregation, collection, color-coding, labeling, safe handling, storage, on-site and/or off-site transport, on- or off-site alternative treatment, disposal, etc.	Minimization, inventory control, environmentally preferable purchasing, material substitution, segregation, safe handling, storage, solvent recovery, transport, etc. For mercury: spill kits, containment, storage, etc. For Argentina: on-site alternative treatment for chemotherapeutic waste	Minimization, containerization, segregation, labeling, safe handling, decay in storage, monitoring, etc.

Figure 3. Types of Health-Care Waste and Best Management Practices

Table 1. Model Facilities

	Medium to large model hospital in a region/state/province; urban and rural model clusters serviced by a central facility in a region/state/province	City-wide model program in multiple medical facilities	Medium to large urban model hospitals	Small to medium rural model hospitals	Cluster of rural model hospitals, clinics and health centers
Argentina					
India					
Latvia					
Lebanon					
Philippines					
Senegal					
Vietnam					

Table 2. Treatment Technologies to be Demonstrated

Country	Technology (size)	Treatment scenario
Argentina	Autoclave (medium)	Rural hospital
	Alkaline hydrolysis	Research institute
India	Autoclave (medium)	Urban hospital
Latvia*	Advanced steam system: rotating autoclave (large)	Central treatment facility
	Microwave (small)	Provincial hospital
Lebanon*	Advanced steam system: combined stream-internal shredding unit (medium)	Mobile system
	Advanced steam system: combined stream-internal shredding unit (medium)	Urban hospital
	Advanced steam system: hydroclave (large)	Central treatment facility
Philippines	Autoclave and shredder (medium)	Urban hospital
	Autoclave and shredder (medium)	Rural hospital
Senegal	Autoclave (medium)	Urban hospital
	Autoclave (small, low-cost)	Small hospital and clinic (Senegal and Tanzania)
Vietnam	Autoclave and shredder (large)	Central treatment facility

**Technologies have been or will be purchased with non-Project funds but will be incorporated into Project activities.*

As these models are being developed at the facility, city and/or provincial levels within each country, an essential aspect of the overall approach entails laying the foundations for sustainability, replicability and scaling-up at the national level. The activities include the following: reviewing relevant national policies and seeking agreement by relevant authorities on policy changes and implementation plans, if needed; enhancing national training programs; developing toolkits for transforming health-care facilities; and disseminating results of the Project nationwide. These solutions are summarized in the "Solutions and Objectives Analysis Tree" in Figure 2.

Project Indicators, Risks and Assumptions

The Logical Framework Matrix in Table 6 provides a detailed list of *performance* and *impact* indicators for project implementation along with their corresponding *means of verification*. The overall Project objectives seek to demonstrate and promote best techniques and practices for health-care waste management, thereby minimizing health-care waste and reducing or eliminating releases of dioxins and mercury to the environment. This will be achieved by demonstrating the applicability of global best techniques and practices in seven countries in the world's five development regions. Barriers to national implementation of best environmental practices and techniques will be reduced by establishing model facilities and focused programs based on national considerations. If replicated

nationally and sustained, best practices and techniques initiated during the Project's implementation are expected to reduce the release of an estimated 187 g TEQ of dioxins[15] and 2,910 kg of mercury[16] to the environment each year from participating countries' health-care sectors,[17] while demonstrating approaches that are more broadly replicable, and therefore possess important future scale-up potential. With respect to this last goal, the Project will establish or enhance national training programs, pursue policy reform, develop replication toolkits and awareness-raising materials, and disseminate these materials nationally and internationally.

Achievement of the goals and outcomes of all elements of the Project is based on the assumption that participating countries will maintain political and social stability over the course of the Project period. While social and political changes are expected, the Project design assumes minimal disruption to the Project timeline and activities.

In addition, the success of establishing model facilities and programs exemplifying best practices in health-care waste management will rely on full buy-in and cooperation from the health-care sector in the face of urgent competing priorities and demands.

The Project also assumes that commercially-available alternative health-care waste treatment technologies that are appropriate to the needs of each model facility or cluster could be purchased, deployed and evaluated within the budget parameters (except for some facilities in Africa where research on lower-cost alternatives will be undertaken). It should be noted that generally, the costs associated with alternative technologies have been declining; however, for Project purposes, some technologies may need to be imported, and additional associated costs are less certain.

The Project component related to the development and manufacture of affordable, small-scale alternative health-care waste treatment technologies will rely on identifying and enlisting locally available skills and materials necessary to build and repair these technologies. Technologies will need to be developed within reasonable bounds of cost and affordability for use in small- and medium-size facilities under conditions that prevail in much of sub-Saharan Africa.

Likewise, affordable mercury-free devices for use in model facilities must remain within budget, since cost will be a large part of determining device acceptability. It is expected that device efficacy will need to be evaluated in each country, and appropriate products will have to be selected based on local experience. Political, economic and professional conditions must support the acquisition and use of mercury-free devices in a way that allows them to become part of a best practices package. Parallel political and economic support for the safe handling and disposal of phased-out mercury devices will also be important.

Project outcomes will be the basis for establishing effective national training programs for the health-care and related sectors; this component presents further risks and assumptions. Most importantly, training institutions must be capable of targeting the most appropriate personnel in non-Project facilities in order to implement systems of the kind demonstrated by the Project and effectively utilize the skills the training program is designed to impart. Because the success of the training programs will determine the overall ability of the Project to replicate itself, the selection of the most appropriate institutions to administer these programs is vital to the overall success of the Project.

Further, to solidify the Project's gains, participating countries must be willing to undertake a policy review aimed at possible reformulations and/or updates to their policy instruments. This policy component is crucial to the institutionalization of the Project's gains, as general government support and encouragement are not, by themselves, sufficient for securing broad and sustained replication. The success of this component will rely on the willing

[15] Dioxin baseline data were obtained for five of the seven countries. The total estimated dioxin releases from the five countries amount to approximately 187 g TEQ per year.

[16] Mercury baseline estimates were obtained using total beds in all the countries (and only 6 states in India where data were available) and an emission factor of 2.8 g mercury per bed per year from both thermometers and sphygmomanometers. The total estimated amount of mercury released from the seven countries' health-care sectors amounts to approximately 2910 kg per year.

[17] This will be accomplished by minimizing the amount of health-care waste generated, limiting the amount of waste burned in medical waste incinerators and by reducing the quantity of broken mercury-containing devices improperly discarded or burned.

cooperation of administrative, legislative and policy units of government; leadership at all levels – from the national, to the state/region/province, to the facility level – must be able and willing to engage in these efforts. In addition to the development of appropriate supporting policy instruments, human and economic resources must also be sufficiently available to engage in these activities in light of other important health-care priorities.

Global and regional dissemination of Project results will not be sufficient to globally reform health-care waste management practices. It is assumed, however, that demonstration results in the Project countries will provide a framework that will help inform interventions that may be instituted in other countries.

Expected Global, National and Local Benefits

As a result of this Project, reductions in dioxin and mercury releases on all levels will have been achieved that would not otherwise have been possible. If replicated nationally and sustained, best practices and techniques initiated locally during the Project's implementation are expected to reduce the release of an estimated 187 g TEQ of dioxins[18] and 2,910 kg of mercury[19] to the environment each year from participating countries' health-care sectors.[20] Additionally, appropriate and affordable health-care waste treatment technologies will be available for use in sub-Saharan Africa that would not otherwise have been available.

The Project's Alternative Systems Approach to health-care waste management will fully integrate the Project's global environmental objectives into more immediate efforts to improve the performance of health-care delivery systems, protect worker health and safety, and support the adoption of alternative technologies suitable for the treatment of health-care waste that effectively decontaminate waste, but do so below temperatures at which combustion and dioxin formation take place. On the national and local levels, as a result of this Project, a more consistent and coherent approach to the implementation of best practices for health-care waste management will be in place in seven countries where this otherwise would have been impossible. The Project will create models and experiences that can then be taken into account by health-care institutions, governments, stakeholders and funding agencies in developing future Projects and interventions.

Finally, in virtually each and every case, despite Stockholm Convention obligations and in the absence of the Project, the baseline would be the generation of substantially larger quantities of health-care waste by the facilities to be targeted, and as a result, a substantially higher level of combustion of those wastes by open burning, uncontrolled burners or inadequately controlled incinerators. GEF intervention will lay the basis for replication measures that serve to meet country obligations under the Convention with respect to requirements/promotion of Best Available Techniques and Best Environmental Practices for Medical Waste Incinerators and thereby, meet the objectives of Annex C which, in addressing *General prevention measures relating to both best available techniques and best environmental practices*[21] states: "Priority should be given to the consideration of approaches to prevent the formation and release of [unintentional POPs]."

Table 4 contains an Incremental Cost Analysis with a more detailed breakdown of the global, national, and local benefits expected as a result of this Project.

Country Ownership: Country Eligibility and Country Drivenness

The nature of this effort is a global demonstration project. As a result, the Project brought together a diverse set of countries through its PDF A and PDF B phases. In the development of the Project components, the investigation of the conditions in each country, and the identification of the infrastructure that would allow each country to

[18] Dioxin baseline data were obtained for five of the seven countries. The total estimated dioxin releases from the five countries amount to approximately 187 g TEQ per year.
[19] Mercury baseline estimates were obtained using total beds in all the countries (and only 6 states in India where data were available) and an emission factor of 2.8 g mercury per bed per year from both thermometers and sphygmomanometers. The total estimated amount of mercury released from the seven countries' health-care sectors amounts to approximately 2910 kg per year.
[20] This will be accomplished by minimizing the amount of health-care waste generated, limiting the amount of waste burned in medical waste incinerators and by reducing the quantity of broken mercury-containing devices improperly discarded or burned.
[21] See Annex C, Part V A chapeau, of the Stockholm Convention.

effectively engage in the effort, participating countries have displayed a number of indicators of their growing commitment to the Project. These include the following:

- All participating countries have ratified the Stockholm Convention, a key component of the Project rationale. Project participation can be a significant contributor to demonstrating the countries' commitment to operationalizing the Convention. The dates of ratification of the Stockholm Convention are as follows:
    - Argentina: 25 January 2005
    - India: 13 January 2006
    - Latvia: 28 October 2004
    - Lebanon: 3 January 2003
    - Philippines: 27 February 2004
    - Senegal: 8 October 2003
    - Tanzania: 30 April 2004
    - Vietnam: 22 July 2002
- In all Project countries, with the exception of the special Project component in Tanzania, both the Ministry of Health and the Ministry of Environment have appointed high-level persons to work on the Project and to serve on the Project's National Working Group and National Project Steering Committees.
- Key stakeholders from environmental and health sectors in the government, as appropriate in the NGO and private sectors, and among the international donor community have participated and provided significant input through both the National Working Groups and the National Steering Committees. In most countries these groups are active and continue to attract new members and contributors.

Annex 2 contains country-specific information on the development and prioritization of National Implementation Plans as they relate to health-care waste management.

Sustainability

Project sustainability will be assured through a combination of the following: active participation of stakeholders; the development and institutionalization of permanent organizational structures and systems; ongoing training programs; contractual arrangements that require long-term commitment by model facilities; and recommendations on policy changes, replication and scaling-up of activities. Efforts during the fourth year to help selected countries seek funding to maintain specific activities beyond the end of the Project will also enhance sustainability. These activities to enhance sustainability will be carried out at both the local and national levels.

Local

At the level of the model facilities or clusters, many Project components will contribute to the goal of sustainability. Model facilities are expected to adopt policies reflecting a strong commitment to the use of best practices in health-care waste management with buy-in from top leadership. Facilities are also expected to institutionalize regular training for all staff, including new employees, and to allocate funding to maintain the improved waste management system. These commitments will be reflected in Memoranda of Understanding to be signed by representatives of model facilities at the start of the Project. In addition to these measures, the planning and implementation of health-care waste management systems will involve local stakeholder participation as an essential part of the process, ensuring broad local acceptance and "ownership" of the system. Equally crucial to local sustainability will be the identification, nurturing and development of "environmental champions." These champions will be individuals in each hospital or clinic who will act as advocates for best environmental practices within their departments. Finally, a permanent organization within each facility, headed by a health-care waste management committee, will be responsible for long-term monitoring, evaluation and continuous improvement. Thus key activities to ensure sustainability at the local level are the adoption of supporting policies, regular training, enhanced budget allocation, stakeholder involvement in health-care waste management systems, the development of environmental champions and the creation of permanent organizational structures.

In some countries, alternative treatment technologies are considered part of the private sector, with investments supported by business plans and activities organized through centralized plant or mobile system enterprises (as in Lebanon). In other countries, these technologies are part of the public services provided to health-care facilities by the government (as in Vietnam). In either case, systems using deployed capital equipment will become self-sustaining through fees paid by hospitals and clinics for the treatment of their wastes.

National
At the national level, the Project will work with a National Project Steering Committee and a National Working Group with extensive stakeholder participation. Both organizations were created in each participating country during the PDF B phase of this Project. Memoranda of Understanding with various national stakeholders will help ensure broad ownership of the Project and long-term sustainability. In particular, Memoranda of Understanding will be signed with institutions that will host national training programs, thereby creating and securing the infrastructure necessary for capacity-building over the long term. In many countries, these memoranda will be supplemented by national policies that require training and, where applicable, certification. By engaging policy-makers in a discussion of policy changes and national plans, the Project will institutionalize best practices in health-care waste management in the participating countries. This will be complemented by replication and scaling-up of activities that will reinforce and promote the use of existing best practices and technologies throughout the countries, further supporting the sustainability of Project gains.

Global
On the global level, information-sharing and networking to bolster sustainability will be promoted by the Global Expert Team, including the Great Lakes Center. During the Project's fourth year, the Global Expert Team will help selected countries obtain the funding to continue programs that are deemed necessary for sustainability. Examples include training programs that may require supplemental funds or programs pertaining to the implementation of national plans. The Great Lakes Center will continue to share and disseminate information after the Project's completion.

Replicability

The strategies for replication, like the sustainability strategies, have local, national and global frameworks; each will depend and build on the others. Local implementation of model projects at the facility or "cluster" level (or even the state level in the case of India) will provide the key demonstration of practices and technologies that effectively meet the Project goals under very diverse circumstances. The following Project components provide a framework that will sustain the local activities while creating opportunities for replication at regional, national and global levels.

Local
The basic project unit is a set of model facilities and clusters that utilize best practices and technologies. Specific practices at the individual facility level will be identified, evaluated and incorporated into training curricula by national training and educational institutions for the reinforcement of lessons learned at the local and national levels. These facility-level experiences also serve to provide background on best practices and technologies for integration into any national legislation, regulation or policy.

In addition to the development of these curricula, peer-to-peer training will complement more formal training both within and among individual facilities. The adoption of best practices is intended to spread locally among neighboring facilities as well as through networks of associated facilities (e.g., health systems). Through their MOU with the Project, model facilities agree to be training and educational sites for classes and delegations wanting to learn from their experience. These classes and delegations can be local, regional or international.

Another crucial component of replicability at the individual facility or cluster level is the identification of process holders or "environmental champions" who will promote replication of the Project outcomes locally and regionally. Identifying the attributes of individuals who can provide such leadership and direction, and providing guidance on how to nurture and develop such leadership, will be vital to ensuring local sustainability and the transfer of best-practice knowledge to other facilities.

National
The national replication component will be designed around the parallel efforts of engaging national stakeholders and international donor agencies, implementing national training and education programs, and the strategic involvement of private enterprise. The national partners in health-sector reform and development, including government agencies, NGOs and international donor agencies, will be engaged in following and evaluating the progress of the Project. This process will build stakeholder networks and establish grounds for these actors to work collaboratively on other projects and programs, including the financing of further health-sector development. The

partnership with international donor agencies will be of particular benefit, as these agencies will be able to use the Project to identify more uniform and effective responses to solving the health-care waste problems that must be addressed in each of their health-sector projects.

These replication efforts will be complemented by the participation of relevant academic institutions in disseminating Project information. An important partnership being incorporated into each national education and training initiative is the development of cooperative agreements with medical and nursing schools to incorporate specific lessons from the Project into training curricula for physicians, nurses and other health professionals. This work, in conjunction with the development of the national training curricula and program, will help to set new national health-care waste management standards, and will solidify and institutionalize the Project gains.

Additionally, a number of specific opportunities for private-sector involvement in Project implementation will be identified and quantified, establishing the "business" rationale for program participation. These opportunities include product procurement, design and manufacture, as well as the provision of services. The growth of private enterprise in delivering services in the health-care sector may prove advantageous to the Project, as private health-care waste management providers increase the availability of funding mechanisms, have a strong desire to be in compliance with government regulations, and are willing to adopt the use of best practices to maintain a leadership position in the field.

Global

Monitoring and evaluation (See Section I Part IV, and Annex 5 for details) will enable the Global Expert Team to chronicle the progress of each national component and the global Project as a whole. The experience at the national and local levels will inform international agencies and agencies involved in standard-setting about best practices in advancing safe health care and reducing the impact of waste management systems on the spread of global pollutants. The technology project component based in Tanzania is designed specifically to disseminate knowledge and advance technology transfer across national borders in sub-Saharan Africa, but may also have applications over a much broader global range. In some cases (e.g., India through WHO SEARO), there are specific mechanisms already in place for the transfer of new knowledge and experience. Some of the education/training partners at the national level also have regional educational missions and cooperative arrangements with neighboring countries that can be used to disseminate results and advance education regionally (e.g., in India through the Indira Gandhi National Open University).

Global dissemination of Project results will be facilitated at all levels of this Project. The two principle cooperating agencies, the World Health Organization (WHO) and Health Care Without Harm (HCWH), have strong global networks, and are supported by equally strong information dissemination systems that will advance global dissemination of the lessons learned. These systems include websites, publications, instructional activities, demonstration projects and conferences in the health-care waste management field. The Project partners at the national and global levels also play a critical role and have already identified appropriate international forums in which to share Project progress and results. These venues include the World Health Assembly, International Congress of Nurses, Safe Injection Global Network, and Global Alliance for Vaccines and Immunization, among others, and have already witnessed national and global partner participation during the PDF A and PDF B phases of the Project.

PART III: MANAGEMENT ARRANGEMENTS

Full Project implementation will be carried out under the guidance of a **Global Project Steering Committee (GPSC)** whose members include one representative from each of the following: UNDP, as Project Implementing Agency; UNOPS as Project Executing Agency for the global project component; a senior level official designated by each of the Project participating Governments[22]; one representative each from HCWH and WHO as Principle Cooperating Agencies; as well as other major donors and partners, if any. Representatives from UNDP Country Offices in the participating countries, as well as other GEF IA/EAs and the Stockholm Convention and the Basel Convention Secretariats will be invited to participate in the Steering Committee.

[22] Project activities in Tanzania are limited to research and development in service of regional and global needs.

In each participating country, the **National Project Steering Committee (NPSC)** will assume oversight for national Full Project activities. The exact composition of the NPSC will vary from country to country depending on custom, practice and/or law. In general, the NPSC will be a policy body that will include high-level, government officials with overall responsibility for the areas in which the Project will carry out activities. Typically, the NPSC will include a designated senior representative from the Health and Environment Ministries and from the Ministry in which the GEF Operational Focal Point is located if different from Ministry of Health or Ministry of Environment. If not already covered by the above, the NPSC should include a representative or a liaison from the authority responsible for Stockholm Convention NIP preparations and from the authority responsible for Basel Convention implementation. The NPSC will also include representation from the national health care sector, the country WHO and UNDP offices, as well as one or more appropriate representative from national NGOs with demonstrated concern and activity in matters associated with health-care waste management.

A project **Chief Technical Advisor (CTA)** will have overall responsibility for Project implementation. The CTA will be assisted by a Global Project Coordinator/Technical Advisor; a Senior Public Health Advisor provided by WHO; and a Senior Policy Advisor provided by HCWH. The CTA will additionally be assisted by a Senior Expert on Healthcare Waste Management Systems; a Technology Development Expert (provided by the University of Dar Es Salaam Faculty of Mechanical and Chemical Engineering); and a Training Program Advisor (provided by the University of Illinois School of Public Health Great Lakes Center). The above will constitute the Project **Global Expert Team (GET).**

During the implementation of the Project, the **Global Expert Team (GET)** will provide technical and policy expertise and will have joint responsibility to assure that Project activities are successfully implemented. The GET will oversee global coordination and management under the overall policy direction provided of the Project Steering Committee (GPSC), the day-to-day guidance of the Chief Technical Advisor (CTA) and in consultation with the HCWH Senior Policy and WHO Advisors. The GET members include the Project CTA, the Project Coordinator/Technical Advisor, Senior Policy and Public Health Advisors from HCWH and WHO respectively, representatives of project partners from the University of Illinois Great Lake Center and the University of Dar es Salaam Faculty of Mechanical and Chemical Engineering, as well as the project's Senior Expert on Healthcare Waste Management Systems.

The **National Working Group (NWG)** will be composed of individuals from appropriate ministries, agencies and stakeholder groups who have practical involvement or interest in day-to-day Project activities. The exact composition and mode of operation of the NWG will vary from country to country depending on need and circumstance. The NWG may include representatives from UNDP (Country Offices), WHO, health, environment and other appropriate ministries, NGOs, training institutions, health-care facilities, medical and municipal waste service providers, and health-care related associations. In general, the NWG will advise the NPSC and will assist the National Consultant(s) by providing expertise and advice on project-related policy, economic, scientific and technical issues and by assisting in networking.

National Consultants (NC) will be hired as necessary to coordinate and implement Project activities. Consultation arrangements will vary country to country based on need, available expertise, and country workplan. National Consultants will report jointly to the Global Project Coordinator/Technical Advisor and a designee of the NPSC. NCs will coordinate and/or carry out: support activities in model facilities on implementation of model programs; activities in the deployment of appropriate technologies; activities towards institutionalization and roll-out of the national training programs; activities necessary to hold successful national conferences; and dissemination, monitoring and evaluation activities. Project activities in Tanzania will be undertaken by the University of Dar es Salaam and by the NGO AGENDA (see Annex 1).

Principal Cooperation Agencies and other Project Partners

The Project has two Principle cooperating Agencies: the World Health Organization, on behalf of the WHO member states participating in the Project, and the international NGO coalition Health Care Without Harm. The Principal Cooperating Agencies jointly proposed the Project and provided oversight and support in the PDF A and PDF B phase of the Project.

The ***World Health Organization*** (WHO) is the United Nations specialized agency on health with the objective of attainment of the highest possible level of health by all peoples. WHO's guiding principles related to health-care

waste management include promoting sound health-care waste management policies and practices; preventing health risks to patients, workers and the pubic associated with exposure to health-care wastes; support for implementation of the Stockholm Convention on Persistent Organic Pollutants; and minimization of human exposure to toxic pollutants. WHO will provide support to Project activities through its headquarters offices and through WHO regional offices. (Annex 6A provides details of WHO role, activities, budget and co-financing).

Health Care Without Harm (HCWH) is an international coalition of 443 organizations in 52 countries working to transform the health care industry so it is no longer a source of harm to people and the environment. HCWH seeks to do this without compromising patient safety or care with the aim of achieving health-care delivery systems that contribute to overall ecological sustainability. HCWH works to phase-out medical waste incineration, minimize the amount and toxicity of all waste generated, promote safer waste treatment practices and secure a safe and healthy workplace for all health care workers. (Annex 6B provides details of HCWH's global and national activities in the Project, budget and co-financing as well as relevant projects and activities beyond the Project.)

The project also involves a number of other Project Partners. The University of Illinois at Chicago Great Lakes Center (GLC) for Environmental and Occupational Safety and Health conducts international research and training in environmental and occupational health. The GLC engages in training, research, consultation, and capacity-building in the Midwest of the United States and in developing and transition countries around the world. GLC is a WHO/PAHO[23] Collaborating Centre in Occupational and Environmental Health, working to realize the WHO Declaration of Occupational Health for All and the PAHO Regional Plan for Worker's Health. GLC staff is expert in occupational and environmental safety and health, curriculum design, evaluation, and delivering training programs. (Annex 6C provides details of CGEOH's global and national activities in the Project, budget and co-financing as well as relevant projects and activities beyond the Project).

AGENDA is a Tanzania-based NGO that was originally created by the Danish Development Agency (DANIDA) to contribute to the development of the business sector in Tanzania by promoting environmentally responsible, transparent and accountable business practices in the country. AGENDA was reconstituted as an autonomous NGO which promotes environment and development activities and services that are compatible with international treaties; national policies and legislation; and local needs and aspirations. AGENDA is actively engaged in work in Tanzania and the African region working with governments and NGOS to promote effective Stockholm Convention implementation and other aspects of the sound management of chemicals and wastes.

Country-based NGO groups and experts will play important roles in the Project as national stakeholders , and also as source of experienced, effective and affordable national experts. Support will be provided by HCWH regional offices in Argentina, the Czech Republic and the Philippines. In India, the NGO, Srishti; and in Argentina, the NGO Asociación Argentina de Médicos por el Medio Ambiente (AAMMA) will actively contribute to national Project implementation.

The World Federation of Public Health Associations and the International Council of Nurses will participate as contributors to Project dissemination and replication activities.

Implementation and Execution Arrangements

UNDP will act as the project's Implementing Agent. Successful execution of the project will require the establishment of an efficient global management structure, complemented by efficient national management structures. Project delivery will be expected to be carried out according to the agreed global project objectives and outcomes, detailed in the project's Logical Framework (Table 6), and upon which the national Annual Workplans (AWPs) and related budgets will be based. UNDP/GEF financial accounting and reporting requirements will be expected to be fully met.

The Project will be executed using a Multiple Execution (MEX) modality, in accordance with UNDP guidelines. Adoption of the MEX modality will entail the establishment of a global 'main' project whose execution will be managed by the United Nations Office of Project Services (UNOPS). Under the global 'main' project, seven individual National execution (NEX) 'sub' projects will be established, where oversight management services will

[23] Pan American Health Organization

be provided by the UNDP Country Offices in each of the respective countries (with the exception of the Tanzania component that will figure under the global 'main' component). In addition, under the terms of the Executing Agency Agreement between UNDP and the World Health Organization, the WHO will manage an eighth sub-project and provide financial oversight management services for the funds associated with the project activities to be carried out by the organization. Each of the seven NEX sub-projects and the WHO sub-project will be linked financially to the global main project in order to facilitate financial reporting and accountability.

This execution modality has been agreed upon in order to promote the following:

- Greater national self-reliance through effective use of, and, as required, strengthening of, management capabilities and technical expertise of national institutions and individuals, through a 'learning by doing' approach;
- Enhanced sustainability of the project outcomes through an increased sense of national ownership and commitment to the environmental protection and inherent development objectives of the project;
- Enhanced integration and synergy with existing national programs through greater use of appropriate national systems and procedures.

Ultimately, this approach is expected to maximize, at the national level, integration of the global project's national activities into national poverty reduction strategies in support of the Millennium Development Goals (MDGs).

In order to accord proper acknowledgement to GEF for providing funding, a GEF logo should appear on all relevant GEF project publications, including among others, project hardware and vehicles purchased with GEF funds. Any citation on publications regarding projects funded by GEF should also accord proper acknowledgment to GEF. On project hardware and vehicles, the UNDP logo should be more prominent -- and separated from the GEF logo if possible -- as UN visibility is important for security purposes.

PART IV: MONITORING AND EVALUATION PLAN AND BUDGET

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP-GEF-HQ. The Logical Framework Matrix in Table 6 provides *performance* and *impact* indicators for project implementation along with their corresponding *means of verification*. These will form the basis on which the project's Monitoring and Evaluation system will be built. A full overview of the project's M&E system is detailed in Annex 5.

Standard Monitoring and Evaluation activities

- The *Inception Report* (IR) stems from the *Inception Workshop*. The IR constitutes finalization of project design, presents the overall workplan, as well as the first detailed Annual Workplan (AWP) divided into quarterly timeframes detailing the activities and progress indicators that will guide implementation during the first year of the Project's execution. The IR is due at the launch of the Project's implementation (month 6) and is the responsibility of each national Project Manager, with support from the Project Coordinator. Short quarterly progress reports outlining main updates in project progress will be provided to the local UNDP-CO and the UNDP-GEF-HQ by each national project team.
- The *Annual Project Workplan* (AWP) describes in detail the provision of inputs, activities and expected results for the project in a given year, indicating schedules and the persons or institutions responsible for providing inputs and producing results. The AWP will be updated and revised each year by each national Project Manager.
- The *Annual Project Report* (APR) is a UNDP requirement and part of UNDP-CO's central oversight, monitoring and project management framework. The APR seeks to obtain the views of the main stakeholders of the Project on its relevance, performance and the likelihood of its success. The APR will be prepared each year by each National Project Manager and the local UNDP-CO with assistance of key stakeholders and the global project management team. The APR shall be submitted to the UNDP Resident Representative at least four weeks prior to the *Annual Tripartite Project Review* (TPR). The UNDP-COs submit the APRs to the UNDP for the TPR.
- To minimize paperwork and processing time, the APR will be held in conjunction with the annual *Project Implementation Review* (PIR), the annual monitoring process mandated by the GEF. The annual PIR reviews financial status, procurement data, impact achievement and progress in implementation. A harmonized

APR/PIR report will be prepared each year between June and September under the leadership of the UNDP-CO together with other project stakeholders and with the support of UNDP-GEF-HQ and the GEF M&E Team.

- The *Tripartite Project Review* (TPR) is the highest national policy-level meeting of the parties involved in the implementation of the Project and will include members of the National Project Steering Committees, the local UNDP offices and, as appropriate, UNDP-GEF-HQ. The TPR considers the progress of the project, based on the APR. TPR meetings will be held once a year (the first within 12 months of the start of the project) under the leadership of the UNDP-CO.
- Mid-term and final evaluations are independent evaluations organized mid-way through the Project (focusing on project effectiveness, efficiency and timeliness of implementation; and highlighting issues requiring decisions and actions) and at the end of the project (as above, plus identifying impact and sustainability of results). In collaboration with the UNDP-COs and the Global Project Coordinator/Technical Advisor, UNDP-GEF-HQ is responsible for organizing the evaluations.
- The *Terminal Report* is the overall assessment of the project by its stakeholders and additionally aims to serve as a source of lessons learned and recommendations for follow-up activities. It will be prepared during the final two months of the project.
- The *Terminal Tripartite Review* considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its immediate objectives and contributed to the broader environmental objective, and decides on future actions. This review will be carried out in the final month of the project.

Table 3. Indicative Monitoring and Evaluation Plan

	Year 1				**Year 2**				**Year 3**				**Year 4**			
	Quarter															
Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Inception report																
Annual Workplan (AWP)																
Annual Project Report (APR)																
Tripartite review (TPR)																
Project Implementation Review (PIR)																
Mid-term Evaluation																
Audit																
Final Evaluation																
Terminal Report																
Terminal Tripartite Review																

PART V: LEGAL CONTEXT

This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the governments of the participating countries and the United Nations Development Programme, signed by the parties during the inception of the Project. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

The UNDP Resident Representative in Country Offices of the Project participating countries is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:

a) Revision of, or addition to, any of the annexes to the Project Document;

a) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;

b) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and

c) Inclusion of additional annexes and attachments only as set out here in this Project Document.

SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

PART I: INCREMENTAL COST ANALYSIS

The incremental cost matrix is provided directly below this summary. Under the baseline, the prevailing view is that some sporadic investment in elimination of unintentional POPs dioxin and mercury releases would likely occur, but at a significantly reduced rate. As Parties to the Stockholm Convention, Government legislation would lend support to efforts for elimination of unintentional POPs dioxin and mercury releases, but such support would not be expected to rapidly translate into increased medical health sector organization or investment in this sector. Financing support for health-care waste management often does not appear as a significant budget line item for national or district health ministries or agencies, if it appears at all. Activities with respect to health-care waste management are often haphazardly organized, and implementation of initiatives intending to promote enhanced health-care waste management is often not enforced. Other barriers including lack of awareness of the benefits of adoption of best practices and techniques in health-care waste management and a lack of incentives for institutional and individual stakeholders, will also remain unaddressed without GEF intervention.

National circumstances in the different countries participating in this demonstration project vary greatly. Therefore, it makes sense to provide a narrative description of the baseline, alternative and increment for each participating country. On the other hand, the quantitative incremental cost calculation is given globally, by project component. In part, this is to simplify the preparation and presentation of information. (Presentation by both country and component would have been voluminous.) Additionally, a significant fraction of co-financing is not (or is not yet) allocated to individual countries, but is available to the Project globally, in some cases for later allocation as needed.

Table 4. Incremental Cost Analysis by Country

Component	Baseline	Alternative	Increment
Global environmental benefits	Investments in adoption of Best Available Techniques and Best Environmental Practices with respect to medical health-care waste management will, to varying degrees amongst the participating countries, be limited due to a lack of incentives, a lack of awareness and capacity amongst stakeholders.	Total releases of dioxins and mercury to the global environment will have been reduced in countries participating in the Project. Appropriate and affordable health-care waste treatment technologies will be available for use in sub-Saharan Africa. Model approaches will have been demonstrated in countries at different stages of development and in different regions, and the lessons-learned will have been disseminated. Health-care institutions, governments, stakeholders and funding agencies will be able to take into account Project experiences in developing future Projects and interventions.	Reductions in dioxin and mercury releases will have been achieved that would not have been possible without the Project. Appropriate and affordable health-care waste treatment technologies will be available for use in sub-Saharan Africa, that otherwise would not be available. A more consistent and coherent approach to the implementation of best practices for health-care waste management will be in place in seven countries where this otherwise would have been impossible. Models and experiences that otherwise would not have been available can be taken into account by health-care institutions, governments, stakeholders and funding agencies in developing future Projects and interventions
National benefits			
Argentina	A number of disparate activities are in place. Buenos Aires has instigated a ban on incineration and one city hospital has announced a mercury-free pledge. There is a move underway to include chemotherapy waste with medical wastes presently burned. No centralized approach is in place or planned in absence of the Project.	Accelerate the pace of change. Initiation of a centralized training program; incorporation of Best Available Techniques and Practices methodologies into national training curricula; implementation of a centralized health-care waste management strategy based on an Alternative Systems Approach in all regions in the country.	Reductions in dioxin and mercury releases will have been achieved that would not have been possible without the Project. A more consistent and coherent approach at the national and state level to the implementation of best practices for health-care waste management will be in place than would otherwise have been possible. New Investment in appropriate technology, and related new understanding will have occurred that otherwise would not have happened.

Component	Baseline	Alternative	Increment
India	A ban on incineration is in place for all types of wastes save category 1 and 2 types – human and animal pathological waste. However, the ban is not well-implemented or enforced. Centralized incineration facilities in urban sectors manage waste poorly and often burn more than category 1 and 2 wastes. In rural areas, awareness is virtually non-existent and open burning is the standard. Despite existence of good models, the application of policy and practices is varied and inconsistent.	Accelerate the pace of change. Adoption of a centralized and holistic system at the state level; enhancement of policy to support enforcement of ban on incineration.	Reductions in dioxin and mercury releases will have been achieved that would not have occurred without the Project. An improved state level model will be in place that can serve as a model to other states. Advances that would not otherwise be possible will have been made in one state that is currently having difficulty implementing national policies.
Latvia	Knowledge with respect to the issue is relatively high but no centralized/harmonized treatment or training program is in place or is being considered.	Enhancement of existing practices, brought up to EU standards. Accelerate the speed of change.	Reductions in dioxin and mercury releases will have been achieved that would not have been possible without the Project. A more consistent and coherent approach to the implementation of best practices for health-care waste management will be in place than would otherwise have occurred.
Lebanon	Despite a higher level of knowledge with respect to the issue, practices are not ideal at present and there is no cohesive plan of action for sustainable health-care waste management.	Accelerate the speed of change. Develop model for dissemination of BAT and BEP in sector throughout Arab states.	Reductions in dioxin and mercury releases will have been achieved that would not have been possible without the Project. A more consistent and coherent approach to the implementation of best practices for health-care waste management will be in place than would otherwise have occurred.

Component	Baseline	Alternative	Increment
Philippines	Some hospitals have adopted health-care waste management practices and a good immunization model is in place under the management of the Department of Health. DOH conducts some training but it is not strategically organized to address HCWM practices in a holistic manner. The country has put in place a ban on incineration but lack of awareness of options threatens to jeopardize its success.	Maintain and enforce the ban on incineration. Incorporation of Best Available Techniques and Practices methodologies into national training curricula; implementation of a centralized health-care waste management strategy based on an Alternative Systems Approach in all regions in the country.	Reductions in dioxin and mercury releases will have been achieved that would not have been possible without the Project. A more consistent and coherent approach to the implementation of best practices for health-care waste management will be in place than would otherwise have been possible. New Investment in appropriate technology, and related new understanding will have occurred that otherwise would not have happened.
Senegal	No BAT and BEP practices in place in hospitals; no availability of alternative technologies; little to no management or budget allocation for health-care waste management. Open burn or basic incineration is standard.	Incorporation of Best Available Techniques and Practices methodologies into national training curricula; implementation of a centralized health-care waste management strategy based on an Alternative Systems Approach in the country. Link with Tanzania research and development component will aim to provide cost-effective technological solutions.	Reductions in dioxin and mercury releases will have been achieved that would not have been possible without the Project. Advances will have been made toward establishing a more consistent and coherent approach to the implementation of best practices for health-care waste management than would otherwise have been possible.
Tanzania (R&D component)	No access to affordable, viable no-burn technologies in sub-Saharan Africa.	Design alternative technologies that meet critical local demands that the technologies be: easily made at the local level using local materials; viable and effective; inexpensive/affordable; energy efficient; easily mass-produced. Make blue prints available and propose simple business model.	Appropriate and affordable health-care waste treatment technologies will be available for use in sub-Saharan Africa that would otherwise not have been available. In many cases, these will be the first practical alternatives available that can replace open burning of health-care waste or combustion in locally built incinerators that lack adequate (or any) controls.

Component	Baseline	Alternative	Increment
Vietnam	Health-care waste management practices are not the standard operating procedure in hospitals. Burning is presently considered the best option and most incinerators are of basic design, with no pollution controls applied.	Incorporation of Best Available Techniques and Practices methodologies into national training curricula; implementation of a centralized health-care waste management strategy based on an Alternative Systems Approach in all regions in the country.	Reductions in dioxin and mercury releases will have been achieved that would not have been possible without the Project. Advances will have been made toward establishing a more consistent and coherent approach to the implementation of best practices for health-care waste management than would otherwise have been possible.

Table 5. Incremental Cost analysis by Project Component

Component	Baseline Cost (US$)	Alternative Cost (US$)	Incremental Cost (US$)	Cost to GEF (US$)
1. Establish model facilities and programs to exemplify best practices in health-care waste management, and develop materials to facilitate replication.	100,000	Costs: **4,801,828** GEF: 1,969,911 Co-funders: 2,831,917	4,701,828	1,969,911
2. Deploy and evaluate commercially-available, non-incineration health-care waste treatment technologies appropriate to the needs of the facility or cluster.	3,500,000	Costs: **7,315,299** GEF: 2,852,497 Co-funders: 4,462,802	3,815,299	2,852,497
3. Develop, test, manufacture and deploy affordable, small-scale non-incineration technologies for appropriate use in small- and medium-size facilities in sub-Saharan Africa, and prepare and disseminate manuals for their manufacture, installation, operation, maintenance and repair.	130,000	Costs: **1,521,842** GEF: 1,123,686 Co-funders: 398,156	1,391,842	1,123,686
4. Introduce and demonstrate best practices for management of mercury waste, and develop and disseminate awareness-raising and educational materials related to mercury.	150,000	Costs: **999,500** GEF: 384,000 Co-funders: 615,500	849,500	384,000
5. Establish or enhance training programs to build capacity for implementation of best practices and appropriate technologies beyond the model facilities and programs.	350,000	Costs: **4,441,365** GEF:1,664,879 Co-funders: 2,776,486	4,091,365	1,664,879
6. Review relevant policies, seek agreement by relevant authorities on recommended updates or reformulations if needed, seek agreement on an implementation plan, and if appropriate, assist in holding a policy review conference for these purposes.	180,000	Costs: **662,823** GEF: 380,823 Co-funders: 282,000	482,823	380,823
7. Distribute Project results on best techniques and practices to relevant stakeholders, disseminate materials and hold conferences or workshops to encourage replication.	120,000	Costs: **2,161,007** GEF: 1,194,484 Co-funders: 966,523	2,041,007	1,194,484
8. Make Project results on demonstrated best techniques and practices available for dissemination and scaling-up regionally and globally.	400,000	Costs: **1,393,287** GEF: 756,176 Co-funders: 637,111	993,287	756,176
Total costs	**4,930,000**	**Total: 23,296,949** **GEF: 10,326,455** **Co-funders: 12,970,494**	**18,366,949**	**10,326,455**

PART II: LOGICAL FRAMEWORK ANALYSIS

Part II of Section II contains the following Tables: Table 6: Logical Framework of Overall Project Strategy, Table 7: Project Output, Activities and Barriers, Table 8: Quantitative and Semi-Quantitative Indicators, Table 9: Project Activity Timeline and Workplan, and Table 10: Country-specific ActivityTimelines and Workplans.

Table 6. Logical Framework of Overall Project Strategy

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Goal	Protection of the global environment and public health by reducing releases of dioxins and mercury			
Global objective	Reduction of barriers to implementation of the Stockholm Convention, International Waters GPA, SAICM and WHO policies			
Project objective	Demonstration and promotion of best practices and techniques for health-care waste management			
Outcome/ Component 1	Best practices for health-care waste management demonstrated, documented and made replicable			
Output 1	• Model facilities and programs are established and implemented. • Activities of model facilities/programs are documented and their performance is evaluated to exemplify best practices in health-care waste management. • Useful replication toolkits on how to implement best practices and techniques are developed.	• Tools for baseline assessment developed/adapted and facility baseline assessment completed • System for measurement and documentation established • Health-care waste management plan completed and implemented • Facility-wide training instituted • Practices at facility measured, evaluated and documented • Replication materials on best practices and techniques created and distributed • Replication materials evaluated	• Tool document and baseline report • Guidelines for measurement and documentation of results • Health-care waste management plan and its implementation records • Training curricula and programs • List of training attendees • Facility-wide training reports • Quarterly and final reports on facility activities • Replication materials • Replication toolkits and their evaluation • Project website	• Political and social stability will be maintained. • Full buy-in and cooperation from the health sector will be maintained in the face of urgent competing priorities and demands.

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Outcome/ Component 2	Appropriate non-incineration health-care waste treatment technologies successfully deployed and demonstrated			
Output 2	• Commercially-available, non-incineration health-care waste treatment technologies that are appropriate to the needs of the facility or cluster, and that satisfy their needs, are purchased, deployed and evaluated.	• Commercially-available non-incineration technologies successfully purchased and deployed • Institutional needs satisfied • Environmental and performance standards satisfied • Use/efficiency and cost implications reported	• Technologies operating at facilities and photographs • Interviews with facility management • Reports covering microbial inactivation tests, use and costs, throughput, environmental performance and records of treatment cycles • Project website	• Satisfactory technologies that meet Project demonstration requirements can be purchased within budget (except for some facilities in Africa where research on lower cost alternatives will be undertaken). • In the event that technologies will need to be imported, customs formalities will not significantly delay Project progress. • Facility management will honestly and accurately report on facility needs and technology performance.

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Outcome/ Component 3	Affordable, non-incineration, health-care waste treatment technologies successfully designed to meet African needs and manufactured, and their replication plans in place			
Output 3	• Appropriate, affordable, small-scale non-incineration health-care waste treatment technologies are developed, tested, manufactured and deployed for use in small- and medium-sized facilities under conditions that prevail in much of sub-Saharan Africa. • Blueprints and manuals for manufacture, installation, operation, maintenance and repair are prepared and disseminated.	• Needs assessment and performance requirements completed for technologies to be developed • Engineering designs developed • Prototypes built and tested • Technology fabrication demonstrated and technology validated • Technology demonstrated and tested in a health-care setting • Manuals for construction, installation, operation, maintenance and repair completed and disseminated • At least one manufacturer in Africa commercially constructing new technologies, and a program in place to provide assistance to other potential manufacturers	• Needs assessment report • Written performance specifications • Engineering design drawings and files • Digital photographs of prototypes • Laboratory and field-test results • Digital photographs of fabricated technologies • Validation report • Reports on performance in health-care setting by developers and users, including photographs • Manuals • Manufacturer business plan • Report on ongoing programs to assist potential manufacturers • Project website	• Political and social stability will be maintained. • Locally available skills and materials necessary to build and repair these technologies exist and will be available. • Technologies can be developed within reasonable bounds of cost and affordability.

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Outcome/ Component 4	Best practices for management of mercury waste demonstrated, documented and made replicable, and use of mercury-free devices promoted * *the latter will only be executed if suitable additional bilateral co-financing can be secured*.			
Output 4	• Practices on safe handling and disposal of phased-out mercury devices are developed, staff training is completed and practices are implemented in model facilities in a replicable way. • Affordable mercury-free devices are purchased and introduced for acceptable and efficient use in model facilities.	• Guidelines on safe handling and disposal of phased-out mercury devices developed • Training on mercury practices organized • Comparisons of the efficacy, acceptability, full costs, device lifespan and other relevant characteristics of mercury-free versus mercury-containing devices carried out • Awareness-raising and educational materials on mercury developed • Mercury conferences held, where applicable • Devices received and used by the facilities • 80% of mercury devices in facilities replaced with mercury-free alternatives	• Guidelines on safe handling and disposal of phased-out mercury devices • Training report • Reports on comparisons of mercury-free versus mercury-containing devices • Mercury practices implementation report • Awareness-raising and educational materials on mercury • Conference minutes, agenda and participant list • Interviews and evaluation reports from model facility staff and other participants • Project website • Device receipts and usage records	• Facility staff can be convinced of the efficacy of non-mercury devices and will honestly and accurately report on their efficacy and acceptability. • Political and economic conditions will not negatively impact the acquisition or adoption of mercury-free devices. • Satisfactory mercury-free devices will be available at costs that are consistent with Project replication objectives.

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Outcome/ Component 5	New and/or enhanced training programs established to build capacity for the implementation of best practices and appropriate technologies beyond model facilities and programs			
Output 5	• Effective national training programs are established or enhanced and are building capacity in the health-care and related sectors for the implementation of best practices and the use of appropriate technologies beyond model facilities and programs.	• Core curriculum developed • Partnership with host institutions formalized • Training TORs/plan developed • At least two training sessions conducted • Student certification program established, if applicable • Training evaluation completed	• Core curriculum documents • MOU with host training institutions • Training reports with lists of attendees • Test scores and copy of test if applicable • Copies of student certificates, if applicable • Training evaluation forms • Interview with employers • Project website	• The training program will target the most appropriate personnel. • Non-Project facilities will be willing to implement systems of the kind demonstrated by the Project, and are in a position to effectively utilize the skills that the training program is designed to impart. • Training programs will provide knowledge that spreads to other personnel and will outlast the Project itself.

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Outcome/ Component 6	National policies aimed at replicating and sustaining best techniques and practices demonstrated by the Project explored and, where feasible, initiated			
Output 6	• Review of relevant national policies, regulations and guidelines is conducted in light of Project experiences. • Appropriate policy updates or revisions are recommended and further agreement and commitments by relevant authorities are pursued. • If appropriate, a national policy review conference by relevant authorities is held for these purposes.	• Relevant national policies listed and analyzed in light of Project experiences • Consideration of updates or revisions to relevant guidelines or other national policy instruments recommended • Dialogue/interview with relevant authorities (MOE, MOH, others) on possible updates or reformulations of policies or guidelines aimed at replicating and sustaining the demonstrated best practices • National policy review conference held, if appropriate	• Review and recommendation reports • Government working papers and documents • Dialogue/interview notes • Conference minutes with participant list • Project website	• Project countries will be willing, given the political and economic climate, to undertake a policy review aimed at possible reformulations and/or updates to their policy instruments. • If policy updates are recommended, the relevant stakeholders will be able to institute the recommended changes.

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Outcome/ Component 7	Project results disseminated to all stakeholders for awareness-raising aimed at their replication			
Output 7	• Project results on best techniques and practices are distributed to relevant federal and state ministries or agencies, health service delivery institutions and other stakeholders. • Targeted promotional materials, workbooks and other tools are disseminated to promote widespread replication. • Conferences or workshops are held to encourage replication. • Agreement of relevant authorities is sought on an implementation plan for replication of best practices.	• Awareness-raising and educational materials developed and localized • National conferences and/or workshops held • Toolkits distributed and utilized • Public awareness campaign conducted to provide information to the general public, patients and families • Interviews/dialogues with relevant authorities held for further agreement or commitment on implementation plan for replication of best practices • Local language materials distributed	• Awareness-raising and educational materials • Conference agenda and participant lists • Number of toolkits distributed • List of stakeholders and stakeholder networks who have been reached and reports on the manner by which they were reached • Report on dissemination strategies used • Reports on public awareness campaign • Report on evaluation of effectiveness • Interview/dialogue notes • List of receivers of materials printed in local languages • Project website and online resource access statistics	Information and encouragement will not by themselves be sufficient for securing broad replication. Other conditions prerequisite for replication include: • Appropriate supporting policy instruments (as described in Component 4) will be put in place. • Human and economic resources will be sufficiently available, relative to other important health-care priorities, to engage in these activities. • Leadership at all levels, from the national to the state to the facility, will be able and willing to engage on these important issues.

	Project strategy	Objectively verifiable indicators	Sources of verification	Assumptions and risks
Outcome/ Component 8	Global, regional and national counterparts from agencies, governments and NGOs beyond participating countries informed of best techniques and practices for the purpose of replication			
Output 8	• Project results on demonstrated best techniques and practices are made available for dissemination globally and regionally. • Project materials are disseminated through international and regional networks.	• Project-related materials developed • Project results disseminated at international and regional meetings • Project website developed and updated • Materials distributed • GEOLibrary augmented with Project results	• Materials related to Project results • List of international and regional stakeholders who received results from Project partners • List of international and regional conferences where presentations were made and information was disseminated • Project website and online resource access statistics • List of people who received printed materials • Project-specific content in the GEOLibrary	• Global and regional dissemination of Project results will not be sufficient to globally reform health-care waste management practice. It is assumed, however, that demonstration results in the Project countries will help inform interventions that may be instituted in other countries.

Table 7. Project Output, Activities and Barriers

Outcomes, components and outputs	Structural barriers to be addressed	Activities	Implementation challenges
Outcome/Component 1: Best practices for health-care waste management demonstrated, documented and made replicable **Output 1**: • Model facilities and programs are established and implemented. • Activities of model facilities and programs are documented and their performance is evaluated to exemplify best practices in health-care waste management. • Useful replication toolkits on how to implement best practices and techniques are developed.	• Lack of knowledge of pollution prevention, waste minimization, segregation and proper waste management practices leads to both inadequate health-care waste management systems and inappropriate incineration and open burning of health-care waste.	• Formalize MOU with selected model facilities • Develop/adapt tool for baseline assessment • Establish a system to measure and document results • Conduct baseline assessments • Plan model health-care waste management program • Implement model program including procurement of equipment • Develop best practices toolkits and other relevant materials • Develop training curriculum, materials and methodology • Implement facility-wide training • Conduct periodic monitoring, evaluation and program improvement	• The health-care sector in most participating countries is dynamic and rapidly changing in terms of ownership/governance models, financing and regulation. • Large numbers of different aid programs and agencies provide support and financing, often in an uncoordinated manner. • Language, literacy, educational and professional differences exist between management, line workers and health-care providers. • In government facilities, procurement practices can be convoluted and bureaucratic. • Health-care institutions are complex and often understaffed, and waste management is not viewed as a priority. Medical staff may or may not be employed by the facility and may not be paid regularly. Some services may be contracted out and managed independently. • Personnel do not have formal training that includes waste management or an understanding of the health hazards that can result from improper waste management practices. • Adequate coordination with entities that transport treated wastes to final disposal sites or untreated wastes to treatment sites does not exist. • Reliable final waste disposal sites are often not available.

Outcomes, components and outputs	Structural barriers to be addressed	Activities	Implementation challenges
Outcome/Component 2: Appropriate non-incineration health-care waste treatment technologies successfully deployed and demonstrated **Output 2**: • Commercially-available, non-incineration health-care waste treatment technologies that satisfy and are appropriate to the needs of the facility or cluster, are purchased, deployed and evaluated.	• Lack of knowledge of or access to appropriate technologies for the treatment of health-care waste leads to inappropriate incineration and open burning of health-care waste.	• Develop technology specifications • Issue request for proposal (RFP) • Oversee bidding process • Review and select appropriate technology • Prepare site and obtain any necessary permits • Oversee shipment, customs clearance and accreditation by national body if necessary • Conduct operator training • Install and operate technology • Monitor, conduct tests and evaluate technology	• Regulatory review and acceptance of technologies can involve a lengthy and bureaucratic process. • Lack of a national regulatory regime reduces incentives to adopt best practices. • The procurement process for equipment, especially in government facilities, can be convoluted and bureaucratic. • Foreign aid programs may offer other technology options that are not aligned with Project goals. • Monitoring capacity to ensure proper operations and testing for emissions may be lacking. • Transportation infrastructure for off-site treatment and safe and secure transport to final disposal sites may be inadequate or unavailable.

Outcomes, components and outputs	Structural barriers to be addressed	Activities	Implementation challenges
Outcome/Component 3: Affordable, non-incineration, health-care waste treatment technologies successfully designed to meet African needs and manufactured, and their replication plans in place **Output 3**: • Appropriate, affordable, small-scale non-incineration health-care waste treatment technologies are developed, tested, manufactured and deployed for use in small- and medium-sized facilities under conditions that prevail in much of sub-Saharan Africa. • Blueprints and manuals for manufacture, installation, operation, maintenance and repair are prepared and disseminated.	• Lack of knowledge of or access to appropriate technologies for the treatment of health-care waste leads to inappropriate incineration and open burning of health-care waste.	• Develop needs assessment, performance criteria and design concepts • Develop engineering drawings • Build prototypes and perform structural and pressure tests • Conduct field performance tests of prototypes and demonstrate technologies in a health-care setting • Develop construction, installation, operations, training, maintenance and repair manuals • Demonstrate fabrication with a local manufacturer • Validate and certify manufactured units • Demonstrate fabrication with manufacturers outside Tanzania • Lay groundwork for replication and sustainability	• Identifying readily available materials and manufacturing capacity that is commonly available in target area can be difficult. • It is difficult to identify technologies with built-in simple reparability and maintenance. • Regulatory acceptance by governments is not guaranteed. • Acceptance by international aid agencies that commonly fund health-care institutions and programs where these devices would be used is not guaranteed. • Sufficient market acceptance and market size to rationalize a private sector initiative may not exist.

Outcomes, components and outputs	Structural barriers to be addressed	Activities	Implementation challenges
Outcome/Component 4: Best practices for management of mercury waste demonstrated, documented and made replicable and use of mercury-free devices promoted **Output 4**: • Practices on safe handling and disposal of phased-out mercury devices are developed, staff training is completed and practices are implemented in model facilities in a replicable way. • Affordable mercury-free devices are purchased and introduced for acceptable and efficient use in model facilities. (*if suitable co-financing secured*)	• Lack of knowledge of or access to mercury-free devices and lack of knowledge about proper management systems for mercury waste lead to both breakage and spills of mercury-containing devices and improper handling and disposal of mercury.	• Develop and implement a plan related to mercury and mercury alternatives • Procure mercury-free devices and spill kits for model facilities • Procure or construct mercury storage units for model health-care and central facilities • Evaluate device acceptability and efficacy • Develop and disseminate awareness-raising, educational and replication/scale-up materials • Seek policy review and recommendations related to mercury use at model-facility and national levels • Conduct a mercury conference if applicable	• Acceptance of national boards governing medical practice, certification of labs, etc., must be gained. • Acceptance of practitioner groups who have only known mercury-based equipment as a standard must be gained. • Affordable quality devices that are readily available to each national market must be identified. • Procurement processes for equipment, especially in government facilities, can be convoluted and bureaucratic. • Safe and secure storage of mercury waste or mercury from retired equipment, and final disposal of mercury as a hazardous waste, may be challenging to achieve.

Outcomes, components and outputs	Structural barriers to be addressed	Activities	Implementation challenges
Outcome/Component 5: New and/or enhanced training programs established to build capacity for the implementation of best practices and appropriate technologies beyond model facilities and programs **Output 5**: • Effective national training programs are established or enhanced and are building capacity in the health-care and related sectors for the implementation of best practices and the use of appropriate technologies beyond model facilities and programs.	• Inadequate or nonexistent training programs	• Set benchmark for monitoring and evaluation of training program at Project inception and for review prior to launch of training program; and identify overall training goal, outcome, general content, indicators for success and methodology. • Develop framework, content and methodology for training programs in appropriate languages • Modify and generalize facility-level training to make it nationally relevant; evaluate and incorporate existing relevant training programs with the goal of achieving sustainability • Establish certification criteria and programs when appropriate • Establish or enhance training infrastructure at host institutions and formalize partnerships • Conduct trainings including training-of-trainers, echo training and cultivation of "environmental champions" • Conduct at least six 25-person training programs • Assure development of a follow-up, support and networking system for training participants • Seek appropriate partnerships and policies to ensure sustainability • Develop and support activities toward inclusion of health-care waste management in medical, nursing and affiliated curricula	• Acceptance of health-care waste management training as a necessity for the operation of health facilities must be gained. • Acceptance of health-care waste management training as an adjunct to medical training for health-care professionals must be achieved. • It may be difficult to establish the "value" conveyed by a certificate or other credential in this field. • Adaptation of training programs to serve individuals from various institutions will be required. • Release time will be necessary for individuals to attend training that has not been valued in the past.

Outcomes, components and outputs	Structural barriers to be addressed	Activities	Implementation challenges
Outcome/Component 6: National policies aimed at replicating and sustaining best techniques and practices demonstrated by the Project explored and, where feasible, initiated **Output 6**: • Review of relevant national policies, regulations and guidelines is conducted in light of Project experiences. • Appropriate policy updates or revisions are recommended and further agreement or commitments by relevant authorities are pursued. • If appropriate, a national policy review conference by relevant authorities is held for these purposes.	• Lack or ineffectiveness of policies on health-care waste management	• Review relevant national policies, regulations and guidelines and support development of policy recommendations • Support a national policy review conference by relevant authorities • Seek agreement on policy updates, reformulations and implementation plans as needed	• Private sector manufacturers and providers of mercury-based equipment and combustion waste treatment technologies may provide resistance. • International donor agencies that currently favor or have programs to promote combustion treatment technologies may provide resistance. • Political will must exist in each country to prioritize reviews and promulgate new standards or regulations in this area in the face of competing demands.
Outcome/Component 7: Project results disseminated to all stakeholders for awareness raising aimed at their replication **Output 7**: • Project results on best techniques and practices are distributed to relevant federal and state ministries or agencies, health service delivery institutions and other stakeholders. • Targeted promotional materials, workbooks and other tools are disseminated to promote widespread replication. • Conferences or workshops are held to encourage replication. • Agreement of relevant authorities is sought on an implementation plan for replication of best practices.	• Lack of awareness and materials on health-care waste management	• Announce Project inception • Develop awareness-raising, educational and replication materials, such as workbooks and toolkits, based on Project activities • Disseminate materials through national networks • Organize national conferences and/or workshops to disseminate Project results • Conduct public awareness campaign to the general public, patients, families, etc.	• It may be difficult to generate interest in and prioritize attention to these issues over other priority issues in the health-care field.

Outcomes, components and outputs	Structural barriers to be addressed	Activities	Implementation challenges
Outcome/Component 8: Global, regional and national counterparts from agencies, governments and NGOs beyond participating countries informed of best techniques and practices for the purpose of replication **Output 8**: • Project results on demonstrated best techniques and practices are made available for dissemination globally and regionally. • Project materials are disseminated through international and regional networks.	• Lack of awareness and materials on health-care waste management • Lack of global and regional awareness on health-care waste management	• Develop and/or modify, and if necessary translate, awareness-raising, educational and replication materials for a global audience • Develop and disseminate technical resources and publications based on research and development, data assessment and technology validation • Present and disseminate awareness-raising, educational and replication materials at regional and international meetings • Disseminate materials and Project information through WHO, HCWH and other stakeholder networks • Share information through the Project website, GEOLibrary and Project listserve(s)	• Some international donors and agencies may resist considering alternatives and reformulating programs to accommodate new technologies and approaches. • Multiple health-related proposals and advances compete for attention on the regional and international health agendas.

Table 8. Quantitative and Semi-Quantitative Indicators

Outcome	Baseline*	Quantitative or Semi-Quantitative Indicator
1. Best practices for health-care waste management demonstrated, documented and made replicable	• Facilities selected to become models currently practice little or no segregation nor minimization of waste • Facilities selected to become models currently do not have facility policies promulgating best practices • Few or no personnel have undergone training in the facilities selected to become models	Model facilities demonstrate best practices for HCWM as reflected in: • Policies requiring best practices existing in all model facilities, including training requirements and measurable goals. • 50% reduction of overall waste at those facilities that do not currently practice segregation • 100% training of health care staff responsible for HCWM in model facility (excluding newly hired staff)
2. Appropriate non-incineration health-care waste treatment technologies successfully deployed and demonstrated	• Facilities, clusters or programs selected to become models either do not have treatment systems (except for Latvia and Lebanon and in one facility in Argentina) or they operate incinerators that do not meet international standards	• By Quarter 8 of the Project, at least one alternative technology will be installed and fully operational in all countries that plan to deploy technologies.**
3. Affordable, non-incineration, health-care waste treatment technologies successfully designed to meet African needs and manufactured, and their replication plans in place	• No local manufacturers of alternative treatment technologies currently exist in Africa	• At least one manufacturer in Africa will be commercially fabricating the designed technologies.
4. Use of mercury-free devices and best practices for management of mercury waste demonstrated, documented and made replicable	• Facilities selected to become models currently do not have policies on management of mercury waste • Facilities selected to become models currently do not use mercury-free devices	Model facilities demonstrate best practices for mercury waste management as reflected in: • Facility policies that require best practices for mercury waste management in all model facilities • 80% of mercury devices in model facilities replaced with mercury-free alternatives.
5. New and/or enhanced training programs established to build capacity for the implementation of best practices and appropriate technologies beyond model facilities and programs	• Majority of participating countries have no national training programs specific to HCWM • In the few countries that have national training programs, participation is limited due to inadequate resources, capacity, and outreach	• Comprehensive national training programs specific to HCW are established in all participating countries • An increase of at least 10% in the number of personnel trained in Year 3 on best practices for HCWM in existing national training programs • At least two national training sessions have been conducted in each country
6. National policies aimed at replicating and	• Participating countries have no national polices on	• All participating countries have initiated

Outcome	Baseline*	Quantitative or Semi-Quantitative Indicator
sustaining best techniques and practices demonstrated by the Project explored and, where feasible, initiated	HCWM or have minimal policies that do not incorporate comprehensive best practices and techniques	dialogue on national health-care waste management policies, as indicated by at least one meeting or conference involving key policy-makers and stakeholders • At least one participating country has revised or further developed its HCWM policies
7. Project results disseminated to all stakeholders for awareness-raising aimed at their replication		• At least one national conference or workshop in each participating country • One set of toolkits developed and disseminated to appropriate parties in participating countries
8. Global, regional and national counterparts from agencies, governments and NGOs beyond participating countries informed of best techniques and practices for the purpose of replication		• Website developed with country-specific information all countries • GEOLibrary contains information from at least 5 training programs • Project results presented at least six international or regional conferences or meetings.

* Country-specific baseline data will be refined during the first phase of Full Project implementation.
** Fully operational means that (1) all infectious waste is treated in the treatment technology before leaving the facility, (2) infectious waste is rendered non-infectious as shown by four consecutive weekly tests following the standard protocol for microbial inactivation efficacy, and (3) the treatment technology is operating daily or at the normal duty cycle for at least three months.

Note: Except for Outcome 3, this table of quantitative and semi-quantitative indicators refers to the seven project countries where model facilities, clusters and programs are being demonstrated. Outcome 3 refers to Tanzania.

Table 9. Project Activity Timeline and Workplan

Table 9 shows the global project activity timeline and workplan. For details of country-specific timelines and workplans, see Table 10.

Duration over period	Activities	Year 1				Year 2				Year 3				Year 4			
		2007	2008			2009				2010				2011			
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16
Global management activities																	
	Project endorsed (with appropriate signatures)																
3 months	Hire global management team members																
3 months	Establish central office																
3-6 months	Website development and localization																
5 days	Global meeting of National Consultants/Coordinators																
	Monitoring and evaluation, midterm internal review																
3 days	Global Project Steering Committee meeting																
	Final monitoring and evaluation, external review																
National management activities																	
	Establish MOUs with local governments and other partners and establish national structures (National Project Steering Committee, National Working Group, etc.)																
	Formal endorsement of NWG and NPSC																
	Hire national coordinator(s) and establish national Project management structure																
	Develop and approve annual workplans and budgets																
	Formal review by NPSC and NWG end of year 1																

Duration over period	Activities	Year 1				Year 2				Year 3				Year 4			
		2007	2008			2009				2010				2011			
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16
	Formal review by NPSC and NWG end of year 2																
	Formal review by NPSC and NWG end of year 3																
Component 1: Model facilities and programs																	
	Formalize MOU with selected model facilities																
3-5 months	Develop/adapt tool for baseline assessment																
3-5 months	Establish a system to measure and document results																
3-5 months	Conduct baseline assessments																
	Plan model health-care waste management program																
9-12 months	Implement model program including procurement of equipment																
	Develop best practices toolkits and other relevant materials																
	Develop training curricula, materials and methodology																
	Implement facility-wide training																
	Conduct periodic monitoring, evaluation and program improvement																
Component 2: Facility-linked appropriate technology																	
2 months	Develop technology specifications																
2 months	Issue request for proposal (RFP)																
2 months	Oversee bidding process																
	Review and select appropriate technology																
3 months	Prepare site and obtain any necessary permits																
3 months	Oversee shipment, customs clearance and accreditation by national body if necessary																

Duration over period	Activities	Year 1				Year 2				Year 3				Year 4			
		2007	2008			2009				2010				2011			
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16
2-5 days	Conduct operator training																
	Install and operate technology																
	Monitor, conduct tests and evaluate technology																
Component 3: Africa-specific appropriate technology development and fabrication																	
	Develop needs assessment, performance criteria and design concepts																
	Develop engineering drawings																
	Build prototypes and perform structural and pressure tests																
	Conduct field performance tests of prototypes and demonstrate technologies in a health-care setting																
	Develop construction, installation, operations, training, maintenance and repair manuals																
	Demonstrate fabrication with a local manufacturer																
	Validate and certify manufactured units																
	Demonstrate fabrication with manufacturers outside Tanzania																
	Lay groundwork for replication and sustainability																
Component 4: Procurement of mercury-free devices and best practices in mercury management																	
	Develop and implement a plan related to mercury and mercury alternatives																
	Procure mercury-free devices and spill kits for model facilities																
	Procure or construct mercury storage units for model health-care and central facilities																
	Evaluate device acceptability and efficacy																

Duration over period	Activities	Year 1				Year 2				Year 3				Year 4			
		2007	2008			2009				2010				2011			
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16
	Develop and disseminate awareness-raising, educational and replication/scale-up materials																
	Seek policy review and recommendations related to mercury use at model-facility and national levels																
3 months preparation	Conduct a mercury conference if applicable																
Component 5: National training on health-care waste management																	
	Set benchmark for monitoring and evaluation of training program at Project inception and for review prior to launch of training program. Identify overall training goal, outcome, general content, indicators for success and methodology.																
6 months	Develop framework, content and methodology for training programs in appropriate languages																
3 months	Modify and generalize facility-level training to make it nationally relevant; evaluate and incorporate existing relevant training programs with the goal of achieving sustainability																
	Establish certification criteria and programs when appropriate																
9 months-1.5 years	Establish or enhance training infrastructure at host institutions and formalize partnerships																
	Conduct trainings including training-of-trainers, echo training and cultivation of "environmental champions"																

Duration over period	Activities	Year 1				Year 2				Year 3				Year 4			
		2007	2008			2009				2010				2011			
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16
	Conduct at least six 25-person training programs																
3 months	Assure development of a follow-up, support and networking system for training participants																
6 months	Seek appropriate partnerships and policies to ensure sustainability																
6 months	Develop and support activities toward inclusion of health-care waste management in medical, nursing and affiliated curricula																
Component 6: National review of health-care waste management policy																	
3 months	Review relevant national policies, regulations and guidelines and support development of policy recommendations																
	Support a national policy review conference by relevant authorities																
	Seek agreement on policy updates, reformulations and implementation plans as needed																
Component 7: National dissemination activities																	
3 months	Announce Project inception																
6 months	Develop awareness-raising, educational and replication materials, such as workbooks and toolkits, based on Project activities																
	Disseminate materials through national networks																
3 months preparation	Organize national conferences and/or workshops to disseminate Project results																

Duration over period	Activities	Year 1				Year 2				Year 3				Year 4			
		2007	2008			2009				2010				2011			
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16
	Conduct public awareness campaign to the general public, patients, families, etc.																
Component 8: Global and regional dissemination activities																	
	Develop and/or modify, and if necessary translate, awareness-raising, educational and replication materials for a global audience																
	Develop and disseminate technical resources and publications based on research and development, data assessment and technology validation																
	Present and disseminate awareness-raising, educational and replication materials at regional and international meetings																
	Disseminate materials and Project information through WHO, HCWH and other stakeholder networks																
	Share information through the Project website, GEOLibrary and Project listserve(s)																

Table 10. Country-Specific Activity Timelines and Workplans

Table 10 describes the activity timeline and workplan for each Project country, in relation to the global activity timeline and workplan shown in Table 9.

Argentina
In Argentina, the timing of four Project activities will differ from the global workplan timeline (Table 9). The planning of model health-care waste management programs at the facility level and the signing of hospital MOUs under Component 1 will occur simultaneously in Q1 and Q2. Research and testing of a new alternative technology for chemotherapeutic waste will be undertaken at a research facility in Argentina under Component 2; some of the research may begin before Q5. Implementation will extend to Q8 and Q9, since outcomes must be replicated in three regional areas. Additionally, outcome support activity identified as necessary by the National Project Steering Committee (NPSC), such as an Evaluation Workshop, will be implemented between Q8 (end of implementation phase) and Q16 (end of Project).
India
Due to India's geographic size and the work already being done related to health-care waste management (HCWM) in some areas, national Project activities will have a strategic double focus. One track will develop a model state where work will focus on improving the current system within one central facility and the area it services. These activities will begin during Q2 and will most likely extend through Q6, with follow-up through Q12. Within the second track, the NPSC will identify a model hospital in a poorer state with an underdeveloped waste management system; this track will follow the global timeline for Components 1 and 2 (model facilities and demonstration technology). An additional Project activity unique to India relates to Component 5 (national training program). IGNOU, with collaboration of the WHO SEARO office, operates an extensive distance learning program on HCWM throughout the country. The NPSC will collaborate with this program by providing technical, strategic and some financial support. Because the program is already functional, this collaboration will begin in Q1.
Latvia
In Latvia, awareness-raising activities under Component 7 (dissemination) will be conducted at the start of the Project (Q1 and Q2) to broaden stakeholder understanding of the need to prioritize improving health-care waste management practices, identified as necessary by the NWG during PDF B. The activities in Latvia for Components 1 and 2 (model facilities and demonstration technology) will maximize effectiveness by using UNDP/GEF resources in combination with available funds for hazardous waste treatment to leverage the successful installation of up to two additional technology sites; the additional funds will be provided by EU sources, the hospitals, municipalities and private funding. Two additional Project activities unique to Latvia relate to Component 5, which pertains to the institution of a national training program. Firstly, this component will commence in Q1 by identifying the main criteria for a procedure to select the training program's host institution. Secondly, once EU funding for hazardous waste treatment is programmed, the Project will consider providing assistance to hospitals in securing EU funding for the improvement of on-site health-care waste treatment. Finally, related to national management activities, during the inception workshop in Q1 the Latvian project team shall consider establishing three working groups to effectively deal with the following Project subcomponents: a) training; b) technology and waste system-related issues; and c) legislation.

Lebanon
Because all new projects in Lebanon must be issued a Grant Approval Decree by the Council of Ministers in order to begin, the Project may not start in-country work before the end of Q2. Consequently, Project activities such as hiring national coordinators, establishment of Project Memoranda of Understanding, and establishment of the National Working Group (NWG) and National Project Steering Committee (NPSC) may be delayed until the start of Q3. The start of all activities within Components 1, 4, 5, 6 and 7 (model facilities, non-mercury equipment, national training program, national policy review and national dissemination) may subsequently shift to start at the beginning of Q3. More time will be given in Lebanon than in other Project countries to activities such as the development of best HCWM practices and training programs within the model facilities before moving on to monitoring and mass awareness-raising campaigns. Additionally, development of the tools for baseline assessment, the assessments themselves, and the development of training curricula and best practice toolkits under Component 1 may take longer than the globally allotted three to five months. As international funding from other sources (EC Life, EU/OMSAR, etc.) is already secured for non-burn waste treatment technologies, Component 3 is not applicable to Lebanon, and activities related to Component 2 (demonstration technology) will focus exclusively on conducting a comparative analysis of existing technologies during Q3 and Q4. Within Component 5 (training programs), the national training needs assessment will be fast-tracked during the first year (Q3 and Q4), and certification criteria development and programs will most likely commence during Q4. Component 6 (national policy review) will be implemented in coordination with other similar projects in the country, including a project financed by the EC Life Third Countries and implemented by Arc en Ciel.
Philippines
As an international conference on mercury organized by Health Care Without Harm (HCWH) and the United Nations Environment Programme (UNEP) was held in the Philippines in January 2006, an additional mercury conference as outlined in Component 4 (non-mercury equipment and policy) will be considered optional for this country. Within Component 5 (national training program), benchmarks for monitoring and evaluation of the training program will be set in Q2. The development of a framework, content and methodology for training programs in appropriate languages may not be necessary as English is widely spoken, though translation to Tagalog or Filipino will be considered. The establishment or enhancement of training infrastructure at host institutions and the formalization of partnerships may begin in Q4 or Q5 prior to the conduction of the training programs. Finally, because the revision of academic curricula involves a particularly extended process in the Philippines, the timeline for the development and support of activities toward inclusion of health-care waste management in medical, nursing and affiliated curricula will be extended from Q4 through Q13.
Senegal
Nearly all activities conducted in Senegal will follow the global workplan and timeline. The singular exception relates to a training program that the Ministry of Health is coordinating called PRONALIN, funded by the Nordic fund. This training program began in 2005 and will continue through 2010. Senegal's NPSC will collaborate with this training program to enhance it with lessons learned from the Project and to assure its sustainability beyond Project completion. These activities will be undertaken from Q1 through Q15.
Tanzania
In Tanzania, the focus will be exclusively on completion of Component 3 (technology development) activities, which will follow the global workplan and timeline for Component 3. The needs assessment, performance criteria and design concepts for non-burn waste treatment technologies appropriate for use in sub-Saharan Africa will be developed during Q1 through Q2, with the development of engineering drawings extending through Q3. Prototypes will be built and structural and pressure tests performed from Q2 to Q4, followed by field tests and a demonstration of technology performance in a health-care setting in Q3 to Q4. Manuals for technology construction, installation, operation, training and maintenance will also be developed at this time. Successful technology fabrication with a local manufacturer and validation and certification of manufactured units will be achieved during Q4 to Q5, and fabrication will be demonstrated with manufacturers outside Tanzania during Q5 to Q6. Finally, the groundwork will be laid throughout Q3 to Q15 for replication and sustainability of this component's achievements.

Vietnam
In Vietnam, the mercury conference outlined in Component 4 (non-mercury equipment and policy) will be incorporated into national conferences to be held as part of Component 7 (national dissemination) to maximize efficiency and use of resources. These national conferences will be held in three or four modules: one or two at Project inception to introduce non-burn waste treatment methods, and two for the dissemination of Project results. The Project will follow this revised timeline in acknowledgement of the fact that government and academic awareness and acceptance of best practices in health-care waste management is currently low and must be raised for full Project success. Korean co-financing of the conferences will be explored, and an additional co-finance activity entailing the organization of a study tour to Korea for key stakeholders on health-care waste and mercury management will also be pursued in partnership with the Korean Ministry of Environment. The unique situation in Vietnam will also shape Project activities under Component 2 (demonstration technology). As one company (URENCO) is responsible for all municipal, hospital and industrial waste management in Hanoi, Component 2 activities there will be directed toward investing in two autoclaves and one additional shredder to promote non-burn treatment of waste in the central facility. Another activity based on the URENCO system will be the demonstration of a first-of-its-kind city-wide sharps management program in Hanoi. Through this program the Project will purchase and distribute reusable sharps storage boxes to all Hanoi health-care facilities managed by URENCO, and sharps waste will be separated, stored, collected, transported and recycled separately from the other waste streams.

SECTION III: TOTAL BUDGET AND WORKPLAN

Section III contains the following budget- and workplan-related tables:
Table 11: Overall Project Budget;
Table 12: Project Budget by Component;
Table 13: Project Co-Financing by Component and Source; and
Tables 14a –h: List of Indicative Budget Details by Country.

Table 11. Overall Project Budget

Description	Year 1	Year 2	Year 3	Year 4	Total
	US$	US$	US$	US$	US$
International personnel					
Global coordination, Global Expert Team and international technical consultants	**373,870**	**373,870**	**373,870**	**224,600**	**1,346,210**
Global and regional dissemination					
Project website; participation at global and regional conferences; validation of emerging health-care waste management technologies and mercury-free technologies; Project-related publications and validation testing; and collaboration and information-exchange with related GEF Projects	**93,750**	**93,750**	**93,750**	**93,750**	**375,000**
Global meetings					
Global Project Steering Committee Meetings and National Consultant trainings	**100,000**	**100,000**	**100,000**	**0**	**300,000**
Country budgets					
Argentina	474,312	217,592	205,583	116,513	1,014,000
India	415,217	259,187	207,658	132,238	1,014,300
Latvia	223,137	222,990	222,843	145,330	814,300
Lebanon	262,664	228,373	194,081	129,182	814,300
Philippines	578,642	194,415	172,188	99,190	1,044,435
Senegal	538,744	240,498	153,313	80,315	1,012,870
Tanzania	332,720	288,480	116,977	36,823	775,000
Vietnam	592,017	211,290	169,563	101,065	1,073,935
Line total	**3,417,453**	**1,862,825**	**1,442,206**	**840,656**	**7,563,140**
Miscellaneous					
Technology contingency	300,000	0	0	0	300,000
Miscellaneous, reporting, evaluation	0	40,000	0	60,000	100,000
UNOPS (8% of global & Tanzania components)	142,105	100,000	100,000	0	342,105
Line total	**442,105**	**140,000**	**100,000**	**60,000**	**742,105**
Total Project budget excluding PDF A and PDF B	**4,427,178**	**2,570,445**	**2,109,826**	**1,219,006**	**10,326,455**
Project co-financing and in-kind contributions					**12,970,494**
Sub-total					**23,296,949**
PDF A					25,000
PDF B					699,948
Total Project budget including PDF A and PDF B					**24,021,897**

Table 12. Project Budget by Component

Project Component	GEF fund (US$)	Country/ partner co-financing (US$)	Total project activity (US$)
1. Establish model facilities and programs to exemplify best practices in health-care waste management, and develop materials to facilitate replication.	1,969,911	2,831,917	**4,801,828**
2. Deploy and evaluate commercially-available, non-incineration health-care waste treatment technologies appropriate to the needs of the facility or cluster.	2,852,497	4,462,802	**7,315,299**
3. Develop, test, manufacture and deploy affordable, small-scale non-incineration technologies for appropriate use in small- and medium-size facilities in sub-Saharan Africa, and prepare and disseminate manuals for their manufacture, installation, operation, maintenance and repair.	1,123,686	398,156	**1,521,842**
4. Introduce and demonstrate best practices for management of mercury waste, and develop and disseminate awareness-raising and educational materials related to mercury.	384,000	615,500	**999,500**
5. Establish or enhance training programs to build capacity for implementation of best practices and appropriate technologies beyond the model facilities and programs.	1,664,879	2,776,486	**4,441,365**
6. Review relevant policies, seek agreement by relevant authorities on recommended updates or reformulations if needed, seek agreement on an implementation plan, and if appropriate, assist in holding a policy review conference for these purposes.	380,823	282,000	**662,823**
7. Distribute Project results on best techniques and practices to relevant stakeholders, disseminate materials and hold conferences or workshops to encourage replication.	1,194,484	966,523	**2,161,007**
8. Make Project results on demonstrated best techniques and practices available for dissemination and scaling-up regionally and globally.	756,176	637,111	**1,393,287**
Total	**10,326,455**	**12,970,494**	**23,296,949**

Table 13. Project Co-Financing by Component and Source

	Component 1: Model facility	**Component 2:** Technology demonstration	**Component 3:** Technology development	**Component 4:** Mercury elimination	**Component 5:** National training program	**Component 6:** Policy review	**Component 7:** National dissemination	**Component 8:** Global/ regional dissemination	**Total co-financing by country/ partner**
	US$	**US$**	**US$**	**US$**	**US$**	**US$**	**US$**	**US$**	**US$**
Project countries									
Argentina	846,398	270,000	0	65,000	464,884	105,000	434,884	0	**2,186,166**
India	127,500	42,500	0	127,500	140,555	0	42,500	0	**480,555**
Latvia	170,211	2,521,000	0	136,000	0	20,000	0	0	**2,847,211**
Lebanon	729,632	249,000	0	0	600,000	0	0	0	**1,578,632**
Philippines	363,509	528,302	0	0	458,491	0	75,472	0	**1,425,774**
Senegal	90,000	0	0	0	720,000	0	0	0	**810,000**
Vietnam	45,000	710,000	0	20,000	220,000	15,000	30,000	0	**1,040,000**
Tanzania	0	0	181,156	0	0	0	0	0	**181,156**
Country Total									**10,549,494**
Project partners									
HCWH	385,000	75,000	150,000	200,000	50,000	75,000	150,000	290,000	**1,375,000**
WHO	67,000	67,000	67,000	67,000	67,000	67,000	67,000	67,000	**536,000**
UIC	7,667	0	0	0	55,556	0	166,667	235,111	**465,000**
Other*	0	0	0	0	0	0	0	45,000	**45,000**
Partner Total									**2,361,000**
Total co-financing by component	**2,831,917**	**4,462,802**	**398,156**	**615,500**	**2,776,486**	**282,000**	**966,523**	**637,111**	**12,970,494**

*Other minor co-financing sources available upon request.

Tables 14A –H: List of Indicative Budget Details by Country

Table 12 contains country-specific budgets categorized by activity over the Project's four years. Categories include: national management, model facilities, demonstration technologies, non-mercury equipment and policies, national policy review, national dissemination activities, national missions and international support from Project partners (the World Health Organization, Health Care Without Harm and the University of Illinois at Chicago). The Project's technology-development activities (component 3) will be implemented in Tanzania. For more information on this component, please refer to the Tanzania budget breakdown.

Table 14a. Argentina Budget Breakdown (estimate)

National activities and components	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
National management: national meetings, national coordination, consulting and translations	22,375	22,375	22,375	22,375	**89,500**
Model facilities (component 1): non-technology capital costs, recurring costs, storage units if applicable, equipment for on-site training and consultation	109,293	54,647	0	0	**163,940**
Demonstration technology linked to model facilities (component 2): capital costs, accessories, site preparation, permits, trainings, transportation vehicles, repair and maintenance and validation testing	244,710	0	0	0	**244,710**
Non-mercury equipment and policy (component 4): spill kits, safe storage for existing mercury equipment, mercury-free alternative devices, mercury assessment tools and activities, public awareness activities and national mercury conference if applicable	11,875	11,875	11,875	11,875	**47,500**
National training program (component 5): One-time costs include curriculum development, translation if applicable, equipment procurement, activities related to the inclusion of HCWM best practices in related professional curricula, and program evaluation. Costs per training session include student materials; facility cost; subsidies for room, board and transportation of students; trainer costs; administrative costs; and transportation to model facilities.	0	42,637	85,275	42,638	**170,550**
National policy review (component 6)	3,750	3,750	3,750	3,750	**15,000**
National dissemination activities (component 7): development and design of dissemination materials, national conference(s) to increase knowledge and awareness of relevant professional and government officials on HCWM and to disseminate Project results, and dissemination through relevant public health-care associations and Project partners	17,125	17,125	17,125	17,125	**68,500**
National missions: costs related to all missions to Argentina (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
International support: costs associated with support received from WHO, HCWH and UIC	46,434	46,433	46,433	0	**139,300**
Total	**474,312**	**217,592**	**205,583**	**116,513**	**1,014,000**

Table 14b. India Budget Breakdown (estimate)

National activities and components	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
National management: national meetings, national coordination and consulting and translations	23,250	23,250	23,250	23,250	**93,000**
Model facilities (component 1): non-technology capital costs, recurring costs, storage units if applicable and equipment for on-site training and consultation. This applies both to the individual facility in the less-resourced state, and to strategic interventions in upgrading systems at a number of facilities to build a model network in another state.	105,034	52,516	0	0	**157,550**
Demonstration technology linked to model facilities (component 2): capital costs, accessories, site preparation, permits, trainings, transportation vehicles, repair and maintenance, and validation testing both for a specific technology in an on-site application at one model facility in a less-resourced state, and for technology enhancements possibly at a central treatment facility or within individual facilities in the model state project	198,750	66,250	0	0	**265,000**
Non-mercury equipment and policy (component 4): spill kits, safe storage for existing mercury equipment, mercury-free alternative technologies, mercury assessment tools and activities, public awareness activities and national mercury conference if applicable	18,000	18,000	18,000	18,000	**72,000**
National training program (component 5): One-time cost includes curriculum development and enhancement of existing programs to build on lessons learned from the Project, translation if applicable, equipment procurement, activities related to the inclusion of HCWM best practices in related professional curricula, and program evaluation. Costs per training session include student materials; facility cost; subsidies for room, board and transportation of students; trainer costs; administrative costs; and transportation to model facilities.	0	28,987	57,975	28,988	**115,950**
National policy review (component 6)	5,000	5,000	5,000	5,000	**20,000**
National dissemination activities (component 7): development and design of dissemination materials, national conference(s) to increase knowledge and awareness of relevant professional and government officials on HCWM and to disseminate Project results, and dissemination through relevant public health-care associations and Project partners	0	0	38250	38250	**76,500**
National missions: costs related to all missions to India (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
International support: costs associated with support received from WHO, HCWH and UIC	46,433	46,434	46,433	0	**139,300**
Total	**415,217**	**259,187**	**207,658**	**132,238**	**1,014,300**

Table 14c. Latvia Budget Breakdown (estimate)

National activities and components	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
National management: national meetings, national coordination and consulting and translations	48,625	48,625	48,625	48,625	**194,500**
Model facilities (component 1): non-technology capital costs, recurring costs, storage units if applicable and equipment for on-site training and consultation	62,453	31,227	0	0	**93,680**
Demonstration technology linked to model facilities (component 2): capital costs, accessories, site preparation, permits, trainings, transportation vehicles, repair and maintenance, and validation testing	0	0	0	0	**0**
Non-mercury equipment and policy (component 4): spill kits, safe storage for existing mercury equipment, mercury-free alternative devices, mercury assessment tools and activities, public awareness activities and national mercury conference if applicable	14,375	14,375	14,375	14,375	**57,500**
National training program (component 5): One-time cost includes curriculum development, translation if applicable, equipment procurement, activities related to the inclusion of HCWM best practices in related professional curricula, and program evaluation. Costs per training session include student materials; facility cost; subsidies for room, board and transportation of students; trainer costs; administrative costs; and transportation to model facilities.	0	31,080	62,160	31,080	**124,320**
National policy review (component 6)	6,250	6,250	6,250	6,250	**25,000**
National dissemination activities (component 7): development and design of dissemination materials, national conference(s) to increase knowledge and awareness of relevant professional and government officials on HCWM and to disseminate Project results, and dissemination through relevant public health-care associations and Project partners	26,250	26,250	26,250	26,250	**105,000**
National missions: costs related to all missions to Latvia (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
International support: costs associated with support received from WHO, HCWH and UIC	46,434	46,433	46,433	0	**139,300**
Total	**223,137**	**222,990**	**222,843**	**145,330**	**814,300**

Table 14d. Lebanon Budget Breakdown (estimate)

National activities and components	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
National management: national meetings, national coordination and consulting and translations	61,216	61,218	61,218	61,218	**244,870**
Model facilities (component 1): non-technology capital costs, recurring costs, storage units if applicable and equipment for on-site training and consultation	105,513	52,757	0	0	**158,270**
Demonstration technology linked to model facilities (component 2): capital costs, accessories, site preparation, permits, trainings, transportation vehicles, repair and maintenance and validation testing	0	0	0	0	
Non-mercury equipment and policy (component 4): spill kits, safe storage for existing mercury equipment, mercury-free alternative devices, mercury assessment tools and activities, public awareness activities and national mercury conference if applicable	12,625	12,625	12,625	12,625	**50,500**
National training program (component 5): One-time cost includes curriculum development, translation if applicable, equipment procurement, activities related to the inclusion of HCWM best practices in related professional curricula, and program evaluation. Costs per training session include student materials; facility cost; subsidies for room, board and transportation of students; trainer costs; administrative costs; and transportation to model facilities.	0	18,465	36,930	18,465	**73,860**
National policy review (component 6)	2,500	2,500	2,500	2,500	**10,000**
National dissemination activities (component 7): development and design of dissemination materials, national conference(s) to increase knowledge and awareness of relevant professional and government officials on HCWM and to disseminate Project results, and dissemination through relevant public health-care associations and Project partners	15,626	15,625	15,625	15,624	**62,500**
National missions: costs related to all missions to Lebanon (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
International support: costs associated with support received from WHO, HCWH and UIC	46,434	46,433	46,433	0	**139,300**
Total	**262,664**	**228,373**	**194,081**	**129,182**	**814,300**

Table 14e. Philippines Budget Breakdown (estimate)

National activities and components	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
National management: national meetings, national coordination and translations	18,625	18,625	18,625	18,625	**74,500**
Model facilities (component 1): non-technology capital costs, recurring costs, storage units if applicable and equipment for on-site training and consultation	97,583	48,792	0	0	**146,375**
Demonstration technology linked to model facilities (component 2): capital costs, accessories, site preparation, permits, trainings, transportation vehicles, repair and maintenance and validation testing	362,000	0	0	0	**362,000**
Non-mercury equipment and policy (component 4): spill kits, safe storage for existing mercury equipment, mercury-free alternative devices, mercury assessment tools and activities, public awareness activities and national mercury conference if applicable	13,125	13,125	13,125	13,125	**52,500**
National training program (component 5): One-time cost includes curriculum development, translation if applicable, equipment procurement, activities related to the inclusion of HCWM best practices in related professional curricula and program evaluation. Costs per training session include student materials; facility cost; subsidies for room, board and transportation of students; trainer costs; administrative costs; and transportation to model facilities.	0	26,565	53,130	26,565	**106,260**
National policy review (component 6)	5,000	5,000	5,000	5,000	**20,000**
National dissemination activities (component 7): development and design of dissemination materials, national conference(s) to increase knowledge and awareness of relevant professional and government officials on HCWM and to disseminate Project results, and dissemination through relevant public health-care associations and Project partners	17,125	17,125	17,125	17,125	**68,500**
National missions: costs related to all missions to the Philippines (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
International support: costs associated with support received from WHO, HCWH and UIC	46,434	46,433	46,433	0	**139,300**
Total	**578,642**	**194,415**	**172,188**	**99,190**	**1,044,435**

Table 14f. Senegal Budget Breakdown (estimate)

National activities and components	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
National management: national meetings, national coordination and translations	63,000	31,500	0	0	**94,500**
Model facilities (component 1): non-technology capital costs, recurring costs, storage units if applicable and equipment for on-site training and consultation	128,810	0	0	0	**128,810**
Demonstration Technology linked to model facilities (component 2): capital costs, accessories, site preparation, permits, trainings, transportation vehicles, repair and maintenance and validation testing	246,750	82,250	0	0	**329,000**
Non-mercury equipment and policy (component 4): spill kits, safe storage for existing mercury equipment, mercury-free alternative devices, mercury assessment tools and activities, public awareness activities and national mercury conference if applicable	12,875	12,875	12,875	12,875	**51,500**
National Training Program (component 5): One-time cost includes curriculum development, translation if applicable, equipment procurement, activities related to the inclusion of HCWM best practices in related professional curricula and program evaluation. Costs per training session include student materials; facility cost; subsidies for room, board and transportation of students; trainer costs; administrative costs; and transportation to model facilities.	0	26,565	53,130	26,565	**106,260**
National policy review (component 6)	5,000	5,000	5,000	5,000	**20,000**
National dissemination activities (component 7): development and design of dissemination materials, national conference(s) to increase knowledge and awareness of relevant professional and government officials on HCWM and to disseminate Project results, and dissemination through relevant public health-care associations and Project partners	17,125	17,125	17,125	17,125	**68,500**
National missions: costs related to all missions to Senegal (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
International support: costs associated with support received from WHO, HCWH and UIC	46,434	46,433	46,433	0	**139,300**
Total	**538,744**	**240,498**	**153,313**	**80,315**	**1,012,870**

Table 14g. Tanzania Budget Breakdown (estimate)

Technology Development Component and respective activities (component 3)	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
Activity 1: Identification of concepts for development. Output: criteria/specifications identified, expert group convened, and advisory committee or network created. Expert group will develop criteria/engineering specifications, oversee technology development and testing and liaise with GET and GPSC. Advisory body will review criteria, specifications and designs. (Includes site visits by members of GET to two existing fabrication plants.)	56,210	0	0	0	**56,210**
Activity 2: Prototype development. Output: designs and prototypes for small- and medium-sized systems created and reviewed by expert group and advisory committee. Designs: Small-scale technology (multiple energy options), medium-scale technology (several energy options), small- and medium-scale shredders and reusable sharps containers.	143,953	47,984	0	0	**191,937**
Activity 3: Testing, modifications and draft manuals. Output: results of testing recorded and manuals finalized. Tests: performance, microbiological, durability, test of reusable sharps containers, and other tests. Draft manuals: construction, installation and operation/maintenance.	44,486	14,829	0	0	**59,315**
Activity 4: Field testing and documentation. Output: results of field tests recorded, modifications made, documentation and training materials completed. Tasks: (1) finalize arrangement with hospital and JSI, and conduct assessment, training, etc., on HCWM at hospital; (2) install technology and revise manual; (3) train hospital operators and draft training materials; (4) monitor usage, testing results, maintenance/repair and disposal of residues; and (5) review and finalize manuals and training materials.	24,348	24,348	12,174	0	**60,870**
Activity 5: Fabrication demonstration. Output: technology built using construction manuals, test results recorded, and fabrication of many units completed (50 small, 10 medium, 600 reusable sharps containers). Tasks: (1) assess market (drivers, barriers and solutions); (2) identify factories and entrepreneurs; (3) fabricate technologies using manuals; (4) test and certify technologies; (5) document replicability, costs and test results; and (6) fabricate several units (listed above).	0	92,118	39,479	0	**131,597**
Activity 6: Finalization of documentation and replication assistance. Output: manuals and training materials finalized and translated. Tasks: (1) finalize documents; (2) translate; (3) post materials on website, print copies and produce electronic copies on CD; (4) present results at national and regional GEF project conferences and other conferences; and (5) Tech Transfer teams assist in technology transfer to other countries.	0	49,499	21,214	0	**70,713**
Activity 7: Global and regional dissemination of component results.	16,430	16,430	16,430	16,431	**65,721**
Sub-total	285,427	245,209	89,297	16,430	**636,363**
10% Technology contingency	28,543	24,521	8,930	1,643	**63,637**
National missions: costs related to all missions to Tanzania (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
Total	**332,720**	**288,480**	**116,977**	**36,823**	**775,000**

Table 14h: Vietnam Budget Breakdown (estimate)

National activities and components	Year 1	Year 2	Year 3	Year 4	GEF Total
	US$	US$	US$	US$	US$
National management: national meetings, national coordination and translations	21,125	21,125	21,125	21,125	**84,500**
Model facilities (component 1): non-technology capital costs, recurring costs, storage units if applicable and equipment for on-site training and consultation	97,583	48,792	0	0	**146,375**
Demonstration technology linked to model facilities (component 2): capital costs, accessories, site preparation, permits, trainings, transportation vehicles, repair and maintenance, and validation testing	324,000	0	0	0	**324,000**
City-wide sharp waste management (component 2)	45,000	15,000	0	0	**60,000**
Non-mercury equipment and policy (component 4): spill kits, safe storage for existing mercury equipment, mercury-free alternative devices, mercury assessment tools and activities, public awareness activities and national mercury conference if applicable	13,125	13,125	13,125	13,125	**52,500**
National training program (component 5): One-time cost includes curriculum development, translation if applicable, equipment procurement, activities related to the inclusion of health-care waste management in related professional curricula and program evaluation. Costs per training session include student materials; facility cost; subsidies for room, board and transportation of students; trainer costs; administrative costs; and transportation to model facilities.	0	22,065	44,130	22,065	**88,260**
National policy review (component 6)	5,000	5,000	5,000	5,000	**20,000**
National dissemination activities (component 7): development and design of dissemination materials, national conference(s) to increase knowledge and awareness of relevant professional and government officials on HCWM and to disseminate Project results, and dissemination through relevant public health-care associations and Project partners	21,000	21,000	21,000	21,000	**84,000**
National missions: costs related to all missions to Vietnam (not including consultant salaries/fees)	18,750	18,750	18,750	18,750	**75,000**
International support: costs associated with support received from WHO, HCWH and UIC	46,434	46,433	46,433	0	**139,300**
Total	**592,017**	**211,290**	**169,563**	**101,065**	**1,073,935**

SECTION IV: ADDITIONAL INFORMATION

PART I: OTHER AGREEMENT

Table 15 lists the co-financing letters from participating countries and Project partners. Not all co-financing sources contributed letters. Some sources are referenced in multiple letters. Please refer to Table 13 for more details regarding co-financing. Table 16 lists Letters of Intent so far received by Project partners.

Table 15. Co-Financing Letters

Document Name	Signatory	Country/ Partner	Description	Amount (USD)
Countries				
Arg1.1cofi.jpg Arg1.2cofi.jpg	Ministry of Health and Environment	Argentina	On behalf of national partners including ministries, central facility, model facilities, training program and NGOs	880,000
Arg2cofi.pdf	AAMMA	Argentina	Related HCWM activities	50,000
Arg3cofi.pdf	Wr2	Argentina	25% discount on purchase of Alkaline Hydrolysis Technology	Not indicated
Arg4cofi.jpg	Ministry of Health and Environment	Argentina	Written manuals and training on chemicals management	266,000
Arg5cofi.jpg	Ministry of Health and Environment	Argentina	Community Doctors Program curricular module	990,166
Ind1cofi.doc	Toxics Link	India	Toxics Link and Shristi HCWM-related activities	425,000
Ind2cofi.jpg	IGNOU	India	IGNOU HCWM training program	55,555
Lat1cofi.pdf	Environmental Protection Fund	Latvia	Technology and mercury-replacement investment	335,911
Lat2cofi.pdf	BAO	Latvia	Purchase and maintenance of appropriate technology	300,000
Lat3cofi.pdf	Medical Waste Solutions Limited	Latvia	Technology investment though LIFE program	2,000,000
Lat4cofi.pdf	Ministry of Health	Latvia	On behalf of model facilities and the ministry	211,300
Leb1cofi.pdf	Arc en Ciel (AEC)	Lebanon	Waste handling, transportation and treatment	1,260,132
Leb2cofi.pdf	Ministry of Environment	Lebanon	Project-related MOE activities	128,500
Phi1cofi.pdf	Department of Health	Philippines	On behalf of national partners. See letter for details.	1,425,774
Sen1cofi.pdf	Department of Health	Senegal	On behalf of national partners including model facilities and Nordic Fund training program.	Not indicated
Tan1cofi.tif	University of Dar es Salaam	Tanzania	Technology development and implementation activities	114,946
Tan2cofi.tif	AGENDA	Tanzania	Technology development coordination activities	27,780
Tan3cofi.doc	Technology Development and Transfer Centre	Tanzania	Technology fabrication and transfer activities	38,430
Vie1cofi.jpg	Vietnamese Environmental Protection Agency (VEPA)	Vietnam	On behalf of all national sources including those enumerated below.	1,040,000
Vie2cofi.jpg	Ministry of Health	Vietnam	MOH HCWM-related activities	240,000
Vie3cofi.jpg	URENCO	Vietnam	For sharp and health-care waste treatment partnership activities	705,000
Vie4cofi.jpg	Viet Duc Hospital	Vietnam	Model facility Project-related activities	30,000
Vie5cofi.jpg	Ninh Binh Cluster	Vietnam	Model facility Project-related activities	20,000
Project Partners				
HCWH1cofi.pdf	Health Care Without Harm	HCWH	HCWH related activities	1,315,000
UIC1cofi.doc	University of Illinois at Chicago	UIC	UIC training- and dissemination-related activities	465,000

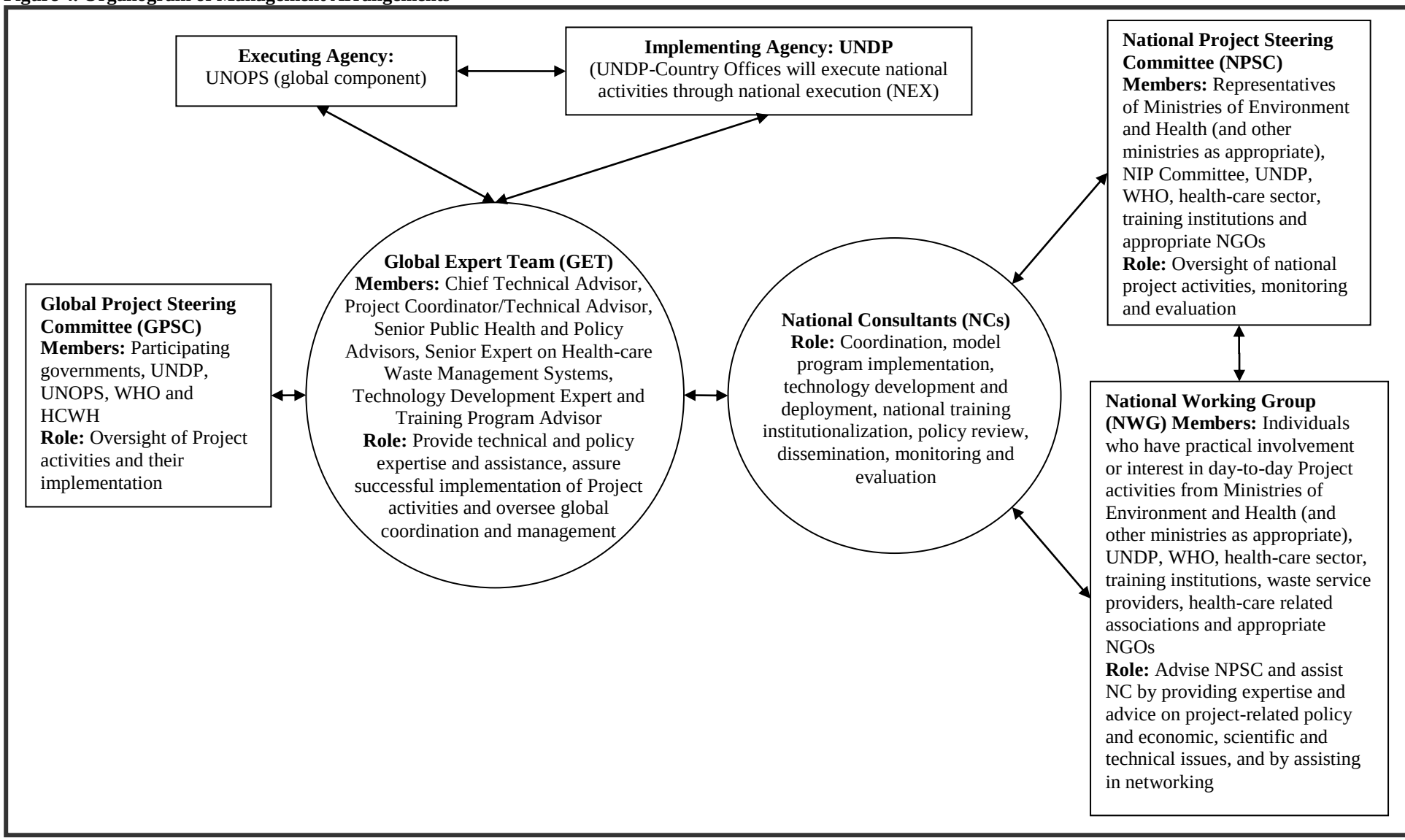
Document Name	Signatory	Country/ Partner	Description	Amount (USD)
WHO1cofi.doc WHO2cofi.doc	World Health Organization Headquarters	WHO	WHO related activities on behalf of national, regional and headquarter offices	536,000

Table 16: Letters of Intent

Document Name	Signatory	Country/ Partner	Description
Latvia LoI Translation.doc	N/A	Latvia	Translation of the letters of intent from model facilities of Latvia
Latvia Rezekne LoI.pdf	Rezekne model facility	Latvia	Letter of intent to participate in Project, stating preparations made including technology purchases, facility improvements and training.
Latvia Ventspils LoI.pdf	Ventspils model facility	Latvia	Letter of intent to participate in Project, stating preparations made including technology purchases, facility improvements and training.
Philippines Manila City LoI.pdf	Mayor of Manila, Philippines	Philippines	Letter of intent to participate in Project, stating readiness to provide space, maintenance and personnel to support Project activities and sustainability.
Philippines UPM LoI.pdf	University of Philippines	Philippines	Letter of intent to participate in Project including contribution of facilities and personnel for training component.
Senegal Rufisque LoI.pdf	Rufisque model facility	Senegal	Letter of intent to participate in Project.
Senegal Sangalcam LoI.pdf	Sangalcam model facility	Senegal	Letter of intent to participate in Project.
Tanzania JSI LoI.pdf	John Snow International	Tanzania	Letter of intent to participate in Project including offer of technical support.
Tanzania Mlandizi LoI.pdf	Mlandizi	Tanzania	Letter intent to participate in Project including offer of any needed assistance.
Tanzania Mwananyamala LoI.pdf	Mwananyamala	Tanzania	Letter of intent to participate in Project.
UIC LoI.doc	University of Illinois at Chicago	UIC	Letter of intent to participate in Project, including in the GWG and in implementation, training and dissemination activities.

PART II: ORGANOGRAM OF PROJECT

Figure 4. Organogram of Management Arrangements



PART III: TERMS OF REFERENCES FOR KEY PROJECT STAFF AND MAIN SUB-CONTRACTS

Title: Chief Technical Advisor (approximately 40%)
Duration: 4 years
Date required: November 2006
Duty Station: Home-base with ability to travel to project countries as needed.
Language: English

Project Goal and Outcome
The overall objective of the full Project, implemented by the UNDP, is to demonstrate and promote best practices and techniques for health-care waste management in order to minimize or eliminate releases of persistent organic pollutants and mercury to the environment. The Project will demonstrate the effectiveness of non-burn health-care waste treatment technologies, waste management practices and other techniques to avoid environmental releases of dioxins and mercury in seven strategically selected countries – Argentina, India, Latvia, Lebanon, the Philippines, Senegal and Vietnam. The Project will develop best practice health-care waste management models through collaborations with at least one large hospital, as well as with an appropriate combination of smaller clinics, rural health and/or injection programs and pre-existing central treatment facilities. The Project will also lay the groundwork for sustainability, replicability and the scaling-up of best techniques and practices beyond the model facilities and the Project countries by establishing or enhancing national training programs, pursuing policy reform, developing replication toolkits and awareness-raising materials, and disseminating these materials nationally and globally. An additional component aimed at developing locally-produced, affordable, non-burn health-care waste treatment technologies will be executed in Tanzania. The Project's ultimate goal is the protection of public health and the global environment from the impacts of dioxin and mercury releases.

The Project will achieve the following major components:
1. Establish model facilities and programs to exemplify best practices in health-care waste management, and develop materials to facilitate replication.
2. Deploy and evaluate commercially-available, non-incineration health-care waste treatment technologies appropriate to the needs of the facility or cluster.
3. Develop, test, manufacture and deploy affordable, small-scale non-incineration technologies for appropriate use in small- and medium-size facilities in sub-Saharan Africa, and prepare and disseminate manuals for their manufacture, installation, operation, maintenance and repair.
4. Introduce mercury-free devices in model facilities, evaluate their acceptability and efficacy, and develop and disseminate awareness-raising and educational materials related to mercury.
5. Establish or enhance training programs to build capacity for implementation of best practices and appropriate technologies beyond the model facilities and programs.
6. Review relevant national policies, seek agreement by relevant authorities on recommended updates or reformulations if needed, seek agreement on an implementation plan, and if appropriate, assist in holding a policy review conference for these purposes.
7. Distribute Project results on best techniques and practices to relevant stakeholders, disseminate materials and hold conferences or workshops to encourage replication.
8. Make Project results on demonstrated best techniques and practices available for dissemination and scaling-up regionally and globally.

Coordination Arrangement
A project **Chief Technical Advisor (CTA)** will have overall responsibility for Project implementation. The CTA will be assisted by a Global Project Coordinator/Technical Advisor; a Senior Public Health Advisor provided by WHO; and a Senior Policy Advisor provided by HCWH. The CTA will additionally be assisted by a Senior Expert on Healthcare Waste Management Systems; a Technology Development Expert (provided by the University of Dar Es Salaam Faculty of Mechanical and Chemical Engineering); and a Training Program Advisor (provided by the University of Illinois School of Public Health Great Lakes Center). The above will constitute the Project **Global Expert Team (GET).**

During the implementation of the Project, the **Global Expert Team (GET)** will provide technical and policy expertise and will have joint responsibility to assure that Project activities are successfully implemented. The GET will oversee global coordination and management under the overall policy direction provided of the Project Steering

Committee (GPSC), the day-to-day guidance of the Chief Technical Advisor (CTA) and in consultation with the HCWH and WHO Advisors. The GET members include the Project CTA, the Project Coordinator/Technical Advisor, Senior Policy and Public Health Advisors from HCWH and WHO respectively, representatives of project partners from the University of Illinois Great Lake Center and the University of Dar es Salaam Faculty of Mechanical and Chemical Engineering, as well as the project's Senior Expert on Healthcare Waste Management Systems.

Primary Responsibilities
Under the technical guidance of UNDP/GEF, as exercised through the Global Project Steering Committee (GPSC) and the operational responsibility of UNOPS, the Chief Technical Advisor will manage and co-ordinate all project activities and will, in particular:

- Work with the Global Expert Team to develop the workplan of the four year-long project under the general supervision of the GPSC and in close consultation and coordination with Senior Country Lead Officials, GEF Partners (WHO, Health Care Without Harm, and others) and relevant donors
- As the key technology expert, provide substantial technical advice and support to country offices on technologies and other related Project activities
- Work closely with the Global Project Coordinator/Technical Advisor to coordinate and monitor workplan activities
- Coordinate and oversee the preparation of substantive and operational reports
- Liaise directly with designated officials of the Participating Countries, Implementing Agency, Executing Agency, UNDP Country Offices, existing and potential additional project donors, Senior Country Lead Officials, and others as required
- Supervise all staff, as well as guide and supervise all external policy relations
- Ensure consistency between the various program elements and related activities provided or funded by other donor organizations
- Foster and/or establish links with other related GEF programs and, where appropriate, with other relevant regional programs
- Develop Terms of Reference for and oversee work of consultants and contractors

Qualifications
- Post-graduate degree (preferably a Ph.D.) in Engineering or a directly related field, and additional academic training in Environmental Management (with particular emphasis on hazardous and biohazardous waste) and in Public Health
- Demonstrated scientific and technical expertise in fields related to the assignment, including publications and
- At least 15 years relevant experience in health-care waste management including waste assessments; development of national policies and plans; training; and the segregation, minimization, storage, transport, treatment, and disposal of health-care waste
- Previous work experience in research, development, evaluation, and demonstration of medical waste treatment technologies
- Familiarity with the requirements of the Stockholm Convention and Best Available Techniques / Best Environmental Practices draft guidelines
- Knowledge of WHO policies and guidelines related to health-care waste, environmental health, infection control, and health delivery systems is a plus
- Demonstrated, successful, and senior level managerial experience in fields related to the assignment.
- Demonstrated diplomatic and negotiating skills
- Familiarity with the goals and procedures of international organizations, in particular those of the GEF and its partners (UNDP, WHO, Health Care Without Harm, and current and future potential additional donors)
- Proficiency in written and spoken English; knowledge of another UN language an asset; some knowledge of two or more of the major languages of the participating countries (Arabic, French, Hindi, Latvian, Spanish, Swahili, Tagalog, Vietnamese or Wolof) an asset;
- Previous work experience in five or more of the participating countries

Title: Global Project Coordinator/Technical Advisor (100%)
Duration: 4 years
Date required: November 2006
Duty Station: Home-base with ability to travel to project countries as needed.
Language: English

Project Goal and Outcome
The overall objective of the full Project, implemented by the UNDP, is to demonstrate and promote best practices and techniques for health-care waste management in order to minimize or eliminate releases of persistent organic pollutants and mercury to the environment. The Project will demonstrate the effectiveness of non-burn health-care waste treatment technologies, waste management practices and other techniques to avoid environmental releases of dioxins and mercury in seven strategically selected countries – Argentina, India, Latvia, Lebanon, the Philippines, Senegal and Vietnam. The Project will develop best practice health-care waste management models through collaborations with at least one large hospital, as well as with an appropriate combination of smaller clinics, rural health and/or injection programs and pre-existing central treatment facilities. The Project will also lay the groundwork for sustainability, replicability and the scaling-up of best techniques and practices beyond the model facilities and the Project countries by establishing or enhancing national training programs, pursuing policy reform, developing replication toolkits and awareness-raising materials, and disseminating these materials nationally and globally. An additional component aimed at developing locally-produced, affordable, non-burn health-care waste treatment technologies will be executed in Tanzania. The Project's ultimate goal is the protection of public health and the global environment from the impacts of dioxin and mercury releases.

The Project will achieve the following major components:
1. Establish model facilities and programs to exemplify best practices in health-care waste management, and develop materials to facilitate replication.
2. Deploy and evaluate commercially-available, non-incineration health-care waste treatment technologies appropriate to the needs of the facility or cluster.
3. Develop, test, manufacture and deploy affordable, small-scale non-incineration technologies for appropriate use in small- and medium-size facilities in sub-Saharan Africa, and prepare and disseminate manuals for their manufacture, installation, operation, maintenance and repair.
4. Introduce mercury-free devices in model facilities, evaluate their acceptability and efficacy, and develop and disseminate awareness-raising and educational materials related to mercury.
5. Establish or enhance training programs to build capacity for implementation of best practices and appropriate technologies beyond the model facilities and programs.
6. Review relevant national policies, seek agreement by relevant authorities on recommended updates or reformulations if needed, seek agreement on an implementation plan, and if appropriate, assist in holding a policy review conference for these purposes.
7. Distribute Project results on best techniques and practices to relevant stakeholders, disseminate materials and hold conferences or workshops to encourage replication.
8. Make Project results on demonstrated best techniques and practices available for dissemination and scaling-up regionally and globally.

Coordination Arrangements
A project **Chief Technical Advisor (CTA)** will have overall responsibility for Project implementation. The CTA will be assisted by a Global Project Coordinator/Technical Advisor; a Senior Public Health Advisor provided by WHO; and a Senior Policy Advisor provided by HCWH. The CTA will additionally be assisted by a Senior Expert on Healthcare Waste Management Systems; a Technology Development Expert (provided by the University of Dar Es Salaam Faculty of Mechanical and Chemical Engineering); and a Training Program Advisor (provided by the University of Illinois School of Public Health Great Lakes Center). The above will constitute the Project **Global Expert Team (GET).**

During the implementation of the Project, the **Global Expert Team (GET)** will provide technical and policy expertise and will have joint responsibility to assure that Project activities are successfully implemented. The GET will oversee global coordination and management under the overall policy direction provided of the Project Steering Committee (GPSC), the day-to-day guidance of the Chief Technical Advisor (CTA) and in consultation with the HCWH and WHO Advisors. The GET members include the Project CTA, the Project Coordinator/Technical

Advisor, Senior Policy and Public Health Advisors from HCWH and WHO respectively, representatives of project partners from the University of Illinois Great Lake Center and the University of Dar es Salaam Faculty of Mechanical and Chemical Engineering, as well as the project's Senior Expert on Healthcare Waste Management Systems.

Primary Responsibilities

The Global Project Coordinator/ Technical Advisor shall be responsible for the day-to-day coordination of all aspects of the Full Project implementation under the guidance and supervision of the Chief Technical Advisor. He/she will work in close and continuing collaboration with the Advisors and other members of the GET under the direction of the CTA. In addition, he/she shall liaise directly with designated officials of the Participating Countries, the UNDP-GEF Regional Coordinators, the Executing Agency, UNDP Country Offices, existing and potential additional project donors, National Focal Points, participating NGOs and others as may be necessary. He/she shall work with the CTA towards the delivery of managerial and financial reports from and on behalf of the Project.

The GPC/TA will have the following specific duties:

- Coordinate activities related to the day-to-day work of the Project
- Work closely with the CTA to coordinate and monitor workplan activities
- In consultation with the CTA, coordinate and review the activities of the Project partners and staff
- Under the general direction of the CTA, oversee and support the Program Associate and manage and supervise the Program Associate workplan and activities
- In consultation with the CTA and UNOPS, oversee and approve global Project expenditures;
- As necessary, provide technical and strategic guidance to country offices and partners on Project activities
- Ensure consistency between the various program elements and related activities provided or funded by other donor organizations
- Prepare and oversee, under the general direction of the CTA, the development of Terms of Reference for regional and national consultants and contractors
- Prepare and submit, in consultation with the CTA and in communication with the GET, quarterly reports (both administrative and financial) of relevant project progress and problems
- In collaboration with the GET, and under the general direction of the CTA, assist in the preparation of the substantive reports of the Project
- Foster and establish links with other related GEF programs and, where appropriate, with other relevant health care waste management programs

Qualifications

- Undergraduate degree in a health-related or social science field, with advanced education (graduate degree) in public health, environmental studies, or a related field
- At least five years of related experience on health care waste management/environment
- Demonstrated knowledge of best techniques and practices in minimizing health care waste, setting up sustainable medical waste management practices, economic and environmental impacts of medical waste management technologies
- Management and implementation of related projects in both urban and rural settings in Asia, Africa and Latin America
- Familiarity with the goals and procedures of international organizations, in particular the procedures and regulations of the UNDP, WHO and GEF
- Current involvement and knowledge of this or similar projects preferred
- Demonstrated experience in management and coordination of similar-size international project for at least two years
- Excellent computer skills, with a demonstrated ability to employ all necessary computer skills for the preparation of complex projects
- Demonstrated project management experience and skills
- Proficiency in written and spoken English; knowledge of another UN language an asset; some knowledge of one of the major languages of the participating countries (Arabic, French, Hindi, Latvian, Spanish, Swahili, Tagalog, Vietnamese or Wolof) an asset.

Title: Program Associate (100%)
Duration: 4 years
Date required: November 2006
Duty Station: Same office as the GPC/TA with ability to travel to project countries as needed.
Language: English

Project Goal and Outcome
The overall objective of the full Project, implemented by the UNDP, is to demonstrate and promote best practices and techniques for health-care waste management in order to minimize or eliminate releases of persistent organic pollutants and mercury to the environment. The Project will demonstrate the effectiveness of non-burn health-care waste treatment technologies, waste management practices and other techniques to avoid environmental releases of dioxins and mercury in seven strategically selected countries – Argentina, India, Latvia, Lebanon, the Philippines, Senegal and Vietnam. The Project will develop best practice health-care waste management models through collaborations with at least one large hospital, as well as with an appropriate combination of smaller clinics, rural health and/or injection programs and pre-existing central treatment facilities. The Project will also lay the groundwork for sustainability, replicability and the scaling-up of best techniques and practices beyond the model facilities and the Project countries by establishing or enhancing national training programs, pursuing policy reform, developing replication toolkits and awareness-raising materials, and disseminating these materials nationally and globally. An additional component aimed at developing locally-produced, affordable, non-burn health-care waste treatment technologies will be executed in Tanzania. The Project's ultimate goal is the protection of public health and the global environment from the impacts of dioxin and mercury releases.

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3. Develop, test, manufacture and deploy affordable, small-scale non-incineration technologies for appropriate use in small- and medium-size facilities in sub-Saharan Africa, and prepare and disseminate manuals for their manufacture, installation, operation, maintenance and repair.
4. Introduce mercury-free devices in model facilities, evaluate their acceptability and efficacy, and develop and disseminate awareness-raising and educational materials related to mercury.
5. Establish or enhance training programs to build capacity for implementation of best practices and appropriate technologies beyond the model facilities and programs.
6. Review relevant national policies, seek agreement by relevant authorities on recommended updates or reformulations if needed, seek agreement on an implementation plan, and if appropriate, assist in holding a policy review conference for these purposes.
7. Distribute Project results on best techniques and practices to relevant stakeholders, disseminate materials and hold conferences or workshops to encourage replication.
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A project **Chief Technical Advisor (CTA)** will have overall responsibility for Project implementation. The CTA will be assisted by a Global Project Coordinator/Technical Advisor; a Senior Public Health Advisor provided by WHO; and a Senior Policy Advisor provided by HCWH. The CTA will additionally be assisted by a Senior Expert on Healthcare Waste Management Systems; a Technology Development Expert (provided by the University of Dar Es Salaam Faculty of Mechanical and Chemical Engineering); and a Training Program Advisor (provided by the University of Illinois School of Public Health Great Lakes Center). The above will constitute the Project **Global Expert Team (GET).**

During the implementation of the Project, the **Global Expert Team (GET)** will provide technical and policy expertise and will have joint responsibility to assure that Project activities are successfully implemented. The GET will oversee global coordination and management under the overall policy direction provided of the Project Steering

Committee (GPSC), the day-to-day guidance of the Chief Technical Advisor (CTA) and in consultation with the HCWH and WHO Advisors. The GET members include the Project CTA, the Project Coordinator/Technical Advisor, Senior Policy and Public Health Advisors from HCWH and WHO respectively, representatives of project partners from the University of Illinois Great Lake Center and the University of Dar es Salaam Faculty of Mechanical and Chemical Engineering, as well as the project's Senior Expert on Healthcare Waste Management Systems.

Primary Responsibilities

Under the direct supervision of the Global Project Coordinator, the Program Associate will provide financial management, administrative and programmatic assistance to the Global Project Expert Team (GET). The Program Associate will support the Global Project Coordinator in the day-to-day operations of the GET, and will liaise regularly with the UNOPS project manager on financial and administrative matters. In particular, the Program Associate's duties will include:

- Work closely with the Global Project Coordinator to coordinate, monitor, and facilitate the execution of all workplan activities
- Maintain regular contact with the National Steering Committees in the respective countries for which the Program Coordinator is responsible, and coordinate with UNOPS and/or UNDP-Country Offices to ensure the smooth and continuous implementation of day-to-day activities.
- Liaise directly with designated officials of the Participating Countries, Implementing Agency, Executing Agency, UNDP Country Offices, existing and potential additional project donors, Senior Country Lead Officials, and others as required
- Prepare internal and external correspondence from the office of the Global Project Coordinator;
- Draft letters and reports on behalf of GEF as necessary
- Assist in the preparation and dissemination of documents for meetings, and in meeting follow-up, including assistance in the creation of presentations
- Edit and review documents drafted by the Global Expert Team
- Assist the Program Coordinator in tracking results of the Project
- Answer queries and requests for information on the Project
- Complete expenditure reports and invoicing for UNOPS and UNDP as necessary
- Communicate with country partners to assure timely submission of reports on monitoring and evaluation, missions, project activities, and the like. Review reports for consistently, accuracy and completion as necessary
- Monitor and assist in management of the Project website
- Monitor and update Project calendar; send reminders to Project staff and national partners;
- Develop and maintain roster database, and global network/ contact information
- Assist in organizing travel arrangements of the Project Coordinator and in the coordination of logistics for global meetings, including planning, obtaining cost estimates, making travel arrangements for the CTA, GPC and TA, and acting as liaison with vendors and support staff
- Assist in the hiring of Project employees, including assistance in the contract process
- Other general administrative tasks such as maintaining schedules, the establishment and maintenance of a Project filing system, ensuring the timely and accurate dissemination of information to Project participants, and assisting in mission organization and execution
- Undertake other duties as may be requested by the Project Coordinator.

Qualifications

- Completion of high school education; undergraduate degree in a health-related or social science field is desirable
- Demonstrated interest and expertise in fields related to the assignment, including at least 5 years of administrative experience with health and environment-related programs and knowledge of health care waste management systems and issues
- Project management experience and familiarity with international organizations, in particular the GEF and its partners, is desirable but not required
- Ability to perform a variety of specialized tasks related to project management, including the ability to provide strategic input to Project planning and implementation, and the ability to effectively gather, analyze and report on data, in addition to administrative and other management duties

- Superb written and oral communication skills, with preference given to candidates with proven experience communicating issues related to health care waste management, such as through the writing of reports and policy papers and the public presentation of related information
- Ability to work well both independently and on a team, including the ability to take initiative and interpret and fulfill responsibilities without intensive management direction
- Superb organizational skills, including the flexibility and detail-oriented management necessary to deal with complexities and competing priorities
- Excellent interpersonal skills, including the demonstration of sensitivity to and appreciation for diverse viewpoints and different communications styles in a multicultural environment
- Demonstration of commitment to the Project's mission, vision and values
- Excellent administrative abilities, including demonstrated experience effectively organizing an administrative workload, coordinating event and other logistics, meeting deadlines and expectations, and managing the day-to-day operations of a large global project.
- Proficiency in written and spoken English; knowledge of another UN language an asset; and some knowledge of one of the major languages of the participating countries (Arabic, French, Hindi, Latvian, Spanish, Swahili, Tagalog, Vietnamese or Wolof) an asset.
- Previous work experience in one or more of the participating countries
- Excellent computer skills, including proficiency in the use of basic office software packages, the creation of spreadsheets and databases, and experience in the handling of web-based communications and management systems.

PART IV: STAKEHOLDER INVOLVEMENT PLAN

Stakeholder participation has been an essential aspect of this Project since its inception and will remain a vital feature of Project implementation. During the PDF A, health and environment ministries, representatives of health institutions, non-governmental organizations including HCWH-affiliated groups, WHO, and UNDP met in New Delhi, India to participate in the development of the concept document. During the PDF B phase, National Project Steering Committees were formed and met at least twice in all countries. The bulk of broad stakeholder participation took place through the National Working Groups. The first meetings of the National Working Groups included presentations by the Project Coordinator, Senior Public Health and Policy Advisors, and/or the project experts. Topics included the Stockholm Convention, the Project rationale and objectives, best environmental practices, and best available techniques. In some countries, the NWG met as often as every month. Numerous consultations took place during PDF B, including the gathering and reporting of baseline data, leading to the development of national plans which were then incorporated into the Project Document.

The names of stakeholders and their respective institutions are given in Tables 17a –g. The table also shows whether they are involved through the NPSC or NWG. Stakeholder participation will continue through the existing structures of the NPSC and NWG. During the implementation, the NPSC will have the following roles and responsibilities:

- Assure that support exists and is maintained, at all levels of government, and within relevant sectors of society, for the Project;
- Review and approve significant Project decisions at the national level, and assist in identifying and allocating support for activities consistent with Project objectives;
- Provide advice and assistance to UNOPS in recruitment of National Consultants;
- Review and approve Annual Project Workplans and Annual Project Reports; participate in the Tripartite Project Review, Terminal Report, and Terminal Tripartite Review;
- Provide guidance to the National Working Group in coordinating and managing Outputs and Activities;
- Provide oversight and support, along with the Global Expert Team, to the National Consultant; and
- Provide a representative to the Global Project Steering Committee.

The roles and responsibilities of the NWG are to:

- Assist in networking between and among national entities including project entities, national officials, cooperating partners such as UNDP and WHO Country Offices, National Focal Points, participating NGOs, existing and potential co-financers, other related GEF projects, and others as appropriate and necessary;
- Provide practical advice to the National Consultant in execution of activities;
- Assist in the collection and dissemination of information on policy, economic, scientific and technical issues related to the Outputs and Activities of the Project;
- Provide assistance and advice to the National Consultant in the preparation of reports; and
- Assist in networking between participating institutions and agencies within participating nations;.

The NPSC will meet annually while the NWG will meet more often on an as needed basis. National Consultants will continue to play a critical role in engaging stakeholders, encouraging their participation, and coordinating their activities. In addition to the NPSC and NWG, stakeholder participation will also be required during the development of national training programs. A major venue for stakeholder participation is on the local level during the formation of model facilities. Such activities as gathering baseline data, training, planning, fostering "environmental champions," implementing plans, monitoring, and evaluation will necessarily involve local stakeholders at all levels of the model facility, from management to health professionals to waste workers, as well as stakeholders outside the facility, such as local government officials, related health facilities, health groups, waste transporters, landfill operators, recyclers, and surrounding communities. Table 18 provides a detailed analysis of stakeholder participation and involvement.

The alternative waste management system will help prevent nosocomial infections among patients and will improve occupational health and safety for health-care workers including auxiliary staff. Several vulnerable groups will also benefit from the Project. Waste minimization, segregation, containment of waste, treatment of infectious waste, and proper disposal of sharps waste will reduce the spread of diseases and other health hazards facing waste workers (waste collectors, transporters, landfill or dumpsite workers, recyclers, and waste pickers or scavengers) who are

often economically disadvantaged or marginalized. Replacing incinerators with more environmentally sound technologies will lessen the health impacts on surrounding communities.

Table 17A-G: National Stakeholders

Table 17a. Argentina

National Project Steering Committee: member institution, name and position	
Secretary of Environment, Ministry of Health and Environment- Chemicals Unit (CU)	Mr. Lorenzo Gonzalez Videla, CU and NIP Coordinator Mr. Hernán Alonso, Coordinator
Secretary of Environment, Ministry of Health and Environment- Hazardous Waste Unit	Mr. Ricardo Benitez, Deputy Director Dr. María Della Rodolfa
Direction of Environmental Health, Ministry of Health and Environment	Ms. Diana Carrero
Health Care Without Harm	Mr. Daniel Tomasini
Doctors for the Environment	Ms. Rosario Castro
United Nations Development Programme	Dr. Leila Devia, Director
Pan American Health Organization	
Basel Regional Centre	
National Working Group: member institution, name and position	
Secretary of Environment, Ministry of Health and Environment- Chemicals Unit	Mr. Pablo Issaly
Secretary of Environment, Ministry of Health and Environment- Chemicals Unit	Ms. Adriana Corres
Secretary of Environment, Ministry of Health and Environment- Hazardous Waste Unit	Ms. Fernanda Bauleo Ms. Luján Laprovitta
Secretary of Environment, Ministry of Health and Environment- Hazardous Waste Unit	Dr. Ana Esperanza Dr. Virginia Orazi
National Direction of Mother-Infant Health, Ministry of Health and Environment	Ms. Luisa Brunstein
National Direction of Mother-Infant Health, Ministry of Health and Environment	Dr. Juan Carlos Burgos
Direction of Environmental Health, Ministry of Health and Environment	Dr. Silvia Ferrer
Direction of Environmental Health, Ministry of Health and Environment	Dr. Mercedes Zarlenga
Hospital Wastes Management Program, City of Buenos Aires	Dr. Gabriela Razzite
Rivadavia Hospital, City of Buenos Aires	Ms. Nivia Beatriz Pereyra
Ramos Mejía Hospital, City of Buenos Aires	Ms. Elena Perich
Argentinean Federation of Nurses, City of Buenos Aires	Ms. Carolina Sanchez
Argentinean Federation of Nurses, City of Buenos Aires	Ms. Laura del Valle Juarez
University of Salta	Ms. Cecilia Allen
Municipality Gral. Roca	Ms. Verónica Odriozola
No-Burn Coalition	Dr. María Della Rodolfa
Health Care Without Harm	Ms. Diana Carrero
Health Care Without Harm	Mr. Jorge Rabey
Doctors for the Environment	Ms. Rosario Castro
Nature Protection Center	Mr. Matías Mottet
Pan American Health Organization	Mr. Daniel Alfano
United Nations Development Programme	Dr. Jaime Nachpitz
Project National Consultant	
Project Facilitator	

Table 17b. India

National Project Steering Committee: member institution, name and position	
Ministry of Environment and Forests	Dr. Indrani Chandrasekharan, Director (Scientific)
Ministry of Health	Dr. A.N. Sinha, Chief Medical Officer
Central Pollution Control Board	Mr. Rajgopalan, Chairman
World Health Organization	Mr. Alex Hildebrand, Regional Advisor
World Bank	Ms. Ruma Tavorath, Environment Specialist
United Nations Development Programme	Mr. Ravi Chellum
Centre for Environment Education	Ms. Shayamala Mani, Program Coordinator
Toxics Link	Mr. Ravi Agarwal, Director
German Agency for Technical Cooperation	Mr. Juergen Bischoff, Director
National Working Group: member institution, name and position	
Centre for Occupational and Environmental Health	Dr. T.K. Joshi, Director
Central Pollution Control Board	Mr. Bharat Sharma, Senior Engineer
Central Pollution Control Board	Dr. R.S. Mahawar, Additional Director, Hazardous Waste Unit
Becton Dickinson	Dr. S. Sharma, Senior Technical Advisor
Program for Appropriate Technology in Health	Dr. Satish, Senior Program Manager
School of Health Sciences, Indira Gandhi National Open University	Dr. A.K. Agarwal, Professor
School of Health Sciences, Indira Gandhi National Open University	Dr. Megha Rathi
Ashoka Trust for Research in Ecology and the Environment, New Delhi	Dr. S.P. Mahapatra
	Dr. Anita Arora, Consultant Microbiologist
Escorts Heart Institute and Research Centre	Mr. Alexander von Hildebrand, Regional Advisor
World Health Organization	Mr. Ravi Agarwal, Director
Toxics Link	Ms. Surabhi Tiwari, Program Coordinator
Safe Point Centre	Dr. Ann Mathew, Pediatrician
St. Stephen Hospital	Dr. Jenifer Lobo, Medical Superintendent
Holy Family Hospital	Dr. Shyamala Mani, Program Coordinator
Centre for Environment Education	Dr. K.S. Baghotia, State Program Officer (BMW Management)
Government of National Capital Territory of Delhi	Mr. Vikas Sharma
Bio Care Technologies Services	Ms. Kavita Sahay, Coordinator
Synergy Waste Management Pvt. Ltd.	Prof. Geeta Mehta
Lady Harding Medical College	

Table 17c. Latvia

National Project Steering Committee: member institution, name and position	
World Health Organization	Ms. Aiga Rūrāne, Head of Latvia Country Office
Ministry of Health	Mr. Rinalds Muciņš, Under State Secretary
Ministry of Environment	Mr. Rolands Bebris, Head of Environmental Protection Department
City Council of Riga	Ms. Nadezda Vanaga, Head of Environmental Department
Ministry of Agriculture	Mr. Viktors Grapmanis, Head of Department
United Nations Development Programme	Ms. Silvija Kalniņš, Head of Office
National Working Group: member institution, name and position	
Ministry of Health	Mr. Andris Egle, Head of the Division of Health Promotion and Environmental Health
Ministry of Health	Ms. Gunta Grīsle, Department of Public Health, Head of Unit
Ministry of Agriculture	Ms. Lelde Meija, Veterinary Department Senior Official
Ministry of Environment	Ms. Poļina Ponomarjova, Department of Environment Protection and Waste Management Deputy Director
Ministry of Environment	Mr. Valdimārts Šļauktiņs, Department of Strategy and Coordination Senior Official
Rīga City Council	Ms. Gunta Dimanta, Environmental Department, Waste Management Division Chief Specialist
Rīga City Council	Ms. Silvija Kairiša, Welfare Department Chief Specialist
Waste Management Association of Latvia	Ms. Ruta Bendere, Member
Latvian Hospital Association	Mr. Jevgēnijs Kalējs, Director
Rīga Technical University	Ms. Daina Kalniņa, Head of Laboratory
State Agency of Tuberculosis and Lung Diseases	Mr. Jānis Leimans, Director
Latvian Association of Nurses	Ms. Jolanta Zālīte, President
Gaiļezers Hospital	Ms. Regīna Barone, Head Nurse
Linezers Hospital	Ms. Olga Gusakova, Head Nurse
Hospital of Traumatology and Orthopedics	Ms. Inese Rantiņa, Head Nurse
Aizkraukle Hospital	Mr. Ēriks Vizulis, Director
Lautus (waste management company)	Ms. Sandra Eglīte, Director
United Nations Development Programme	Ms. Silvija Kalniņš, Head of Office

Table 17d. Lebanon

National Project Steering Committee: member institution, name and position	
Ministry of Environment	Dr. Berj Hatjian, Director General
Ministry of Interior and Municipalities	Mr. Khalil el-Hajal, Director General
Ministry of Public Health	Dr. Farid Karam, Head of Department of Sanitary Engineering
Syndicate of Private Hospitals	Dr. Sleiman Haroun, President
Council for Development and Reconstruction	Mr. Jawdat Abou Jawdeh
Order of Nurses	Dr. Elie Aaraj, President
United Nations Development Programme	Mr. Edgard Chehab, Program Manager
World Health Organization	Ms. Nohal El Homsi
National Working Group: member institution, name and position	
Ministry of Public Health	Dr. Farid Karam, Head of Department of Sanitary Engineering
World Health Organization	Ms. Nohal el Homsi
United National Development Programme	Ms. Jihan Seoud, Country Office
Stockholm Convention	Dr. Hanna Bou Habib, National Focal Point
Basel Convention	Dr. Georges Berbari, National Focal Point
POPs Project	Mr. Vahakn Kabakian, Project Manager
Ministry of Interior and Municipalities	Mr. Khalil Hajal, Director General
Council for Development and Reconstruction	Mr. Jawdat Abou Jawdeh
Order of Physicians	Dr. Mario Aoun, Head of Order
Order of Dentists	Dr. Elias Maalouf, Head of Order
Syndicate of Pharmaceuticals	Dr. Arman Fares, Head of Syndicate
Syndicate of Private Hospitals	Dr. Sleiman Haroun, Head of Syndicate
Syndicate of Medical Laboratories	Mr. Fadi Hobeich
Syndicate of Dental Laboratories	Mr. Patrick Shabtini
Faculty of Health Sciences, American University of Beirut	Dr. Iman Nuwayhid, Professor Dr. Tobie Zakhia, Professor
University of Saint Joseph	Mr. Fadi Moujaas, Director
Arc En Ciel (NGO)	Ms. Hala Achour, President
Greenline Association (NGO)	Mr. Roland Chidiac, Owner
Env-Sys (private company)	Dr. Elie Aaraj, Head of Order
Order of Nurses	

Table 17e. Philippines

National Project Steering Committee: member institution, name and position	
Department of Health	Under Secretary Ethelyn Nieto, Committee Chair
Department of Environment and Natural Resources	Acting Secretary Analiza Teh, Committee Co-chair
Department of Environment and Natural Resources	Dir. Lilibeth Medrano, Committee Co-chair
Philippine Hospital Association	Dr. Tiburcio Macias, President
Department of Interior and Local Government	Under Secretary Eduardo Soliman
National Economic and Development Authority	Mr. Rolando Tungpalan, Assistant Director General
World Health Organization	Dr. Jean Marc Olive
United Nations Development Programme	Ms. Clarissa Arida
Health Care Without Harm	Ms. Merci Ferrer
National Working Group: member institution, name and position	
Department of Health	Acting Secretary Nemesio Gako, Working Group Advisor
Department of Health	Dir. Criselda Abesamis, Working Group Chairperson
Department of Health	Dr. Desiree Narvaez, Working Group Co-chairperson
Environmental Management Bureau, Department of Environment and Natural Resources	Ms. Angelita Brabante, Working Group Vice-chair
Environmental Management Bureau, Department of Environment and Natural Resources	Engr. Leah Texon
Integrated Midwives Association of the Philippines	Mrs. Patricia Gomez
Philippine Dental Association	Dr. Georgina Palmario
United Nations Development Programme	Mr. Morito Francisco
Health Care Without Harm	Ms. Merci Ferrer
Solid Waste Management Association of the Philippines	Ms. Mary Ann Baro
Ecowaste Coalition of the Philippines	Ms. Eileen Belamide
Dept. of Interior and Local Government	Dir. Manuel Gotis
Dept. of Interior and Local Government	Mr. Edward Templonuevo
Dept. of Interior and Local Government	Dir. Yolanda Oliveros
Department of Health	Dir. Rebecca Penafiel

Table 17f. Senegal

National Project Steering Committee: member institution, name and position	
Ministry of Environment	Ibrahima Sow, GEF Focal Point
Direction of Environment	Rockhaya Ndiaye Diop, Secretary of the National Commission of Chemical management
Direction of Health Facilities, PRONALIN*	Dr. Colonel Babacar Ndoye, Coordinator of the National Program to Fight Nosocomial Infections
	Joséphine C Traoré, Assistant to the Coordinator of the National Program to Fight Nosocomial Infections
Direction of Health Facilities, PRONALIN*	Demba Baldé, Hygiene Service
	Assane Gueye Cissé, Technical Director
Direction of Public Hygiene, PRONALIN*	Salimata Seck, Program Manager
Agency for Sanitation, APD-IGU**	
Agency for Sanitation, APD-IGU**	
National Working Group: member institution, name and position	
Ministry of Environment	Ibrahima Sow, GEF Focal Point
Direction of Environment	Rockhaya Ndiaye Diop, Secretary of the National Commission of Chemical Management
Direction of Health Facilities, PRONALIN*	Dr. Colonel Babacar Ndoye, Coordinator of the National Program to Fight Nosocomial Infections
	Joséphine Traoré, Hygienist, Assistant to the Coordinator of the National Program to Fight Nosocomial Infections
Direction of Health Facilities, PRONALIN*	Demba Baldé, Hygiene Service
Direction of Public Hygiene, PRONALIN*	Assane Gueye Cissé, Technical Director
	Salimata Seck, Program Manager
Agency for Sanitation, APD-IGU**	Roger J. P. Schmidt, Principal Project Coordinator
Agency for Sanitation, APD-IGU**	
GTZ / EPOS Health Consultants	

* Ministry of Health and Preventative Medicine (PRONALIN)

** Dakar Institute of Urban Management, of the Ministry of Local Communities (APD-IGU)

Table 17g. Vietnam

National Project Steering Committee: member institution, name and position	
Environmental Protection Agency, Ministry of Natural Resources and Environment	Mr. Phung Van Vui, Vice-Director General
Department of Environment/GEF Vietnam, Ministry of Natural Resources and Environment	Mr. Hoang Minh Dao, Vice-Director General
Administration of Preventive Medicine, Ministry of Health	Dr. Nguyen Thi Hong Tu, Vice-Director General
Department of Health-care Equipments and Buildings, Ministry of Health	Dr. Duong Van Tinh, Director General
Department of Therapy, Ministry of Health	Dr. Ly Ngoc Kinh, Director General
United Nations Development Programme	Mr. Dao Xuan Lai, Program Officer
World Health Organization, Vietnam	Ms. Margaret Sheehan
Vietnam Urban Environment Association	Mr. Chu Van Chung, Vice-Chairman
National Working Group: member institution, name and position	
Environmental Protection Agency, Ministry of Natural Resources and Environment	Mr. Nguyen Thanh Yen, Officer/ Country Technical Coordinator
Department of Environment/GEF Vietnam, Ministry of Natural Resources and Environment	Mr. Nguyen Tan Hung, Officer
Administration of Preventive Medicine, Ministry of Health	Ms. Nguyen Thi Lien Huong, Deputy Head of Occupational Health
Administration of Preventive Medicine, Ministry of Health	Ms. Nguyen Thi Hoang Nha, Officer
Department of Health-Care Equipments and Buildings, Ministry of Health	Mr. Bui Sy Viet, Officer
Department of Therapy, Ministry of Health	Mr. Pham Duc Muc, Officer in charge of nursing
United Nations Development Programme	Ms. Margaret Sheehan
World Health Organization, Vietnam	Ms. Le Thi Bich Thuy
Vietnam Urban Environment Association	Ms. Nguyen Thi Hoang Lan, Director of Development Cooperation

Table 18. Stakeholder Analysis

Stakeholder	Characteristics (as relate to HCWM)	Problems and interests (as relate to the Project)	Potentials and deficiencies (as relate to Project participation)	Implications for the Project
Health ministries	• In most countries the health ministry has a point-person on health-care waste management (HCWM), but this person tends to have multiple other area responsibilities. • Communication and coordination between the health ministries and the environment ministries on HCWM need to be formalized. • The health ministries bring a strong public health orientation to the basic Project rationale. • The health ministries are aware of problems with HCWM, but they have little in-house technical or organizational knowledge of solutions or approaches.	• The health ministries place a strong emphasis on worker safety in health facilities related to HCWM, including protection from sharps and bloodborne pathogens. • They place a strong emphasis on public safety, including protection from contact with untreated bio-hazardous waste. • Confusion often prevails over choices to protect workers and the community, and the impact on environmental and public health, e.g., advancing incineration to destroy waste prior to disposal.	• In most cases, direct oversight and regulatory authority guide change, even in rapidly privatizing sectors. • Changes related to the Project are aligned with the public health mission of health ministries. • Health ministries lack human, technical and financial resources to affect all necessary components of systemic change. • Aid programs that impact HCWM are not all coordinated through the health ministries, and in some cases offer "assistance" that is contrary to Project goals.	• The health ministries are a good focal point around which to bring the health sector together and coordinate actions with other stakeholders. • No resistance is anticipated since Project goals align with national goals and offer new resources to realize them. • The health ministries play an important role in targeting and approving resources for HCWM, nationally and through international aid efforts. • The health ministries are a connection to the professional medical and health-care community.
Environment ministries	• Health-care waste management is not always a focus of the environment ministries. Responsibilities and regulations may be split between multiple divisions (air, land, solid waste, etc.). • Communication and coordination with health ministries on HCWM need to be formalized. • The environment ministries are aware of problems with HCWM, but have little in-house technical or organizational knowledge of solutions or approaches. • Responsibility for HCWM may be delegated to state, regional or even local entities.	• The ministries often focus on specific media impacts (e.g., air quality), not on synergistic impacts or on understanding unintended consequences of choices. • The environment ministries need access to technical information on alternatives for management, treatment, storage (e.g., mercury) and final disposal of waste, and expertise on effecting sector-wide change. • The environment ministries are responsible for implementing the Basel and Stockholm Conventions.	• While the environmental ministries have good technical capacity in some areas, they tend to have narrow focuses according to specific media impacts; this diminishes their ability to coordinate a holistic approach to HCWM problems. • It is possible to achieve better compliance with the Basel Convention. • Direct aid for HCWM is not always coordinated, and international aid addresses related environmental issues (e.g., solid waste disposal). This results in infrastructure investments that do not align with Project goals. • Ministries lack regulatory and enforcement staff.	• Coordination between the environment and health ministries will maximize benefits for the countries. • The environment ministries advance knowledge on treatment and disposal options, and approve new treatment technologies and processes. • The ministries are the central coordinators of storage and final disposal of waste mercury from phase-out. • The environment ministries play an important role establishing regulations and standards for HCWM in private treatment and disposal facilities.

Stakeholder	Characteristics (as relate to HCWM)	Problems and interests (as relate to the Project)	Potentials and deficiencies (as relate to Project participation)	Implications for the Project
Hospitals and health-care centers	• Hospitals and health-care centers are directly responsible for producing, categorizing and choosing the methods of treatment and disposal of health-care waste (HCW). • Responsibilities related to HCWM are often decentralized. Key responsibilities (e.g., infection control, housekeeping and plant management) often reside with middle management, with little coordination of the different people overseeing various parts of the system. • No designated budget for HCWM exists. HCWM costs cannot be recovered or built into service fees. • HCWM education is not integrated into professional training in medical, nursing, facility management or health-care management programs. • Staff training and education is often fragmented, and more is needed to address varied educational and cultural backgrounds (from cleaning staff to physicians). • HCWM is often subsumed under infection control issues, and solutions are addressed according to that limited framework.	• Regulatory regimes, enforcement and education are weak and lead to a lack of priority given to HCWM. • Funding for HCWM and treatment technologies often comes from health-care facility budgets for operation and treatment. • International aid agencies provide conflicting information and options.	• Public hospitals face diminishing budgets and do not have the necessary resources to change HCWM systems, purchase on-site technologies or pay for private off-site services. • The direct correlation between good HCWM and worker safety has the long-term potential to decrease costs and increase worker retention and satisfaction. • To promote change, the mission of hospitals and health-care facilities to improve health can be linked with the reality of operations that compromise public health (e.g., poor treatment and disposal of bio-hazardous or chemical wastes). • WHO resources and other HCWM resources are readily available and are oriented toward health professionals and institutions.	• Hospitals and health-care centers are the direct users of materials and producers of waste. Their full participation is crucial; without their buy-in and commitment to act, little can be accomplished in meeting the overall Project goals. • Hospitals and health-care centers must establish processes and choose materials in coordination with all other parts of the system to achieve Project goals. If their decisions are made in isolation, they could simply transfer the risk from one medium to another, or from one section to another (e.g., from hospitals to waste treatment companies).

Stakeholder	Characteristics (as relate to HCWM)	Problems and interests (as relate to the Project)	Potentials and deficiencies (as relate to Project participation)	Implications for the Project
Health-care professionals	• Physicians, nurses and other health professionals assume that the necessary infrastructure for providing direct medical care is available and working. They are not educated about the potential negative health effects of their decisions (e.g. which materials are used or how materials are disposed). • Mercury-based devices and PVC packaging and products have long been used in health care services. Health professionals whose focus is patient care generally use them without question, as they adequately meet immediate needs. • Some physicians and technicians see mercury as the "gold standard" in diagnostic measuring. • Many professionals are not involved in professional associations where discussion on HCWM issues might take place. • Health professionals often treat medical care and public health as separate focal areas and issues. • Physicians and nurses are often not decision-makers for management-system changes.	• Physicians, nurses and other health professionals feel overwhelmed with direct responsibilities for providing care and care-related services; they often do not see the need, or feel they have the ability, to participate in "infrastructure"-related activities such as HCWM. • In private facilities where physicians may have more management responsibilities and decision-making authority over infrastructure improvements, cost-benefit analyses are more influential, especially in a weak regulatory environment.	• Health-care professionals are among the key leaders in advancing the need for alternatives and new practices nationally and internationally. • Models established in some areas under the leadership of physicians are well-recognized. • WHO resources and other HCWM resources are readily available and oriented toward health professionals and institutions. • International professional associations (e.g., the World Federation of Public Health Associations, and the International Council of Nurses) have information and policies that support action by professionals. • Professional creeds and goals are aligned with Project goals and the implications for environmental and public health.	• Health-care professionals' actions and choices often dictate the possibilities for HCWM systems. The Project is designed to provide leadership opportunities for individual professionals to advance the Project goals through professional associations and training programs. • Health professionals must be involved in technology choices, particularly of equipment and supplies on which they rely to conduct daily work (e.g., non-mercury devices). They must "own" and come to promote the new equipment, supplies and procedures as those that are best for their work and for fulfilling the mission of providing quality care.

Stakeholder	Characteristics (as relate to HCWM)	Problems and interests (as relate to the Project)	Potentials and deficiencies (as relate to Project participation)	Implications for the Project
Waste workers (at health facilities and in public and private departments and companies that transport, treat and dispose of wastes)	• Waste workers involved in collection, treatment, transport and disposal are not involved in management or technology choices, whether employed by health institutions, public departments or private companies. • These workers are typically of lower socio-economic status and educational and literacy background, and might speak a different language than professional staff. • They are often not valued or acknowledged by professional staff or management. • They have little knowledge about the physical, biological or chemical risks to their or their families' health as a result of exposures. • Little economic or other incentive exists to make changes that appear to "make more work." • Waste workers are sometimes associated with scavengers and have economic investment in the status quo. • Waste workers are sometimes unionized, but unions are not often educated to address safety issues with workers that align with Project goals.	• Worker education and training materials have been developed in some areas and may serve as models for addressing the needs of waste workers. • Direct correlation can be drawn between the health of workers and their families and new waste practices and procedures to encourage compliance and participation. • Room for job enhancement and possible advancement exist with the "professionalization" of HCWM.	• Waste workers receive little training in their jobs in general, and seldom any specific training regarding HCWM. • Workers have little need or interest in associating their work with broader issues of environmental or public health, but will respond positively to associations with their personal health and safety and that of their family. • Once trained and properly acknowledged and equipped, workers are important links in quality control checks that sustain and improve the system. • Workers who learn the basic principles of infection control and safe work procedures in the workplace might be more able to understand and contribute to public health initiatives outside of the workplace.	• Waste workers who are not properly trained and do not feel invested in the outcome of the Project can sabotage a system either purposefully or through neglect. • Encouragement and incentives for workers to reliably and safely participate in a new system of HCWM is essential to the overall success of the program.

Stakeholder	Characteristics (as relate to HCWM)	Problems and interests (as relate to the Project)	Potentials and deficiencies (as relate to Project participation)	Implications for the Project
Waste service providers (public and private)	• Providers of services to collect, transport, treat and dispose of HCW are often not integrated (e.g., full service) or specialized (e.g., only deal with HCW), but rather multi-sectoral (public and private vendors) and fragmented. This results in numerous "hand-offs" of waste from the point of generation to the point of disposal. For example, a public hospital might generate waste, rely on a private vendor to transport it to a treatment facility that may be public or private, and then transport treated wastes to a final disposal facility that might be publicly run or sanctioned, but might or might not be well-managed. • Workers in both public and private waste services do not tend to be well-educated in dealing with special wastes from health care facilities. Line workers tend to have the same characteristics as waste workers at hospitals (see section above). • An increasing number of private firms are seeking to provide services, utilizing a wide variety of management and treatment technologies, and with varying pricing schemes and waste acceptance protocols. • Countries are generally choosing to allow a private waste infrastructure to emerge, including HCWM, since public resources are not adequate. • Private HCWM firms have identified the sector as an emerging market with growth potential and have set pricing structures accordingly.	• Private vendors that are beginning to dominate the field have a strong interest in remaining profitable and viable, especially when investing in long-term infrastructure such as technologies, pollution-control devices and landfills. • As waste management specializes, municipal and regional public sector workers are being replaced by private service providers. • The need for educated labor increases as new technologies and infrastructure are introduced. • An uncertain regulatory environment will deter investment in new technology.	• HCWM is a rapidly emerging field. Basic principles and technologies are well established, new technologies are emerging, and both the need and the opportunity for private investment and participation are growing rapidly. • The profitable nature of HCWM for the private sector tends to be at the "end of the pipeline" and does not encourage participation in or understanding of the entire system. • New technologies might allow some companies to expand their service area beyond HCW using the same technology and infrastructure, creating expanded business opportunities.	• Direct public sector involvement in the operation of waste management services is declining. The need for well-established public-private ventures to provide seamless systems for HCWM is vital. • Interest in and understanding of the needs for a holistic approach to HCWM are growing among international donors and investors. This will enhance and enable the development of good and sustainable systems. • Regulatory and pricing systems that sustain private sector investment will determine the interest and ability of private sector services to play a major role in HCWM.

Stakeholder	Characteristics (as relate to HCWM)	Problems and interests (as relate to the Project)	Potentials and deficiencies (as relate to Project participation)	Implications for the Project
Treatment and disposal technology developers and manufacturers	• Health-care waste treatment technologies are increasingly being manufactured in non-western countries (e.g., India), and opportunities exist to increase local design and production that will better serve local needs and conditions.	• To invest in new manufacturing, industry requires a market, stable regulation and established practices to sustain it. • Technologies (especially treatment technologies) need to be designed to meet the budgetary and use requirements of many types of institutions with different needs.	• Much of the technology necessary to meet Project goals is not complex (e.g., autoclaves and electronic non-mercury measuring devices) and lends itself to manufacture directly or through partnerships in the participating countries. • Conflicts may arise over the efficacy of imported verses locally fabricated technologies. • The opportunity exists for a variety of public-private and private-private partnerships to meet specific needs.	• The availability of certain treatment technologies is essential to the long-term success of the Project. Technologies must meet defined operating specifications and must be priced appropriately. • This need can potentially be met through either locally manufactured or imported technologies. • Lack of design and manufacturing knowledge, infrastructure or a sufficiently established market may impede the development of local industry.
NGOs (environmental, health, and community development organizations; local, national and international)	• NGOs have consistently been leaders in the development of and advocacy for new safe HCWM strategies. • An international network of NGOs has been active in exchanging information and developing options for the past ten years. • Members of the international network of NGOs are active in India, the Philippines and Argentina. • NGOs have been free to develop options outside of the constraints faced by public sector institutions. They have had the flexibility to establish partnerships with individual health institutions, universities, private sector vendors and governmental departments to test new approaches for HCWM. • NGOs have been in a position – and are driven by their missions – to make connections between practices in the health industry and environmental and public health.	• NGOs are motivated to create sustainable systemic change. • NGO interests must align themselves with the more incremental steps associated with the Project.	• NGOs have no resource base to implement or invest in the changes necessitated by the Project. • NGOs are sometimes invited to participate as limited partners in change operations in health-care facilities or waste management projects, but their authority and decision-making ability is severely limited. • NGOs are participating in some of the most advanced networks for environmental technology and practice information and can readily acquire and disseminate information. • NGOs have assembled the best information and resources currently available in HCWM, and have forged important partnerships with WHO and other international agencies.	• NGOs have essential information and history in many of the participating Project countries. Their incorporation into the Project will provide important informational resources and possible opportunities for future dissemination. • NGOs can provide assistance in the long-term sustainability of the Project and its ability to continue to expand nationally and regionally.

Stakeholder	Characteristics (as relate to HCWM)	Problems and interests (as relate to the Project)	Potentials and deficiencies (as relate to Project participation)	Implications for the Project
Professional training institutions and universities	• Well-established institutions and universities already act as important sources of knowledge development, training and education for professionals in environmental and health fields. • Universities offer a source of research, data-gathering and other skills necessary for implementing and sustaining the program long-term. • Universities and professional training programs have the infrastructure to provide education and training for workers and professionals, as well as outreach to the general public.	• In general, professional training institutions and universities have no specific interests or needs related to the Project. India has a pre-existing commitment to develop a training program with WHO, and Tanzania has an interest in working to further technology development and dissemination as part of the Project.	• Identified institutions either have existing, recently developed programs that directly support Project goals (e.g., India), or have complimentary missions or opportunities (usually focused on worker safety) that can be easily enhanced to meet Project needs. • Institutions have expressed an interest and willingness to serve as sources of expertise (e.g., Tanzania), information and training, on national and regional levels and in association with model hospitals.	• Institutions have a potential role as significant partners in research, development and training. • Adequate funding will be needed to develop and sustain their ability to participate.

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ANNEX 1:
COUNTRY-SPECFIC PROJECT COMPONENTS

ANNEX 1: COUNTRY-SPECFIC PROJECT COMPONENTS

ARGENTINA

Model Facilities

Urban Model Hospital	
Public Pediatric Hospital (Hospital Público de Pediatria) is a teaching hospital where residents and interns are trained in different specialties through agreements with various universities. It has a Commission of Education comprised of multidisciplinary teams. The hospital has demonstrated a high commitment to quality. Waste is managed through the department of Medicine, Hygiene and Safety, which is committed to this Project and has made substantial advances in the field of health-care waste management. The hospital infrastructure is reliable and capable of responding to the needs of this Project. Work teams are dedicated to administration and documentation, as well as to the promotion of research in different fields. The hospital has a direct institutional link to the Ministry of Health and Environment that will ensure the continuity of the Project's gains over the long term. The hospital's activities have a strong national and regional impact, a fact that will undoubtedly facilitate the dissemination of information related to the Project's activities. Currently, the hospital does not have procurement policies that favor waste minimization or the identification and substitution of inputs (for instance, of mercury-containing materials). Few materials are recycled (paper and cardboard) or reused within the hospital. By the end of 2002 the hospital stopped operating a pyrolytic incinerator, and waste is now treated and disposed off-site. This change has required a shift in thinking that has not yet been completely accepted, a factor that may impede the implementation of best management practices. The hospital's technical staff agree that a wide range of improvements regarding the efficiency of waste segregation is possible. The hospital has a large professional and technical staff, many of whom could become trainers on health-care waste management.	
Hospital name	*Public Pediatric Hospital (Hospital Público de Pediatria)* SAMIC Prof. Dr. Juan P. Garran Buenos Aires
Number of beds	475
Average occupancy rate	90%
Average number of outpatients per day	1,800
Type based on hospital services	Teaching and research pediatric hospital. Services include: medical clinic, surgery, burn emergencies, radiology, laboratories, oncology and transplants.
Hospital type	Public. Decentralized management. National and international patients served.
Type and location of technology	By the end of 2002 the Hospital stopped operating a pyrolytic incinerator and the infectious waste is treated and disposed of off-site through an external autoclave service.
Southern Region Focal Hospital	
Hospital "Francisco López Lima" does not have procurement policies that favor waste minimization or the identification and substitution of inputs (for instance, mercury-containing materials). Materials are not formally recycled, though informal collection of paper and cardboard occurs. There is a wide range of possible improvements regarding the efficiency of waste segregation; problems include the mixing of infectious and domestic wastes and the presence of PVC and diverse chemicals in waste, including chemotherapeutic waste. The Project will have to review the actual classification of waste according to risk criteria, and analysis will have to be done to establish the necessary mechanisms to achieve and sustain efficient segregation. The staff has identified its own training and capacity-building needs. The Municipality of General Roca has acquired an autoclave to replace the incinerator. The new technology requires new internal practices that need to be strengthened, especially in all aspects related to segregation.	
Hospital name	Hospital "Francisco López Lima" City of General Roca Province of Rio Negro

Number of beds	134
Average occupancy rate	90%
Type based on hospital services	General medicine hospital. Services include: general, surgery, gynecological, maternity, neonatology, trauma and radiology services.
Hospital type	Public. Patients come from all over the region
Type and location of technology	At present, an external incineration service for infectious wastes is being used. It is a municipal plant operated by a private firm. The replacement of the incinerator is likely to be implemented around 2006.
Northern Region Focal Hospital	
President Juan Domingo Perón Hospital does not have procurement policies that favor waste minimization or the identification and substitution of inputs (for instance, mercury-containing materials). Materials are not formally recycled, though informal collection of paper and cardboard occurs. There is a wide range of possible improvements regarding the efficiency of waste segregation; problems include the mixing of infectious and domestic wastes and the presence of PVC and diverse chemicals in waste, including chemotherapeutic waste. The Project will have to review the actual classification of waste according to risk criteria, and analysis will have to be done to establish the necessary mechanisms to achieve and sustain efficient segregation. The staff has identified its own training and capacity-building needs. The new hospital building is a highly motivating factor, since all the personnel have high expectations to work under better conditions.	
Hospital name	President Juan Domingo Perón Hospital City of Tartagal, Province of Salta It includes a sanitary facility 6 km away that serves a Wichi settlement.
Number of beds	120, increasing to 200 at the new building
Average occupancy rate	100% maternity, 75% other services
Average number of outpatients per day	22
Type based on hospital services	General and some critical specialties. Diagnosis and treatment services.
Hospital type	Public. Patients come from all over the region.
Type and location of technology	At present, the hospital sends its infectious wastes to a plant using an autoclave and incinerator located more than 450 km away.
Central Region Focal Hospital	
Reconquista Central Hospital (Hospital Central Reconquista) does not have procurement policies that favor waste minimization or the identification and substitution of inputs (for instance, mercury-containing materials). Materials are not formally recycled, though informal collection of paper and cardboard occurs. There is a wide range of possible improvements regarding the efficiency of waste segregation; problems include the mixing of infectious and domestic wastes and the presence of PVC and diverse chemicals in waste, including chemotherapeutic waste. The Project will have to review the actual classification of waste according to risk criteria, and analysis will have to be done to establish the necessary mechanisms to achieve and sustain efficient segregation. The staff has identified its own training and capacity-building needs. There is strong institutional and political support to pursue initiatives that help improve waste management conditions at health-care facilities.	
Hospital name	Reconquista Central Hospital (Hospital Central Reconquista) City of Reconquista *Province of Santa Fe* It includes Lanteri rural hospital.
Number of beds	140
Average occupancy rate	90%
Type based on hospital services	General medicine. Services include: general, surgery, intensive care, obstetrics, gynecological, pediatric and neonatal services. Medium complexity diagnosis and treatment services.
Hospital type	Public. General. Patients come from all over the region.
Type and location of technology	At present, the hospital sends its infectious wastes to an electrothermal deactivation plant located more than 450 km away. Due to long distances, this service is critical and frequently stops for long periods of time. The private sector disposes of medical waste in open dumps.

Technology

Twenty-five percent of the provinces do not have any health-care waste treatment at all and no transboundary movements are officially registered. In six other provinces only one plant has been identified.

Seventy-eight percent of health-care waste is treated by incineration, achieved through diverse technologies with differing maintenance requirements. More than one-third of the incineration processes are in situ. The great majority of these plants do not meet international requirements.

The decision to incorporate autoclaves is a result of local regulations rather than an acknowledgement of the effects of incineration. The strategy consists of letting hospitals that serve large rural areas located far away from existing treatment plants use in situ alternative technologies.

The plan is to install an autoclave – of not more than 150 kg per cycle – in one or two of the regional hospitals, with the possibility that they could also receive and treat health-care waste from other sources. Another possibility is to install one autoclave in one of the regional hospitals and to install alkaline hydrolysis equipment as part of a pilot study at the National Research Institution in order to explore its effectiveness in treating organic residues and medicine and chemotherapeutic wastes, which are currently being incinerated. A study of this kind would provide reliable information on a new technology that is not well known but may prove appropriate for this range of chemicals. Conducting the study at a National Research Institution may also induce the national government to encourage the use of this technology if the outcome is positive, with the additional benefit that it may open the market to new business possibilities.

Approach	On-site treatment
Type of technology	Autoclave, and possibly an alkaline hydrolysis unit
Capacity	150 kg/hour
Additional equipment	Steam generator and compacting device
Category of waste to be treated	Infectious waste
Facility being serviced	The hospital, its primary care centers, and private institutions within the region
Location of treatment system	Within the hospital
Distance to landfill or dump site (km)	Approximately 10 km

National Training Program

Health-care waste management (HCWM) capacity-building needs are not yet well identified nor satisfied. The specific capacity-building needs regarding training and certification should be clearly spelled out.

The public health sector is where the best conditions may be found to support the program through the commitment of health-care staff and personnel to training and certification at national, provincial and municipal facilities.

The National Working Group is analyzing the legal and administrative procedure in order for the Ministry of Health and Environment to issue a regulation establishing that all health-care staff and personnel within its jurisdiction should be duly trained and certified in HCWM. Its application in other jurisdictions may be achieved through an agreement with Argentina's Health Federal Council (COFESA). The commitment of the private sector to hire staff and personnel certified through the program could be obtained.

Relevant existing trainings and stakeholders	*National Technological University (UTN)* Public Educational Structure with regionalization • Post-graduate degree in Hygiene and Safety • Specialization in Environmental Management – Special Wastes Management • Master in Environmental Management – Special Wastes Management Salta Catholic University (UCS) Distance education courses • Technical Course on Hygiene and Safety, Graduate level • Technical Course on Quality Management, Graduate level

	• Specialization in Hygiene and Safety, Post-graduate level • Master in Environmental Management, Post-graduate level
Name of training institution	*National Technological University (UTN)* Héctor Brotto, Dean Sarmiento 440 City of Buenos Aires Dr. Patricio Colombo Murúa Pellegrini 790 City of Salta
Training program description	Multiple campuses of UTN Distance education courses of UCS
Key partners	Ministry of Health and Environment through its competent departments
Certification Institutions	UTN and UCS
Strategies to ensure sustainability after Project completion (funds to pay for the training)	The commitment of health-care staff and personnel to training and certification at national, provincial and municipal facilities will contribute to long-term sustainability. The National Working Group is analyzing the legal and administrative procedure in order for the Ministry of Health and Environment to issue a regulation establishing that all health-care staff and personnel within its jurisdiction should be duly trained and certified in HCWM. In other jurisdictions an agreement with Argentina's Health Federal Council (COFESA) is being planned.

INDIA

The GEF Project Consultants and the Global Expert Team recommend that a unique approach be taken in India. The central recommendation is based on the assessment that India is already advanced in relation to other countries participating in the Project, and it has already developed several excellent model institutions. However India is a geographically vast and diverse country, and some states' health-care waste management systems are less developed than others. Taking both of these facts into account, the India Project component will involve the development of a model facility in a currently underserved state to encourage further institutional development, particularly in low-resource regions. This approach will be supplemented and paralleled by an approach to build a model state in a region that already has a good infrastructure of well-functioning health-care facilities and Central Treatment Facilities, and is overseen by State ministries that have taken a progressive approach to achieving best health-care waste management practices. This dual track will ensure that India not only contributes new knowledge to the Project based on advances that have already been made in certain regions, but also will continue to inspire further work at the institutional level in regions that are not so advanced, keeping the Project in line with similar approaches in other participating countries. Approval by the NPSC, the Government of India and the GEF Focal Point is reserved until the Project is reviewed in full detail in the project document.

Thus Project implementation in India will focus on a three-part strategy. One track will focus on developing a model state where work will improve the current system within one central facility and the area it services. A second track will identify a model hospital in a poorer state with an underdeveloped waste management system for development into a model facility whose performance may be replicated in other states and regions. A third track will focus on updating national HCWM training programs to reflect lessons learned in support of Project sustainability and replicability goals.

Model Facilities

Model State Program in HCWM

Under this approach, the Project will first evaluate gaps in the state's HCWM systems that must be filled in order for the state to meet Project Objectives (reductions in mercury and dioxin emissions). The Project model will build on the current effort to set up service territories within a state based around a Central Treatment Facility (CTF) as a focal point for system change. One existing Central Treatment Facility will be chosen in concert with the State MOEF and Ministry of Health. The criteria for this choice will include the following considerations:

- Consider gaps in the coverage of service territories (rural and urban);
- Consider gaps in treatment technology (incineration of some wastes); and
- Consider gaps in the health-care waste management practices of institutions in their service area.

Once these gaps are identified, the Project will then implement activities aimed at addressing these gaps in service and compliance, developing a complete system for proper treatment and disposal options for both rural and urban areas. The outcome will be the establishment of a seamless network of services and treatment and disposal practices that is cost effective and meets Project objectives.

The state of Tamil Nadu has been chosen as an excellent candidate for this Project component. The criteria used for selecting Tamil Nadu as a candidate for the model state program included:

- State with good track record in implementing HCWM objectives
- High likelihood of success
- Ease of translating project experience and success nationally
- Ongoing HCWM programs/activities in state
- Availability of CTF
- Opportunities for partnerships
- Opportunities for co-financing

Specifically, Tamil Nadu met the above criteria in the following ways:

- Tamil Nadu has a good track record in implementing HCWM objectives. This is evidenced by the future action plan of the government as well as current status of implementation;
- Working in Tamil Nadu means a high likelihood of success because of good governance and the environment in the state;

- Experience gained in Tamil Nadu can be easily translated to inform projects in other regions of the country, especially developed states;
- There are already a rich set of ongoing HCWM programs/activities in state including the World Bank-funded State Health System development project, which has a substantial HCWM component;
- CTFs are well-established in Tamil Nadu, and they have been cooperative with the Pollution Control Board and with the goals of this Project;
- In Tamil Nadu there are many opportunities for partnerships, with such institutions as WHO, the World Bank, medical colleges, and IGNOU Study Centres (as described below in the National Training Program component for India);
- In Tamil Nadu there are many opportunities for co-financing of the project, including with the World Bank and WHO initiative on tsunami relief.

State	Tamil Nadu* ** The state of Tamil Nadu is being used as a possible example of a state that has already achieved some level of consistent HCWM practice at the institutional level, has been developing a network of CTFs to serve health-care institutions, and has active programs in the government, NGOs and with other development organizations.*
Number of health-care facilities	2,450 (Private facilities: 1835)
Number of hospital beds	85,519 (Private: 41,306 beds)
Number of Central Treatment Facilities	10 proposed; 5 are operational. All are cleared for operation. Start-up of next 5 set for first half of 2006.
Number of facilities using CTFs	650
Type and location of technology	CTFs equipped with autoclave/incinerator (*Ramnathapuram facility is without an incinerator*)

Model Cluster and Central Treatment Facility

The Project will develop very specific health-care waste management models through working with at least one large hospital and several smaller clinics and/or rural health or injection programs in the service territory of one CTF. The focus will be on education, training, assessing management systems and ensuring that the systems for properly moving waste from point of generation to treatment to final disposal is a continuous flow.

The Project will help staff at participating facilities develop and implement best practices in concert with the work at the CTF. To accomplish this, the Project's activities include the following: reviewing existing waste management practices and policies including purchase and product utilization; establishing waste minimization and waste management objectives; proposing and adopting modification in current practices and policies; training managers and staff; monitoring and reviewing progress; and providing ongoing support and assistance to ensure objectives are being met.

CTF practices at individual institutions in the service area will be evaluated and actions will be recommended for improving practices to increase waste segregation, reduce waste volumes and ensure compliance with existing law mandating that no chlorinated plastics be sent for incineration. Systems design and staff training will be evaluated, and standardized recommendations will be established for the CTF to disseminate to facilities using its services. In the case of rural facilities or smaller facilities not captured in the service territory of a CTF, systems will be designed to either create a collection and transportation linkage to a CTF, or an alternative system for treatment and disposal will be established and modeled at key unconnected facilities and documented as part of the "model" process.

Facility name	GJ Multiclave (India) Pvt. Ltd.
Technologies in place	Autoclave Shredder Incinerator for anatomical wastes
Number of beds served	Capacity is 10,000 but currently operating at the level of 7,000 beds only
Description of services and training offered by the CTF to health-care facility clients	Waste collection from one section of private facilities in Chennai

Model Facility in an Underserved Area

The second part of the India implementation plan is to select a state with less expertise and lower outcomes in implementing HCW management, and establish an institutional model to demonstrate new practices and technologies that are most relevant for a state with access to fewer resources. Uttar Pradesh qualifies as a state that would serve as a good host for a model of this nature, according to the state selection matrix prepared by India's NPSC for this purpose. In addition to its other attributes as an underserved area, it is in the process of implementing a World Bank Health System Development project that includes HCWM as a component that can be incorporated into the Project design.

The Project will select and assess one facility to serve as the model within Uttar Pradesh. As part of the assessment, the facility will be examined according to how well it would serve as a point of learning and dissemination for other facilities in the state and in similar low-resource states in India. A baseline assessment of current practices, assets and liabilities in the waste management system will be conducted and an overall HCWM improvement plan will be established to increase segregation, reduce wastes needing special treatment, better manage mercury with the goal of virtual mercury elimination, select and install an alternative treatment technology appropriate to the size and needs of the facility, and document both the transition to the new condition of best practices as well as the new state of best practice and technology as a benchmark for other facilities.

State	Uttar Pradesh
Number of health-care facilities	3,224
Number of hospital beds	78,083
Number of Central Treatment Facilities	14
Number of facilities using CTF	1,581 (49.03%)
Number of facilities granted authorization	519
Total number and percent of facilities utilizing/proposed to utilize CBWTF	2,100 (65.12%)
Percent of total BMW treated per day	23.93%
Co-finance opportunities	World Bank
Partnership opportunities	World Bank, medical colleges

National Training Program

As detailed below, lessons from both of the model programs will be integrated into a new national curriculum. This effort will start with the curriculum currently in use through the Indira Gandhi National Open University on health-care waste management that is part of a distance learning certificate program. IGNOU will be a partner in developing training at the state level (Tamil Nadu, Model State), and will use the experience in both demonstration programs to strengthen its national certificate program and to continue building a network of satellite learning centers for students enrolled in the certificate program. The Project will focus intensive training efforts through the certificate program in the two model states during the Project implementation period to build a critical mass of educated workers and supporters to grow and sustain the program. In addition, work will begin to build links with medical colleges and nursing schools in the two model states to incorporate elements of the training into their professional curricula that is consistent with the IGNOU program.

In 2004, the Indira Gandhi National Open University (IGNOU)'s School of Health Sciences developed a distance learning curriculum on health-care waste management. In January 2006, IGNOU in collaboration with WHO-SEARO has launched a 14 credit six-month Certificate Programme in Health-Care Waste Management (HCWM) available as a distance learning curriculum and through fifteen study centers across India and partner institutions in other Southeast Asian countries. Program objectives are threefold: sensitize the learner about health-care waste and its impact on our health and environment; acquaint the learner with existing legislation, knowledge and practices regarding infection control and health-care waste management in South-East Asia Region Countries; and equip the learner with skills to manage health-care waste effectively and safely. Health managers, doctors, nurses, paramedics and others who have completed the pre-requisites may enroll in this course. The student handbook and prospectus

can be obtained from IGNOU regional centers or at the IGNOU headquarters in Delhi. www.ignou.ac.in/schools/sohs/chcwm/4-16c.pdf IGNOU initiated this program parallel to the initiation of the GEF project and has engaged the same stakeholder community in its development. The program is designed to be tuition-driven and thus self-sustaining in the long term. There is also interest in designing additional modules for training special populations in shorter certificate courses (e.g., CTF operators).	
Relevant existing trainings	Distance learning curriculum on HCWM at Indira Gandhi National Open University
Name of training institution	Indira Gandhi National Open University
Training program description	The program will be implemented through a network of Programme Study Centres in India and Partner Institutions located in other South-East Asian and other countries. These Programme Study Centres and Partner Institutions will be located in health-care institutions including medical colleges, hospitals, district and private hospitals, rural health centers, etc. A team of trained teachers called counselors will be identified and trained for providing academic counseling and supervising the Programme Study Centres/Partner Institutions. The administrative control will be through the Regional Centers of IGNOU located usually at state capitals nationally, by the Partner Institutions, by the Indian Consulate in the other countries and by the School of Health Sciences located at the IGNOU Headquarters, Delhi, India.
Key partners	Ministry of Environment & Forests Trained Nursing Association of India Individual hospitals
Certification institutions	IGNOU
Strategies to ensure sustainability after Project completion (funds to pay for the training)	IGNOU is developing the HCWM curriculum and training programs to serve regional audiences (SEARO) and possibly beyond. It is a tuition-driven program that will be developed to be a self-sustaining program at IGNOU.
Non-GEF resources	Additional ongoing training efforts in HCWM will be leveraged to provide access to training and information nationally. While the IGNOU effort will provide a national framework for consistent training and certification, it is the intent of the program to draw on the expertise of and align efforts with other training programs and resources, including Toxics Link, Centre for Occupational and Environmental Health, and Centre for Environment Education. The Ministry of Health will provide training in bio-medical waste management, and plans to conduct orientations for doctors, paramedical personnel and class IV employees in three states in 2006.

LATVIA

During the full Project inception workshop, the Latvian Project team shall consider establishing three working groups to effectively deal with the following Project subcomponents: a) training; b) technology and waste system-related issues; and c) legislation. Awareness-raising activities will be conducted at the start of the Project to broaden stakeholder understanding of the need to prioritize improving health-care waste management practices, identified as necessary by the National Working Group during the PDF B phase. If determined feasible and necessary, a review will be conducted of the National Implementation Plan for the Stockholm Convention on POPs which was adopted by the Latvian Government in May 2005.

Model Facilities

During the PDF B phase, the Ministry of Health conducted a survey of eight regional hospitals in order to select facilities for inclusion in Project activities. The main selection criteria, as agreed upon by the National Working Group and National Project Steering Committee, were the following:

- Established practices in health-care waste collection and separation and neutralization/decontamination on-site, as well as within the surrounding territory from other hospitals;
- Co-financing possibilities from the hospital itself or from the municipality;
- Capacity of staff;
- Established work safety practices; and
- Multi-profile hospitals.

Additionally, it was important to select facilities representing a wide geographic range within Latvia so as to ensure the modeling of proper medical waste management across Latvia as much as possible.

Urban Model Hospital

The Municipal Hospital of Ventspils was selected for inclusion in the Project, as it met the above criteria and could act as a representative model facility in the western region of Latvia. In addition, the National Project Steering Committee also took the following into consideration when making their selection:

- Ventspils has experience in attracting financing from the Environmental Protection Fund and other sources for medical waste;
- Ventspils has a license from the Ministry of Environment for waste disposal;
- Ventspils has established practices in waste treatment both on-site and in cooperation with private waste management company SIA "Lautus"; and
- Surrounding medical institutions have submitted requests to transport their medical waste for treatment to Ventspils.

Due to concerns both from the NWG and NPSC members on contamination of water, it was also a consideration that Ventspils uses on-site microwave technologies rather than chemical treatment.

Hospital name	Municipal Hospital of Ventspils
Number of beds	241
Average occupancy rate	67% in 2004
Average number of outpatients per day	33 per day (12,000 annually)
Type based on hospital services	Multi-profile hospital
Hospital type	Public
Type and location of technology	Using MEDISTER 160 microwave technology, a part of health-care waste is neutralized on-site.

Rural Model Facility

In addition to the main selection criteria detailed above under the Ventspils Hospital, the NPSC and NWG considered it important to address the issue of wide suspicion that many hospitals incinerate biological and other wastes in their local incineration unit, which is not equipped with special filters for reduction of harmful emissions. Thus Rēzekne was chosen as a hospital at which a more environmentally friendly approach could be demonstrated and replicated.

The Municipal Hospital of Rēzekne was selected to be a model facility in the eastern region of Latvia in part due to its geographic location. The Rēzekne Hospital has established practices for collection and treatment of waste from other surrounding hospitals. The hospital administration has experience in mobilizing funds from the Latvian Environmental Protection Fund and is willing to provide a contribution of up to 25% for this project investment mobilizing an additional 25% from the municipality of Rēzekne. The willingness of the municipality to take on financial commitment is considered a very positive aspect for Project participation.

Facility name	Municipal Hospital of Rēzekne
Number of beds	355
Average occupancy rate	82% in 2004
Average number of outpatients per day	40 (14,660 annually)
Type based on hospital services	Multi-profile hospital
Hospital type	Public
Hospital level	Regional
Type and location of technology	Sterimed disinfection technology on-site. Biological material incinerated on-site.

Technology

Latvia will maximize the effectiveness of its technology activities by using UNDP/GEF resources in combination with available funds for hazardous waste treatment from EU sources and from the hospitals, municipalities and private funding, to leverage the successful installation of up to two additional technology sites in the country's regions.

There are two private health-care waste companies that are licensed and active in Latvia. Independently of one another, both have chosen the rotating autoclave as the preferred technology for Latvia's needs and size. One company is purchasing the autoclave in 2006 for operation at the hazardous waste site in Olaine (20 km from the capital city Riga) and the other has EU LIFE financing to install an autoclave within the Riga region. Thus the UNDP/GEF Project will complement this private initiative through a public-private partnership to improve health-care waste treatment in Latvia. It has been estimated that a total of four such autoclaves would be required in Latvia to meet the country's waste treatment needs.

The National Working Group members expressed many concerns regarding the use of Sterimed-type technologies on-site, which cause chemical matter to be emitted into the wastewater system. Because of these concerns, the Project will support the introduction of microwave technologies on-site in the hospitals as a parallel effort.

Approach	Centralized treatment and on-site treatment
Type of technology	Rotating autoclave for centralized treatment; microwave technology for on-site treatment
Capacity	Up to 500 tons annually
Additional equipment	Filters on-site in the hospitals
Category of waste to be treated	Multiple types of health-care waste
Facilities being serviced	Hospitals, ambulances, private practices and veterinarians within the surrounding area of the model facilities
Location of treatment system	On-site and at the regional landfill
Distance to landfill or dump site (km) from the technology	Ventspils: up to 50km Rēzekne: up to 50 km

National Training Program

Latvia will undertake two unique activities within this Project component. Firstly, this component will commence at the full Project inception by identifying the main criteria for a procedure to select the training program's host institution. Secondly, once EU funding for hazardous waste treatment is programmed, the Project will consider providing assistance to hospitals in securing EU funding for the improvement of on-site medical waste treatment.

There are no specific training courses on health-care waste management available for health-care professionals in Latvia, and HCWM knowledge and skills are not considered in the individual certification programs for health-care providers nor in the health-care institutions themselves. There is a new *Regulation on hygienic requirements for hospitals and infection control in the health-care facilities* in the pipeline, which provides an opportunity to develop and integrate a training program on HCWM as a post-graduate training course. The main issues that were preliminarily considered in developing such a training course were twofold:

- It must enable professionals to develop and provide the training/instruction, and
- The training/instruction must be offered in the educational institution where the target group (health-care professionals) is trained or instructed.

Thus, from the research, it was determined that the best course of action would be to combine the expertise and enthusiasm of the Rīga Technical University on the topic of HCW with the infrastructure and linkage to health-care professionals at the Rīga Stradiņa University, where the course would be incorporated into the accredited program for health-care professionals.

Name of training institutions	Rīga Stradiņa University in cooperation with Rīga Technical University
Training program description	Single University
Key partners	Rīga Technical University Latvian Association of Nurses Latvian Association of Hospitals Ministry of Health Ministry of Education and Science Public Health Agency
Certification institution	Program to be accredited through the Ministry of Education & Science
Strategies to ensure sustainability after Project completion (funds to pay for the training)	Linking certification for mandatory training for health-care facility professionals responsible for HCWM to accreditation requirements of health-care facilities, thus making it in the interest of the health-care facilities themselves to fund officials to attend the program.
Non-GEF resources	State budget resources allocated for education and training

LEBANON

Model Facilities

The National Working Group (NWG) identified in January 2006 five model facilities with the understanding that the full Project and/or the National Project Steering Committee (NPSC) would reduce the number to three. Five main selection criteria were used: each facility must have passed the Ministry of Public Health accreditation cycle in 2005; obtained a waste treatment permit from the Ministry of Environment; the ability to demonstrate dioxin reduction during project implementation; different treatment technologies; and intent to sign an MOU with the Project. It is important to note that any given model facility may have failed Section 38 of the MOPH accreditation (related to health care waste management) yet passed the overall accreditation. Additionally, to achieve geographic and size distribution, the selection included one facility in Beirut and four facilities outside Beirut (four different governorates), as well as 1 small (50-60 beds), 2 medium-sized (100-150 beds), and 1 large facility (>250 bed).

In February 2006, the NPSC then reduced the selection to three facilities as follows:

1. Hotel Dieu (Beirut): A large hospital accredited by the Ministry of Public Health, Hotel Dieu holds a waste treatment permit from the Ministry of Environment. St. Georges Hospital and the American University Hospital came second and third respectively during the draw by the National Working Group.
2. Riyak Hospital (Bekaa): A medium-sized hospital in the Bekaa valley, Riyak Hospital installed an autoclave in 2003 but has expressed interest in relocating that unit to a site that would serve a larger number of hospitals. The hospital in Talsheeha and Khoury Hospital came second and third respectively during the draw.
3. Haykal Hospital (North): A small hospital in the North, Haykal Hospital is poised to receive funding to improve HCWM by installing an autoclave that will serve a cluster of hospitals in the region. Nini Hospital and the National Health Center came second and third respectively during the draw.

The only potential drawback to this selection is that all three facilities are private. The Nabatiyeh public hospital (in the South) and Haroun Hospital (in Mount Lebanon) were dropped. The Ministry of Environment officially endorsed the selection on March 1st, 2006 and has officially notified the facilities. The PDF-B National Coordinator is currently visiting the three facilities to confirm their interest and their commitment to serve as model facilities in the full Project. In case any of the three facilities does not wish to participate, the Ministry of Environment will approach the second facility for that region (based on the results of the draw). Additionally, Lebanon will also identify and work with a model (i) medical laboratory and (ii) dental clinic.

Urban Model Hospital 1	
Hotel Dieu, located in Beirut, is one of the largest hospitals in Lebanon (>250 beds). It passed the 2005 accreditation cycle at the Ministry of Public Health with the highest overall ranking among all the hospitals in Lebanon (score "A"). The hospital has also obtained a permit from the Ministry of Environment to treat medical waste on-site; it uses autoclave technology, provided and operated by Arc en Ciel, a Lebanese NGO. The hospital is representative of large privately owned hospitals in Beirut.	
Hospital name	Hotel Dieu
Number of beds	250 beds
Average occupancy rate	N/A
Average number of outpatients per day (if applicable)	N/A
Type based on hospital services: primary, secondary, tertiary and description of services [e.g.: general, specialty (pediatric, maternity, orthopedic, etc.), teaching, etc.]	Internal Medicine, General Surgery -Heart Surgery, Kidney, Liver and Bone marrow transplant, Maternity, Pediatrics, Intensive Care Units, One day surgery, Outpatient care, Diagnostic procedures, Pathology and Laboratory Medicine, blood bank, Medical Imaging services, Radiation Oncology, Hem dialysis, Pharmacy, Physiotherapy, Emergency services.
Hospital type: [Private for-profit, private not-for-profit, public, etc.]	Private-for-profit
Type and location of technology	Auto-clave sterilization on site
Urban Model Facility 2	

Albert Haykal Hospital is a medium sized hospital (about 100 beds), representative of medium sized hospitals in North Lebanon Governorate of the North. The hospital has passed the 2005 accreditation cycle of the Ministry of Public Health (score "C"). It has also obtained a permit from the Ministry of Environment for health care waste management. The hospital is currently sterilizing HCW by way of autoclaving. The hospital has expressed its intent to sign a MoU with the project in due course.	
Facility name	Albert Haykal Hospital
Number of beds (if applicable)	100 beds
Average occupancy rate (if applicable)	80%
Average number of outpatients per day (if applicable)	60 patients
Type based on hospital services: primary, secondary, tertiary and description of services [for example, general, specialty (pediatric, maternity, orthopedic, etc.), teaching, etc.]	Internal medicine, surgery, maternity, pediatrics, intensive care unit, physiotherapy, pharmacy, laboratory and emergency services
Hospital type: [private for-profit, private not-for-profit, public, etc.]	Private-for-profit
Level of hospitals [provincial, regional, district, municipal, health center, clinic, use country-specific classification]	Provincial hospital
Type and location of technology	On-site autoclaving (unit is owned by the hospital)
Rural Model Facility 1	
The Nabatiyeh public hospital was chosen as model facility for the following reasons: 1) it is the ONLY public/government hospital that has passed the MoPH accreditation cycle in 2005 (score "C"); 2) it is medium in size; and (3) it burns HCW – in theory therefore, the Project could achieve significant dioxin reduction. The Nabatiyeh Public Hospital is located in South Lebanon (Governorate of the South).	
Facility name	Nabatiyeh Government Hospital
Number of beds (if applicable)	<100
Average occupancy rate (if applicable)	NA
Average number of outpatients per day	NA
Type based on hospital services:	NA
Hospital type:	Public
Level of hospitals	District
Type and location of technology	Burning (To be Confirmed)
Rural Model Facility 2	
Riyak Hospital is representative of medium-sized hospitals in the Bekaa region. It passed the MOPH accreditation cycle and has obtained a waste treatment permit from the Ministry of Environment. The hospital is privately owned and managed and has expressed its intent to sign a MOU with the project in due course. The hospital bought and installed an autoclave unit several years ago but is considering selling the unit to the municipality of Zahle whose mayor has expressed interest in housing the unit near the sanitary landfill. This way, the autoclave unit can serve a cluster of hospitals and the shredded/sterilized HCW could be directly landfilled. The depreciated price of the autoclave unit is about $100,000.	
Facility name	Riyak Hospital
Number of beds	100
Average occupancy rate	NA
Average number of outpatients per day	NA
Type based on hospital services:	General
Hospital type:	Private-for-profit
Hospital Level	Municipal
Type and location of technology	On-site autoclave treatment
Rural Model Facility 3	
Haroun Hospital is representative of small hospitals in the Mount Lebanon Region. It has passed the MoPH accreditation cycle and has obtained a waste treatment permit from MOE. The hospital is private and owned by the President of the Syndicate of Private Hospitals – this arrangement was considered to be a facilitating factor for project implementation.	
Facility name	Haroun Hospital

Number of beds (if applicable)	100-150
Average occupancy rate	NA
Average number of outpatients per day	NA
Type based on hospital services:	General
Hospital type:	Private-for-profit
Hospital Level	Municipal
Type and location of technology	To be Determined

Technology

Background In recent years, Lebanon has made significant progress in health care waste management (HCWM) through two service providers; Arc en Ciel (AEC), and EnvSys. AEC is a Lebanese NGO that began providing HCWM services in 2003. It purchased and installed a wet-type autoclave in Hotel Dieu Hospital in Beirut, one of Lebanon's largest private hospitals. The hospital currently receives waste from at least two other nearby hospitals and three more may soon join that system; Hotel Dieu has a permit to install a second treatment unit that would double its treatment capacity. AEC transports the health-care waste to Hotel Dieu in closed trucks. EnvSys, a Lebanese for-profit company specialized in HCWM, operates autoclaves on mobile units servicing five hospitals. Combined, AEC and EnvSys cover about 7% of the total number of private hospitals in Lebanon. The unit cost for the treatment of HCW is reportedly $0.55/kg but the basis for this cost estimation remains unclear. Hospitals that wish to install a waste treatment unit need to get the Ministry of Environment (MoE) approval first by conducting an Environmental Impact Assessment. Although incineration is not strictly banned in Lebanon, MoE no longer grants permits for new incinerators pursuant to Law #432.

In an effort to formalize environmentally sound HCWM practices, MOE with the assistance of the EU and UNDP published in 2002 an "Environmental Auditing Manual for Hospitals" that aims to (i) assess compliance with government legislation, regulations and guidelines; (ii) assess adherence to internal policies and procedures; and (iii) identify areas for improvement to minimize the adverse impacts related to HCWM.

The full project will address the following strengths and weaknesses in Lebanon's HCWM system:

- International donors have already committed funds for waste treatment technology. AEC has received a grant from the EU Life Third Countries program to install an autoclave in the Mount Lebanon Governorate (€450,000); the EU has also approved funding for two HCWM projects in the Governorates of the South (Abbasiyeh, €342,000) and Mount Lebanon (Chouf Suwaijani, about €220,000) through a program with the Office of the Minister of State for Administrative Reforms (OMSAR); the Spanish Agency for International Development (AECI) has reportedly also endorsed a HCWM project in the North Governorate (near Tripoli) for AEC to install a treatment unit in Haykal Hospital. These initiatives, plus the treatment facility at Hotel Dieu in Beirut, provide a cluster approach to HCW treatment by servicing a group of hospitals. In relation to international donor funds/project, the Project will assess coordination mechanisms amongst national HCW treatments and analyze gaps and needs.

- Lebanon has recently enacted key legislation on Health Care Waste Management -- Decree 8006 (dated 11/06/02) amended through Decree 13389 (30/09/04) -- but enforcement remains weak. The Project will explore enforcement mechanisms and work with all concerned stakeholders to accelerate their implementation.

- Waste management has little impact on accreditation. The Ministry of Public Health (MOPH) has developed accreditation standards and guidelines for acute hospitals in Lebanon grouped into 38 discrete sections; Section 38 is on waste management and contains 8 standards. The weight of any single section has little overall significance on the accreditation system – i.e., a hospital may fail the waste management section and yet score well overall. The Project will support activities towards strengthening the language of Section 38 so that waste management carries more weight in the overall accreditation system.

- Hospitals are reluctant to pay for waste treatment. Whether they can afford it or not, hospitals are not accustomed to the notion that the "polluter pays" and need to be made aware of their environmental responsibility. Enforcement of basic HCWM practices will require incentives and good will. Any given hospital

has the option of buying the service from a local service provider or buy and operate its own unit on site. The Project will analyze treatment costs to determine break-even points and economies of scale.

- Existing waste treatment technologies are not adequately monitored. At least 20 hospitals so far have licenses to treat infectious waste but many more hospitals treat their waste without a license (e.g., open burning, closed burning, disposal). The efficiency of waste treatment using autoclaves has not been assessed as not all hospitals have submitted EIAs prior to installation. Those hospitals that have submitted an EIA and received MoE approval are randomly monitored. The Project will assess the performance of these treatment units, and formulate and disseminate lessons learned nationally and regionally.

Technical Approach In light of demonstrated progress in HCWM technology in Lebanon, the Project will not invest additional resources to identify and test new technologies but instead, focus on finding ways to reduce and/or sustain treatment costs in order to encourage hospitals to start practicing environmentally sound waste management to achieve close to 100 percent coverage by 2010 (at the end of the four-year project). In particular, the Project will implement five tasks related to waste technology:

- Conduct a baseline survey of the health-care waste stream in Lebanon (update old data if needed)
- Monitor the performance of existing waste technologies to determine efficiency and compliance
- Analyze treatment costs to determine break-even point and economies of scale
- Formulate and disseminate lessons learned to other facilities in Lebanon and regionally
- Conduct a feasibility study to extend HCWM services to cover the whole country

Technology: Autoclaving (fixed)	
Arc en Ciel (AEC), a Lebanese NGO has been purchasing and installing facility-level autoclaves since 2003. The organization currently treats HCW from 10 hospitals in two facilities (urban and rural), at the rate of about 1.2 tonnes per day, which is equivalent to 15 percent of the national waste stream. The EU recently awarded AEC a three-year project (2006-8) worth €450,000 to expand their work in HCWM. In particular, AEC will purchase, install and operate an additional autoclave to serve hospitals in the Governorate of Mount Lebanon. AEC will also deliver HCWM training to an estimated 1000 nurses, design and implement a public awareness campaign and provide legal and policy support to the Ministry of Environment to revamp the HCMW sector. AEC has already purchased and installed two autoclaves (ECODAS) that incorporate vacuuming, continuous feeding, shredding, mixing, fragmenting, drying, chemical treatment and/or compaction. The unit can treat up to 300 liters per cycle.	
Approach: [onsite, cluster, central facility not by landfill, central facility at landfill, mobile, etc.]	Onsite (AEC collects HCW from several facilities and transports them to Hotel Dieu where the autoclave is housed and operated)
Type of Technology	Auto-clave (commercial name is ECODAS)
Capacity (kg/hour)	Intercycle 300 liters/cycle (35 min/cycle)
Additional Equipment (shredder, grinder, compactor, transport carts, etc.)	Shredder incorporated
Category of waste to be treated? (e.g.: bio-infectious, pathological, chemotherapy, etc.)	Infectious waste
Facility(ies) being serviced	Hospitals and laboratories
Location of Treatment System	On-site and mobile unit
Distance to Landfill or Dump Site (km)	Dependant on the hospital location
Distance to model facility(ies)	TBD
Does the technology already exist? If yes, what is the technology name?	It is used in 10 hospitals so far (more hospitals will install autoclaves in 2006)
Technology 2: Autoclave (mobile)	
Also an Auto-clave, but it is mobile. Env-Sys, a Lebanese company specialized in HCWM, has introduced a different type of autoclave to the country (commercial name is HYDROCLAVE). The company owns several autoclaves and operates them as mobile units. Treated waste is stored in special medical waste bags and sent to the nearest municipal waste landfill. The company uses chemical and/or biological indicators to test the waste after sterilization and provides the hospital with the test results.	
Approach: [onsite, cluster, central facility not by landfill, central facility at landfill, mobile, etc.]	Mobile
Type of Technology	Auto-clave H25

Capacity (kg/hour)	75 kg/cycle (60 min/cycle)
Additional Equipment (shredder, grinder, compactor, transport carts, etc.)	Generator, shredder, grinder and heater (chaudière)
Category of waste to be treated? (e.g.: bio-infectious, pathological, chemotherapy, etc.)	Infectious wastes
Facility(ies) being serviced	Hospitals
Location of Treatment System	Mobile
Distance to Landfill or Dump Site (km)	Dependant on the location of the hospital
Distance to model facility(ies)	NA because mobile unit services several hospitals that have subscribed to the service
Does the technology already exist? If yes, what is the technology name?	It is used in more than 5 hospitals with MoE treatment permits
Technology 3: mobile	
A second type of mobile auto-clave systems is the H100. It is a system used by the private company Env-Sys. Once the waste is treated it is placed in Medical Waste Disposal Bags and disposed off in the municipal waste stream.	
Approach: [onsite, cluster, central facility not by landfill, central facility at landfill, mobile, etc.]	Mobile
Type of Technology	Autoclave H100
Capacity (kg/hour)	400kg/cycle (2 hours)
Additional Equipment (shredder, grinder, compactor, transport carts, etc.)	Shredder and grinder
Category of waste to be treated? (e.g.: bio-infectious, pathological, chemotherapy, etc.)	Infectious waste
Facility(ies) being serviced	Hospitals
Location of Treatment System	Onsite
Distance to Landfill or Dump Site (km)	Dependant on the location of the hospital
Distance to model facility(ies)	NA because the system is mobile
Does the technology already exist? If yes, what is the technology name?	Yes

Training and Education

Background Since 2000, several organizations have designed and organized training sessions on HCWM for hospital staff and nurses including the Ministry of Public Health and WHO, the Syndicate of Private Hospitals, the Order of Nurses and Arc en Ciel (AEC). In coordination with WHO, the Syndicate of Private Hospitals conducted the first formal training in 1997; the most recent training was conducted in 2004. The number of hospitals that passed the waste management section of the ministry's accreditation system reportedly increased between the first and second accreditation cycles. During this period, Lebanon's nursing schools/faculties have also been including some course work on HCWM but so far they have not offered a formal course on HCWM.

With grant funding from the EU-Life Third Countries Program (2007-2009), AEC started implementing a program on HCWM in Mount Lebanon; the Governorate of Mount Lebanon is host to 49 private hospitals, 36 percent of the total number of hospitals in Lebanon. As part of this program, AEC in cooperation with the Faculty of Nursing at Saint Joseph University will implement a training program on HCWM in a dozen hospitals. The program will train more than 1,500 nurses per year and culminate with the dissemination of a formal training kit designed to enhance in-house training capabilities.

WHO has established a Regional Centre for Environmental Health Activities (CEHA) based in Amman, Jordan. The center is engaged in several programs related to HCWM including the "Promotion of Health of Cities, Villages and Communities." The WHO office in Lebanon has expressed interest in the PDF-B project and would be ready to mobilize CEHA resources to support the training program.

Project Justification The GEF Project will address the following weaknesses related to Lebanon's achievements and capabilities in HCWM training:

- Lebanon has organized a number of training sessions but training needs have not been formally assessed; training capabilities have not been tailored to specific stakeholder groups like service providers, nurses, infection control staff, hospital managers, housekeeping, etc.
- The Syndicate of Private Hospitals has expressed concerns that hospitals cannot /will not pay to sustain training programs. So far, there is no system in place to finance training programs.
- There is no formal evaluation of training programs or a certification system to designate trainees who have completed a training program/module.
- So far, there has been little coordination between training organizations and projects. The opportunities for synergies between those organizations in relation to HCWM remain untapped.

Technical Approach

The GEF Project will have two elements; training and education. Both elements will build on previous achievements in HCWM training and education through pilots and national integration. The training element will target hospital staff and service providers including HCW providers and housekeeping. It will culminate with the launching of a certification system involving several line agencies including the ministries of public health and environment, World Health Organization and the Syndicate of Private Hospitals. The educational element will target the five schools/faculties that offer a degree in nursing by elevating HCWM from an ad-hoc syllabus to a full-fledged, stand-alone course. In particular, the GEF Project will implement the following tasks related to HCWM training and education:

Training

- Based on the preliminary assessment conducted during PDF-B, assess national training needs covering relevant stakeholders both internal to the facility (nurses, doctors, waste workers, infection control and procurement staff, housekeeping, public health and environmental health specialist, etc.) and external (municipal, government, and private sector players)
- Evaluate the training program/module prepared by AEC (Université Saint Joseph) by sharing it with relevant institutions for comments and enhancement (MOE, MOPH, WHO)
- Audit HCWM in the model facilities before and after the training
- Train hospital staff, nurses and services providers in all four model facilities using the training program/module prepared by AEC/Université Saint Joseph
- Based on the outcome of the pilots in the model facilities, modify and enhance the facility-specific training to produce a "custom" training program/module that is nationally suitable
- Formalize the training program/module during a national workshop to achieve national ownership
- Develop incentives to sustain training programs by examining training costs and potential sources of funding (e.g., apply a "training fee" on treatment service)
- Adapt and disseminate the "custom" training manual regionally and organize bilateral exchanges to maximize cross-learning
- Organize awareness seminars for hospital staff including nurses and housekeeping on mercury spill prevention, management and clean-up, and designate responsibility for monitoring training program, its effectiveness and impacts
- Develop a certification system for trainers and trainees

Education

- Work with the Faculty of Health Sciences at the American University of Beirut to develop a formal course on HCWM as part of the nursing curriculum; alternative facilities include the Lebanese University (Hadath), Université Saint Joseph (Beirut) and the University of Antonine (Baabda)
- Test the course on HCWM by completing at least one nursing cycle with HCWM as a formal course.

National Training Program
The Syndicate of Private Hospitals started a training program in 1997 with considerable WHO support through its regional Center for Environmental Health Activity (CEHA). At least four training sessions were organized each year between 1997 and 2004. The number of hospitals that have passed the Health Care Waste Management section of the MOPH accreditation reportedly increased since the start of the training program. AEC has received some funding from the EU-Life Third Countries program to implement a training program on

HCWM in a selection of facilities. Also, the Order of Nurses and WHO will be involved in the training component.	
Relevant Existing Trainings and stakeholders (if applicable)	
Name of training institution(s)	Syndicate of Private Hospitals
Training program description (single university, multiple campuses of one university, multiple universities and programs, health ministry training centers, government run program, other training institutions, WHO training center, medical or nursing schools, other described)	Training has taken place in several hospitals
Key partners (health ministry and related departments, WHO, universities, associations of nurse, medical doctors, public health, hospital	WHO (CEHA)
Certification Institutions	None to date
Existing training policies and regulations (if applicable)	None to date
National Training Program	
AEC has received some funding from the EU-Life Third Countries program to implement a training program on HCWM in a selection of facilities.	
Name of training institution(s)	Arc En Ciel
Key partners (health ministry and related departments, WHO, universities, associations of nurse, medical doctors, public health, hospital	Order of Nurses, Syndicate of Private Hospitals, MOPH/WHO, Arc En Ciel
Certification Institutions	WHO/MOPH and MOE
Existing training policies and regulations (if applicable)	None to date
Strategies to assure sustainability after Project completion (funds to pay for the training)	TBD
Non-GEF Resources	EU Life Third Countries, OMSAR

PHILIPPINES

Model Facilities

Urban Model Hospital

Ospital ng Maynila Medical Center (OMMC) was identified as the urban model hospital because it is a good representative of the Local Government Unit (LGU)-operated hospitals in the National Capital Region and the country as a whole. Most of the government hospitals in the Philippines are devolved to the Local Government Units and the model facility should be operated by the LGU to facilitate replicability of the project to other health-care facilities.

The size and capability of the hospital as a tertiary facility and the range of services it offers are important factors that were considered in the selection. The hospital location (in metro Manila) makes it accessible for coordination in terms of planning, monitoring and evaluation. It is also accessible and convenient for other project components such as training and model facility visits, and as a showcase to other health-care facilities in the country and the region.

The hospital management and the City Government showed strong commitment as project partners and the City Mayor signed a Letter of Intent (LOI) to participate in the HCWM project. Included in the LOI is the City's commitment to provide co-financing to the Project. The City has also designated personnel in charge of HCWM and is willing to collaborate on the training program.

OMMC is a teaching and training hospital for health-care providers. Proper waste management in the facility would therefore have unlimited benefits in terms of producing health workers that are future advocates of proper waste management.

Hospital name	Ospital ng Maynila Medical Center
Number of beds	300
Average occupancy rate	Average of 85% (maximum more than 100%)
Average number of outpatients per day	374
Type based on hospital services	Tertiary. Services include: surgery, obstetrics, medicine, ear-nose-throat, ophthalmology, pediatrics, family medicine, and rehabilitation for physical therapy patients. The facility is also a teaching hospital.
Hospital type	Public
Type and location of technology	Formerly incineration (on-site); contractor (off-site)

Rural Model Facility

Pangasinan Provincial Hospital (PPH) was identified as the rural model hospital because it is a good representative of the Local Government Unit (LGU)-operated hospitals in the country. It is located in Region 1 and within the Health Resources and Services Administration (HSRA) "Formula One for Health" areas, which is one of the criteria set by the Technical Working Group (TWG).

The size and capability of PPH as a provincial hospital (tertiary facility) and the range of services it offers are factors that were also considered in the selection. The hospital location makes it accessible for final disposal of treated HCW to the Clark Sanitary Landfill, an approved and operational sanitary landfill. The total lot area of about five hectares is more than adequate for housing an on-site treatment facility. The hospital plans to upgrade to 250-bed capacity. It has also designated personnel in charge of HCWM and is willing to collaborate on the training program.

PPH is a teaching and training hospital for health-care providers in the province. Proper waste management in the facility would therefore have further benefits in terms of producing health workers that are future advocates of proper waste management.

Facility name	Pangasinan Provincial Hospital
Number of beds (if applicable)	150
Average occupancy rate (if applicable)	100% or more
Type based on hospital services	Tertiary. Services include: obstetrics-gynecology, surgery, pediatrics, medical, and outpatient services. The facility is also a teaching hospital.

Hospital type	Public
Hospital level	Provincial
Type and location of technology	Burying (on-site); open pit (onsite)

Technology

By virtue of the Philippine Clean Air Act (RA 8749), the use of incineration is banned in the Philippines. The following treatment technologies can be used for HCW management in the country: autoclave, microwave, hydroclave or other approved non-burn technology. The preferred option for appropriate technology is an on-site treatment facility (facility-based). This strategy will minimize cost and potential risks of HCW transport and storage.

Priority will be given to locally made or manufactured technology or equipment to ensure sustainability of operations and minimize cost of maintenance. Treatment technology should comply with existing Environmental Laws and Regulations in the country. Based on the above considerations, an autoclave treatment technology will be used in this project. Treated health-care waste for both model facilities will be transported to and disposed in the Clark Sanitary Landfill, which is about 100 km from both locations.

Approach	On-site treatment
Type of Technology	Autoclave
Capacity	1.5 cubic meters (450 kg) per unit per hour *(Target for this project is to provide two units per model facility)*
Additional equipment	Shredder, bins, color-coded bags and transport carts
Category of waste to be treated	Infectious, pathological
Location of treatment system	On-site
Distance to landfill (km) from the technology	Approximately 100 km

National Training Program

The Department of Health (DOH) provides training on HCWM in the country. A training module developed by the DOH is used in training health-care providers from different levels of the health-care delivery system. At present the DOH has trained a total of 468 key persons: 45 from the regional level, 59 from DOH hospitals, 114 from provincial and city levels, 152 from local government units, 35 from private hospitals and 3 from other units.

Aside from DOH training, there is no other training program on HCWM in the country. Most of the personnel trained came from government health-care facilities with only 35 trainees or about 7.5% from private health-care facilities. In spite of these efforts from the DOH to train health-care providers on proper HCWM, most of the stakeholders believe that there is an urgent need to sustain training of personnel from the private sector and other government health-care facilities.

The University of the Philippines, College of Public Health (CPH) will be the partner academic institution for the training component of the Project. A Letter of Intent (LOI) submitted by the College states the institution's commitment to be the training arm of the Project during the implementation phase. The College is also willing to offer the training and certification course on HCWM continuously after Project completion.

The target trainees per model facility include personnel from management, rank-and-file, maintenance, as well as medical and nursing staff. For other LGU hospitals/clinics and private hospitals in Metro Manila, only key persons will be trained (five per facility) as trainers for their respective health-care facilities.

At the end of the Project, the HCWM training module will be part of the regular short course offering of the College of Public Health. This is open to participants from any health-care facility in the Philippines and other countries.

Relevant existing trainings and stakeholders	Training-of-trainers on HCWM, Department of Health

Name of training institution	Department of Environmental and Occupational Health College of Public Health, University of the Philippines, Manila Dr. Ronald D. Subida Department Chair
Training program description	Multiple campuses of one university, or Health Department training centers
Key partners	Department of Health Local Government Units (LGUs) University of the Philippines
Certification institutions	College of Public Health, UP Manila
Strategies to ensure sustainability after Project completion (funds to pay for the training)	Core trainers trained from each health-care facility can conduct training for other staff of the hospital. Private and other government hospitals can avail of the training modules that will be part of the regular short courses offered by the College of Public Health, UP Manila (for a minimal fee) after Project completion.
Non-GEF resources	Department of Health Local Government Units Private Hospitals

SENEGAL

Model Facilities

Urban Model Hospital	
The Senegalese Steering Committee unanimously agreed that Hoggy Hospital should serve as the urban model facility for this Project. Criteria identified by the national stakeholders included facility size, number of services provided, replicability of outcomes and a willingness and ability to implement and maintain the changes necessary to meet Project goals. Hoggy Hospital best met all of the identified criteria. It is a medium-sized hospital located in the Dakar area, large enough to be an appropriate urban model while small enough that Project results could be easily replicated by health-care facilities throughout the country. It is similar in systems management, financial structure and stability and waste management systems to the average medium-size Senegalese hospital. Further, as a public hospital, Hoggy is quite willing to collaborate with the ministries and the Project team, exchange and share information and implement related training programs. Most critically, since Hoggy Hospital currently does not have a health-care waste treatment technology, the hospital management is open to purchasing non-burn technology for this purpose.	
Hospital name	Hoggy Hospital (Dakar)
Number of beds	287
Average occupancy rate	95%
Average number of outpatients per day	No data
Type based on hospital services	Tertiary hospital. Services include: surgery, gynecology, maternity, emergency, research, laboratory, pediatrics, medical clinic, surgery, radiology and oncology.
Hospital type	Public
Type and location of technology	Currently some of the health-care waste is open-burned on-site and some is transported off-site where it is also burned.
Rural Model Facility 1	
Sangalcam is the first of two rural model facilities chosen in Senegal. Sangalcam is located approximately 30 kilometers outside of Dakar in the Rufisque region. It is close enough to the city to be accessible to Dakar's waste management system and to be linked to the urban model facility. Uniquely, Sangalcam is located among 52 villages thus serving a relatively wide region with a population of 50,000; generally, facilities of this size are in more isolated areas and serve a much smaller population. This unique situation will be leveraged to facilate replication of Project gains among the health stations where most rural medical services are provided (768 stations nationally). Sangalcam will provide information about best practices to these health stations to encourage adoption of best practices.	
Hospital name	Posté de Santé de Sangalcam
Number of beds	4
Average occupancy rate	Over capacity during rain/malaria season. Other seasons 100%.
Average number of outpatients per day	45
Type based on hospital services	Primary services
Hospital type	Public
Hospital level	Provincial
Type and location of technology	Currently there is no health-care waste treatment management. Open-burning is practiced on-site.
Rural Model Facility 2	
Youssou Mbargane (YM) Diop Hospital is the second rural model facility and also located in the Rufisque region. Of the two rural facilties, YM Diop Hospital is further from Dakar and located in a more remote rural area. YM Diop Hospital already is and will continue to be involved in the Project-linked training program. YM Diop is representative of many smaller health centers in Senegal, making it ideal for demonstration of best practices that can be replicated nationwide. Currently YM Diop has no health-care waste management system.	
Hospital name	Youssou Mbargane Diop Hospital
Number of beds	50
Average occupancy rate	Over capacity during rain/malaria season. Other seasons 100%.
Average number of outpatients per day	No data.
Type based on hospital services	
Hospital type	Public

Type and location of technology	Health Center
Type and location of technology	Currently health-care waste is burned in small-scale incinerator with no air pollution control measures.

Technology	
In Senegal, health-care treatment waste technologies are currently quite limited. In many cases, the waste is not treated at all and is disposed with municipal waste. The Dakar region is in the process of opening its first sanitary municipal landfill. In the rest of the country, all waste is disposed in a non-sanitary and non-secure fashion. Most treated health-care waste is either open-burned or burned in small-scale incinerators with no air pollution control measures. Due to low or no awareness of proper health-care waste management systems and lack of knowledge about economically viable non-polluting treatment technologies, the current trend in Senegal is the promotion of burning. Through the Project, health-care waste from the urban model facility and both rural facilities will be treated through economically viable, simple non-burn technologies. Currently, it is unclear if the partnership between the government of Senegal and the private contractor AMMA responsible for collection, transportation and management of municipal waste will continue. In the first six months of the Project's implementation phase, national stakeholders in collaboration with the GEF will decide whether to promote the central or on-site treatment of waste from the urban model facility; the allocated budget for activities in Senegal is adequate to fund either option. Both rural model facilities will use simple, low-cost on-site autoclaves for the treatment of health-care waste. All model technologies will be chosen with consideration given to the local circumstances and needs in order to assure the highest likelihood of replication, sustainability and pollution reduction.	
Approach	Urban to be decided; both rural facilities will use on-site technologies.
Type of technology	Economically viable simple autoclaves
Capacity	Variable as needed
Additional equipment	N/A
Category of waste to be treated	Bio-infectious and anatomical
Facility being serviced	Model facilities and potentially additional urban facilities if central facility model is chosen
Location of treatment system	On-site for rural and undecided for urban facility
Distance to landfill or dump site (km)	20 to 40 km

National Training Program	
The Project will collaborate with and build on the PRONALIN training program on infection control, HCWM and epidemiology funded by the Scandinavian Development Fund and overseen by the Department of Preventative Medicine of the Ministry of Health in Senegal. PRONALIN began in 2005 and will continue through 2015. The program's overall budget is thirty million USD devoted to the procurement of technology, materials and training. The training program is allocated approximately seven million USD. Through this program, every health-care facility in Senegal will receive HCWM training. The training program will range from 3 days for medical doctors to one week for nurses, infection control staff and waste managers. Originally, the program managers planned to purchase small-scale incinerators. However, because of their collaboration with the Project thus far, the PRONALIN project managers have agreed to further explore other treatment technology options in the upcoming year. All three model facilities have been trained through the PRONALIN program. Building on this program, the Project will provide technical support and content expertise, additional national and regional materials-development and dissemination support and further financial support. Through this Project the training program will be disseminated to other west African francophone countries.	
Name of training institution	PRONALIN in collaboration with the Department of Preventative Medicine
Training program description	Basel Regional Center for Francophone Countries (BCRC Dakar)
Key partners	Ministry of Health, Department of Preventative Medicine, Scandinavian Development Fund; The National School for Sanitary and Social Development (ENDSS).

Strategies to ensure sustainability after Project completion (funds to pay for the training)	The Project is in collaboration with an existing training program that is in place through 2015. The existing training activities are overseen and monitored by the Department of Preventative Medicine of the Ministry of Health and funded by the Scandinavian Development Fund. Through financial and programmatic collaboration with this existing government program, the Project can best assure continuation and improvement of HCWM training nationally after the Project's completion.

TANZANIA (Appropriate Technology Development Component)

Background of Partner Institutions
The College of Engineering and Technology (CoET) is a semi-autonomous campus College of the University of Dar es Salaam. The College is composed of three faculties, namely the Faculty of Mechanical and Chemical Engineering, the Faculty of Civil and the Built Environment and the Faculty of Electrical and Computer Systems Engineering. The Faculty of Mechanical and Chemicals Engineering is the largest in the College with six academic departments. It offers eight undergraduate programs and about the same number of postgraduate programs, employs approximately 59 academic staff and 30 technical staff, and has a student population of about 700 undergraduate students and 200 postgraduate students. All staff and students involved in the Project will come from this Faculty, which has experience in developing small- to medium-scale equipment and technologies.

The Technology Development and Transfer Centre (TDTC) plays the role of coordinating technology development and transfer activities in the College. The Centre is equipped with a modern mechanical workshop and has access to all laboratories and workshops in the College of Engineering and Technology. The Centre focuses on the following components: In-house technology development, which involves development of research outputs from College faculties and departments; and technology brokerage, which involves developing and transferring technologies using a mediated approach (negotiated contacts or purchase and sale agreements).

The College, in collaboration with Tanzania Gatsby Trust, the Ministry of Industry and Trade, and Small Industrial Development (SIDO), is promoting the incubation concept. A Technology Incubator promotes the development of small- and medium-sized enterprises through the enhancement of the technology available to and used by the enterprises. An incubator will act as a vehicle to provide an instructive and supportive environment to entrepreneurs who will be ready to take on and commercialize the health-care waste treatment technologies that will be developed by the Project. This will consequently guarantee sustainability and replication of Project activities in Tanzania and other countries.

Project Organization
A Technology Development Team (TDT) of about 5-6 people will be created. Its function is to coordinate and oversee the work of the Technology Development component of the project. It will be co-chaired by the lead technical consultant of the Global Expert Team and the Dean of the Faculty of Chemical and Mechanical Engineering at the University of Dar es Salaam. It will include international experts in infection control and product development, and a hospital engineer in Africa familiar with the hospital setting. Communication will be primarily through email, although site visits will be organized as needed.

In addition, a Technology Development Advisory Committee (TDAC) will be formed. This committee of about 20 people will provide advice and feedback on performance requirements, final designs, testing, evaluation and other aspects of the development as requested by the TDT. It will include representatives from each of the main Project partners (UNDP, WHO and HCWH), the seven participating countries, other countries in Africa, and international experts in specific areas related to health-care waste treatment and disposal. Communication will be through email.

Within the University of Dar es Salaam will be a university-based Research and Development Group (R&DG) which will be involved in the engineering, development, construction and test work. This will include the Faculty of Chemical and Mechanical Engineering, the Technology Development and Transfer Center (TDTC) and possibly the Department of Microbiology.

Technology Concepts
The basic requirements are a small- and medium-size treatment technology and appropriately sized waste containers. Basic design criteria could include:

- Effectiveness in disinfecting waste (ability to meet microbial inactivation efficacy requirements),
- Ease of validation of microbial inactivation,
- Ability to meet recognized standards,
- Affordability for developing countries,
- Ease of fabrication using locally available materials and human resources,
- Ease and safety in operation and maintenance,

- Durability and reliability under normal daily use,
- Relative ease of repair,
- Appropriate sizes (capacities),
- Options for different energy sources (electric, bottled gas, local fuels, solar, etc.),
- Low environmental emissions, and
- Residues could be recycled or safely discarded in open dumps.

Some of the initial designs will be taken from the results of the 2003 international competition sponsored by Health Care Without Harm with technical support from the World Health Organization (www.medwastecontest.org). Initial input will also be obtained from the members of the Technology Development Advisory Committee.

Activities during the Full Project

Task	Output	Responsibility
Develop performance criteria or performance specifications for the appropriate technologies	Draft design specifications	TDT
Review criteria or specifications by TDAC	Finalized design specifications	TDT, TDAC
Screen concept designs from existing technologies and results of the 2003 international competition on low-cost treatment technologies for rural areas	Proposed concept design	TDT
Conduct research and review of concept designs by R&DG to come up with recommendations	Recommended design	R&DG
Review and finalize recommended design; share information on the final design with the TDAC	Final design	TDT, R&DG
Develop and review engineering drawings	Engineering drawings	R&DG, TDT to review
Build prototypes	Prototypes	R&DG
Determine tests to be conducted (engineering, performance, pressure vessel certification, microbial inactivation); develop test protocols; review and approve test protocols; share information on test protocols with the TDAC	Test protocols	TDT, R&DG
Perform tests; modify designs and repeat tests if necessary	Test results	R&DG, TDT (EK)
Send test results to TDAC for review	Comments from TDAC	TDT
Determine factors to evaluate in field-testing; inform TDAC	Factors to evaluate	TDT
Install technology at a local hospital; conduct operator training; monitor operation, maintenance, microbial inactivation testing, etc.; keep records	(Unit operating in hospital or clinic)	R&DG, AGENDA, selected hospital and clinic*
Conduct field-testing and evaluation for at least one month	Report	AGENDA
Send field-testing reports and evaluation to TDAC for review	Comments from TDAC	TDT
Select manufacturer to fabricate technology using construction manuals**	Manufacturer selected	TDTC, TDT, AGENDA
Demonstrate fabrication	Units built	Manufacturer
Validate fabricated units, including validation of manuals; arrange for certification of pressure vessel	Validation report; certification	R&DG, certification agency
Send reports, manuals, etc., to TDAC for final review	Comments from TDAC	TDAC
Finalize construction, installation, operating and maintenance, training and other manuals	Manuals	R&DG, AGENDA
Lay groundwork for replication and sustainability		TDTC, AGENDA

*The Tanzanian NGO AGENDA will work beforehand with the selected hospital and clinic to implement a basic waste management program and conduct trainings

**TDTC and AGENDA will prepare a market study/needs assessment and will identify a manufacturer and possibly an entrepreneur in Tanzania.

As part of information dissemination, results of the technology development component will be posted on the Project website along with test results and field-testing case studies. Results will also be submitted for publication in scientific and engineering journals. The results will be presented at national, regional and international conferences.

VIETNAM

Model Facilities

Urban Model Hospital	
Viet Duc University Hospital is one of the best known hospitals in Vietnam both nationally and in Hanoi. Constructed in 1904, Viet Duc University was originally established to enable ideal learning conditions for medical students of Hanoi Medicine University. Through a century of development, the hospital is now not only the biggest surgical center but also one of the leading medical internship and research locations in Vietnam. Viet Duc was chosen as the model urban hospital for the project for the following reasons: (a) it has the highest reputation and quality nationally, (b) it receives some of the largest support and investment amounts from the Government of Vietnam, (c) it has an excellent management system, (d) it is dedicated to the goals of the Project and willing to implement the planned activities, (e) it has the necessary financial means to maintain sound health-care waste management, (e) its medium size is ideal, allowing a demonstration of extensive systems change while still remaining manageable, and (f) it is a training/university hospital thus ensuring replication of the management practices.	
Hospital name	Viet Duc University Hospital
Number of beds	450
Average occupancy rate	Overloading (200%)
Average number of outpatients per day	620
Type based on hospital services	Teaching hospital. Services include all major surgeries and services.
Hospital type	National state-own at central level
Model Cluster	
The NPSC and NWG agreed that in order to best demonstrate rural models for best techniques and practices in health-care waste management, a cluster of hospitals would be necessary. In Vietnam, provincial hospitals, district hospitals and health centers work closely in providing health-care services. The system needs to be examined holistically in order to make any substantive and long-lasting change. Additionally, the NPSC and NWG set proximity to Hanoi as a criteria for the rural cluster. This criterion was necessary in order to ensure collaboration between urban and rural model centers as well as between the rural cluster and the training program. A study tour and survey of facilities within 100 kilometers of Hanoi was conducted in the following provinces: Ninh Binh, Nam Dinh, Ha Tay, Hai Duong and Bac Ninh. After careful assessment, the cluster in Ninh Binh province, with the Provincial General Hospital as its core, was selected for the following reasons: hospitals in Ninh Binh province are willing to cooperate; they have the management system and financial structure necessary to implement and sustain the necessary programs and changes; Ninh Binh province is 100 kilometers from Hanoi enabling day-long study tours linked to the training component; and Ninh Binh province was the only surveyed province without existing incinerators, decreasing the likelihood of conflict with the proposed Project-related technology.	
Hospital name	Ninh Binh Provincial General Hospital (together with more than ten other neighboring district and communal facilities)
Number of beds	400 beds in Ninh Binh Provincial General Hospital and more than 200 beds in other neighboring district and communal facilities
Average occupancy rate	Range of 70-300%
Average number of outpatients per day for each location	300 outpatients per day for Ninh Binh Provincial General Hospital and more than 500 for other neighboring district and communal facilities
Type based on hospital services	Multi-profile hospital. Services include: diagnosis, surgery, emergency, pediatrics, X-ray, labs, etc. Other neighboring district and communal facilities provide mostly diagnosis and some simple treatment.
Hospital type	State-owned
Level of hospital	One provincial hospital and more than ten district and communal facilities

Type and location of technologies	One small simple autoclave
Main facility	Ninh Binh Provincial General Hospital
Distances from other facilities to the main facility	Within 10 km
Waste treatment plans for the cluster	All bio-medical waste from the cluster will be collected and treated by the autoclave in the main facility. None-infectious waste will be managed by the municipal authorities and disposed in the sanitary landfill.

Model Central Facility

Currently Hanoi Urban Environment Company (URENCO) services all of the hospitals (more than 50) and a majority of the health centers in Hanoi. Further, URENCO is responsible for municipal and industrial waste management services. Health-care waste is treated adjacent to both the composting center and the city landfill. Hanoi's Ten-Year Growth Plan includes adequate space for treatment and disposal of health-care waste. URENCO's waste management collection, transportation and treatment practices are systematic, documented and sustainable.

URENCO approached the Project partners seeking partnership, and its management is quite committed to collaboration and the Project's goals and outcomes. Currently URENCO incinerates the city's health-care waste. However, the incinerator has exceeded the recommended usage duration and URENCO is seeking to replace its treatment technology. To minimize environmental impacts, URENCO would like to replace its existing incinerator with a non-burn technology. Through the Project, we will work with URENCO to purchase twin autoclaves and a shredder. Two autoclaves will ensure continuous service even if one piece of equipment is being serviced. The shredder will lead to volume reduction, will render the waste unrecognizable and will ensure that health-care devices cannot be reused.

In addition, with collaboration of URENCO, the Project will develop a city-wide reusable sharps waste management system in Hanoi. URENCO has committed to integrate the proposed new system into its existing health-care waste management system. URENCO will provide reusable sharps boxes to all the hospitals and health-care centers it services in Hanoi, and will regularly collect, transport, treat and dispose of sharps waste. Depending on the amount of sharps waste produced, each hospital will be given an allotment of sharps boxes. As the boxes are filled, they will be exchanged with sanitized empty boxes. URENCO has agreed to oversee a tracking system as it does with its current health-care waste to ensure adequate information for feedback to hospitals on the quality of their sharps waste management. To the best of the Project management team's knowledge, this will be the first city-wide sharps waste management system of its kind in a metropolitan city in the Global South.

Approach	Centralized treatment
Type of technology	Two identical autoclaves to ensure continuous management
Capacity	200 kg/load for each autoclave
Additional equipment	One shredder
Category of waste to be treated	Infectious waste
Facilities being serviced	All hospitals and most health centers in Hanoi
Location of treatment system	Cau Dien Municipal Waste Treatment Complex, Cau Dien, Hanoi
Distance to landfill or dump site (km)	Adjacent to central facility
Distance to model facility	Within 10 km

National Training Program

The Project will collaborate with the Vietnam Administration of Preventive Medicine (VAPM) of the Ministry of Health on the national training program. VAPM currently has an extensive national training program on HCWM and occupational health and safety. Through the Project, the aforementioned training program will be further evaluated, supported and enhanced. Further, the Project will collaborate with the Ministry of Health and the Ministry of Natural Resources and Environment in order to ensure the efficacy and sustainability of the existing training program. The existing training program has a training center/node in every province, enabling the existence of decentralized, localized and effective training program(s) across the country.

VAPM manages a system of Provincial Preventive Medicine Centers. Based on this system and as obligated by national legislation, the Ministry of Health, in collaboration with other Ministries, agencies and provinces, spreads labor safety and environmental health training to health-care facilities nationwide. Surveys in 2004 by the Vietnam Preventive Healthcare Department of 74 health-care units and 1,509 health-care workers in three provinces/cities revealed that 69.5% of surveyed workers get access to labor safety and environmental health training. The training expense is incurred by the respective health-care facilities. The Ministry of Health and partners are only responsible for the development of training materials.

The Project training program will be incorporated into this system, and could utilize the existing structure and self-funding mechanism to ensure sustainability. Furthermore, the national training program will work toward the inclusion of HCWM in the curricula of health-care and medical professionals. Such programs will help ensure appropriate systems and implementation of health-care waste practices. Currently, most medical schools have environmental-health-related curricula where HCWM could be incorporated.

Relevant existing trainings and stakeholders	Annual labor safety and environmental health training to all health-care facilities nationwide through preventive medicine system
Name of training institution	Ministry of Health, Department of Preventative Medicine
Training program description	The program trains key instructors (training-of-trainers) who in turn travel to all health-care facilities and train relevant and responsible staff. The program uses the provincial governance structure and has one central node in each province. The program is overseen by the Ministry of Health. The Program's goal is to ensure effective HCWM, infection control and worker health and safety. Objectives: • Establish Central a HCWM Training Team, • Develop training materials for HCWM, • Build provincial core trainers on HCW, and • Provide training courses for health-care workers on HCWM at health-care facilities
Key partners in the Project training program	• Lead: Ministry of Health (Vietnam Administration of Preventive Medicine, Department of Therapy, Department of Personnel) • Partners: Ministry of Natural Resources and Environment (Vietnam Environmental Protection Agency); WHO, academia, provinces, hospitals
Certification institutions	Vietnam Administration of Preventive Medicine, Ministry of Health (through its Provincial Preventive Medicine Center)

Existing training policies and regulations	• Inter-ministerial Circular No.14/1998/TTLT-BLDTBXH-BYT-TLDLDVN dated 31 October 1998 of the Ministry of Labor, Invalids and Social Affairs; the Ministry of Health; and the Vietnam General Association of Labor, on the implementation of labor protection in enterprises and businesses. • Circular 13/BYT-TT of the Ministry of Health dated 21 October 1996 on the implementation of management of laborer health and occupation diseases. • Inter-ministerial Circular No.08/1998/TTLT-BLDTBXH-BYT dated 20 April 1998 of the Ministry of Health and the Ministry of Labor, Invalid and Social Affairs, on the implementation of regulations on occupational diseases. • HCW Management Regulations promulgated by Decision 2575/1999/QD-BYT dated 27/8/1999 of the Ministry of Health.
Strategies to ensure sustainability after Project completion (funds to pay for the training)	As dictated by national legal decree, the existing training was established in 1998. The Project will enhance and support the existing program, which legally will continue after the Project.
Non-GEF resources	Korean government, WHO and other related NGOs

ANNEX 2:
COUNTRY CHARACTERISTICS
(AS GATHERED ON PDF B MISSIONS)

ANNEX 2: COUNTRY CHARACTERISTICS (AS GATHERED ON PDF B MISSIONS)

ARGENTINA

National Implementation Plan (NIP)

Argentina is currently in the inventory stage, and the NIP will be completed in December 2006. Health-care waste management (HCWM) is an identified high priority, and the final plan will include language encouraging the use of non-burn technologies for waste treatment and disposal.

WHO Rapid Assessment Tool (RAT) Results - Summary of national HCWM status

	National equivalent percentage	HCWM rating
Large hospitals	17*	Good
Medium-size hospitals	45	Satisfactory
Small health facilities	67	Problematic
National rating	**43**	**Satisfactory**

*Assessor's note: The rating of the large hospital in the survey is not representative of other large hospitals, which may not rate as highly.

Health-care waste management opportunities and challenges

Opportunities

- Training was identified as necessary in all of the evaluated institutions, and health-care workers have indicated interest in receiving it. The proposal to develop local resources for training-of-trainers, a key component to ensuring Project sustainability and replicability, was particularly well received.
- Some health-care waste treatment facilities already use non-burn waste treatment methods. Some use autoclaving technology, and one uses electrothermic deactivation technology (Stericycle, Inc. ,located in Theobald, in the province of Santa Fe).
- Recycling is already taking place in both the informal and formal sectors, and both governmental bodies and NGOs promote recycling activities. Formal programs are most widespread in small and medium-sized cities. Materials recycled through formal programs include plastic, glass, cloth, metal, paper and cardboard. The three largest cities and many small cities have composting programs.

Challenges

- Because of Argentina's vast geography, the need for an adequate system of health-care waste management (HCWM) is critical, particularly in areas with strong health-care systems.
- Seventy-eight percent of HCW treatment facilities use incineration as the sole method of waste treatment and disposal, and more than a third of incineration facilities are located on-site in hospitals. Many types of incinerators are used in Argentina; nearly all fall far short of international standards for technological and monitoring requirements.
- No alternatives to incineration currently exist for treating organic remains, waste from liquid chemicals, and medicines or chemotherapeutic waste, which cannot be autoclaved.
- In general, health-care facilities' purchasing considerations do not include criteria for minimizing waste, nor criteria specifying the use of inputs, chemicals, or instruments free of mercury or other toxic substances. Purchasing mechanisms do not ensure that minimum standards for quality or reusability are met, and the widespread use of disposable bags, containers and gloves is a problem that creates serious challenges in implementing safe and sustainable processes.
- In general, major efforts have not been made to replace instruments containing mercury.
- Segregation of infectious waste is not efficient. In most institutions, infectious waste is mixed with non-infectious waste. Red bags are often used inappropriately for the disposal of medicinal waste, chemotherapeutic waste and organic remains.
- All institutions evaluated during the PDF B phase have a recent, and in some cases latent, practice of incineration of infectious waste. Some also incinerate housekeeping waste.
- The population in general is not accustomed to thinking about where their waste goes, and what it costs their municipality. This cultural variable is important in designing a sustainable and complete solution.
- A national plan is needed that includes coordination among provinces and municipalities and a drastic change from the current management of municipal solid waste in the country.

Relevant laws and guidelines

- National, provincial and municipal laws relevant to health-care waste management already exist. The structure of all laws is similar, regulating generators and transporters of waste, operators of waste treatment facilities and final disposal. The differences between the laws appear in the definitions of waste governed by the laws, the technical requirements, and the types of authorized treatment technologies.
- National Law No. 26.011 approves the Stockholm Convention.
- Resolution No. 349/94 gives the Ministry of Health responsibility for health-care waste management.
- The National Law on Hazardous Waste, No. 24051, establishes categories for hazardous waste subject to regulation and provides for the following: a national registry of waste generators and operators; environmental certification; regulation of generators and transporters of hazardous waste, operators of hazardous waste treatment facilities and final disposal; and penalties for non-compliance.
- Law No. 154 of the city of Buenos Aires regulates the generation, handling, storage, collection, transportation, treatment and final disposal of pathogenic waste.
- Law No. 747 of the city of Buenos Aires, February 2002, bans incineration within the city's jurisdiction and the contracting of services that use incineration, whether inside or outside the city's jurisdiction. The law initiated a process of incorporating autoclaves into health-care waste treatment facilities. In December 2005, the city of Rosario banned incineration in a similar law.
- Law No. 11717 of the Environment of the Santa Fe Province creates a Provincial Environment and Sustainable Development Council, mechanisms for community participation, technical environmental regulations, environmental education, protected natural areas, regulations concerning hazardous waste, incentives for implementation and penalties for non-compliance.
- Resolution No. 069/96 Approval of Technical Rules for Hazardous Waste Handling and Treatment of the Santa Fe Province defines pathogenic waste, names the responsibilities of the generator, creates requirements for treatment facilities and lists approved methods of treatment.

State of municipal waste management and recycling programs

- Municipal governments are responsible for solid waste collection and disposal. In small and medium-sized towns, most municipal governments provide solid waste management services directly, or contract with a private company or co-op often involved in other public utilities. In large cities, most municipal governments contract the service to private sector companies.
- Open dumps are the most common method of land disposal nationwide. In many locations, open dumps are created on government land or in areas environmentally degraded from previous use. In the largest cities, including all the regional capitals, sanitary landfills and semi-regulated dumps are used. Semi-regulated dumps have perimeter protection and intake control, and are periodically covered, but do not have controls for leachates or emission of gases. In large cities, clandestine open dumps also exist.
- Recycling is taking place in both the informal and formal sectors. In nearly every city in Argentina, informal workers, many of them children, recycle by picking materials of value from dumps and city streets. The number of people picking recyclable materials from trash has risen with the level of poverty in the country.
- Formal programs are most widespread in small and medium-sized cities. Materials recycled through formal programs include plastic, glass, cloth, metal, paper and cardboard. The three largest cities and many small cities have composting programs. Many formal recycling programs are strongly related to the social problem of municipal solid waste management.
- Both governmental bodies and NGOs promote recycling activities. Within the governmental sphere is the National Waste Valuation [Recycling] Plan (Plan Nacional de Valoración de Residuos of the National Secretary of Environment and Sustainable Development (SayDS). Among active NGOs is Eco Clubes.

Organizational structure of the Ministry of Environment and Ministry of Health

- The Secretary of Environment and Sustainable Development, under the Ministry of Health and Environment, is responsible for health-care waste management (HCWM) at the national level. There are two Sub-secretaries within the Secretary of Environment and Sustainable Development: The Sub-secretary of Natural Resources, Rules, Research and Institutional Relations; and the Sub-secretary of Planning, Codes and Environmental Quality. Within the latter, the Hazardous Waste Unit and the Chemicals Unit are involved in HCWM. The Hazardous Waste Unit maintains a registry of generators, transporters and operators of hazardous waste and participates in training and information dissemination projects focused on hazardous waste.
- The Ministry of Health addresses HCWM through its Regulation and Control Program and Quality Assurance Program, which includes norms governing waste handling.
- Each province divides responsibility for health-care waste management differently. Commonly, the ministries and departments involved are the State Secretary of Environment and Sustainable Development, the Secretary of Tourism and Sustainable Development, the Provincial Secretary of Health, the Environmental Sanitation Department and/or the Ministry of Public Health.

Description of the health-care system

- The national government, regional governments and municipal governments of large cities share responsibility for providing free health care, through hospitals and other health services.
- The public, private and NGO sub-sectors all provide health services. 53% of beds are in government facilities, 44% in private facilities and 3% in NGO sector facilities.
- There are 3,311 facilities with inpatient care, and 14,524 facilities with outpatient care only.
- The largest number of available beds in government health-care facilities is at the regional level, followed by the municipal level. This shows the decentralization of the health system in Argentina.

Related projects

Related programs exist in the following regions:

- The World Bank is currently funding projects to install sanitary landfills and centralize final waste disposal in the Chubut and Santa Cruz regions.
- In the Entre Ríos region, there are recycling programs in Federal and in Crespo for organic and inorganic waste, a recycling program in Nogoya and plans for a landfill and a separation and recycling plant in Gualeguay.
- In the Jujuy region, a complete solid waste treatment facility is under construction in Palpalá, with another two possible facilities planned in the region.
- In the Santa Fe region, there is a Municipal Solid Waste Treatment Plant (LIMPES) in Esperanza that recycles inorganic waste and composts organic waste. There are composting programs in Cañada de Gómez and Sunchales and a program called SEPARE in the city of Rosario.
- In the Chaco region, there is a recycling facility in Charata that works in collaboration with the NGO Eco Clubes, and a small recycling facility in Resistencia.
- In the La Pampa region, there are two composting facilities in Veinticinco de Mayo and Castex.

INDIA

National Implementation Plan (NIP)

- India is in the process of developing an NIP. No information is available at present.

Health-care waste management opportunities and challenges

Opportunities

- Many approaches and tools are already available, with many players engaged in the field. State governments, the media, NGOs and the judiciary all play an important role in creating awareness and sharing knowledge about health-care waste management (HCWM).
- A strong and clear regulatory commitment has improved the implementation of the Bio-Medical Waste (BMW) Rules. The State Pollution Control Boards' (SPCBs) and Pollution Control Committees' (PCCs) enforcement capacity and willingness to act on it have made a major difference in the effectiveness of implementing the BMW Rules. In addition to the BMW Rules, a nationwide ban on the burning or incineration of PVC plastic also exists.
- An effective state strategy for Central Waste Treatment Facilities (CWTFs) with private sector involvement is gaining ground. There are 84 CWTFs planned for the country, and the private sector role in off-site health-care waste management is becoming increasingly important.
- Hospitals are increasingly recognizing the potential value of recyclable materials, which is creating opportunities for collection and the establishment of formal and safe recycling programs within hospitals or within formal recycling enterprises.
- Higher education is playing a strong role in promoting safer waste treatment practices. A certificate program established at Indira Gandhi National Open University (IGNOU) in health-care waste management (HCWM) is one good example of this. A number of graduate students have also taken degrees at the Masters and Doctoral levels which emphasize HCWM.
- India recently ratified the Stockholm Convention.
- NGOs are playing strong national and regional roles in promoting good health-care waste practices. Leadership in this has largely come from Srishti, Toxics Link and Health and Us Medical Action Network (HUMAN), a network of NGOs concerned about health-care wastes.
- Some encouraging national efforts include the building of infrastructure that aligns with the Project. The Infection Management and Environment Plan (IMEP) for Reproductive and Child Health Programme, Phase II (RCH-II) has funds to invest in non-burn technologies and training efforts. The Ministry of Health will conduct orientation trainings in HCWM for doctors (3 days), para-medical personnel (2 days) and class IV staff (1 day) in three states – Maharashtra, Delhi and Orissa.
- A strong interest among a number of hospitals and health systems in improving their waste management systems has led to the establishment of model facilities in different regions of the country.
- Investments in alternative treatment technologies have been made both in individual facilities and in central treatment facilities. These include domestically-produced as well as imported technologies. In areas that are more rural or have fewer resources, there has been extensive experimentation with locally designed technologies ranging from shredders to solar powered disinfecting technologies.
- The presence of donor agencies also presents opportunities. There are many ongoing projects funded by the World Bank that assist in the procurement of equipment and provide training to health-care workers.
- The World Health Organization (WHO) has shown strong interest in supporting best practices in HCWM as demonstrated in recent publications on mercury and bio-medical waste management and support for the IGNOU certificate program in health-care waste management.

Challenges

- India's size and diversity and the lack of consistent national infrastructure for waste management present challenges to the design and implementation of a consistent, safe and sustainable system for health-care waste management throughout the country.
- Detailed guidelines must be developed for proper implementation of bio-medical waste regulations by different State Pollution Control Boards and Pollution Control Committees.
- Health-care waste management and allocation of resources are prioritized differently from state to state.
- Greater awareness and sensitivity among doctors, those directly responsible for HCWM, is needed.
- Mandatory disposal of two categories of waste through incineration presents a challenge. No alternatives are yet approved for pathological wastes and chemotherapy wastes.
- Improper segregation at the source leads to unnecessary burning of many categories of waste.

- Most hospital workers responsible for collection, transport and disposal of wastes have low literacy rates, and in some hospitals several different languages are spoken.
- There is a lack of training for contractual waste handlers.
- Sharps disposal still poses a challenge, especially in immunization programs.
- The strong informal recycling sector values wastes from hospitals because of the high quality and value of material; it also leads to some collection and direct reuse of improperly disposed-of materials such as syringes, tubing and other equipment.
- The diverse nature of the international aid community, nationally and even within regions, can lead to redundancy in aid programs and sometimes contradictory programs in individual hospitals, in urban areas or in states.
- A basic understanding of the environmental and human health impacts of mercury and dioxins needs to be built into schooling, training and continuing education for practitioners. Training centers and schools need non-mercury equipment so that practitioners use it from the earliest stage of their training. Technicians need training in calibration and maintenance of non-mercury equipment. Practitioners need to be convinced of the efficacy of non-mercury technology. The state and central governments do not prioritize mercury as an environmental and human health threat.

Relevant laws and guidelines

- The Bio-medical Waste (Management and Handling) (Second Amendment) Rules (BMW Rules), 2000, Ministry of Environment and Forests, place responsibility for health-care waste management on the institution that generates the waste. The BMW Rules set standards for segregation, packaging, transportation, storage, treatment and disposal of HCW, and recognize the State Pollution Control Boards as the enforcing authority of this law.
- The Guidelines for Common Bio-Medical Waste Treatment Facilities set standards for the set-up and operation of a HCW treatment facility.
- The Infection Management and Environment Plan (IMEP) for Reproductive and Child Health Programme, Phase II (RCH-II) addresses the need for disposal systems for syringes and anatomical waste.

State of municipal waste management and recycling programs

- Generally, municipal waste is deposited in landfills.
- The national agency responsible for regulating municipal waste is the Central Pollution Control Board (Ministry of Environment and Forest).
- The municipal solid waste system is governed by the Municipal Solid Waste Rules (MSWR) of 2000. Under MSWR 2000, government authorities are responsible for solid waste management at the national, state, district and municipal levels.
- At the national level, the Central Pollution Control Board is responsible for coordinating with the State Boards, reviewing standards and guidelines, monitoring their implementation and compiling monitoring data.
- At the state level, the State Pollution Control Board (SPCB) and Pollution Control Committees (PCCs) monitor compliance with standards regarding ground water, ambient air, leachate quality, compost quality and incineration. The SPCBs and PCCs authorize municipal authorities or private operators to set up waste processing and disposal facilities and landfills. At the state level, the Secretary in charge of the Department of Urban Development has responsibility for the implementation of MSWR 2000.
- At the district level, the District Magistrate or Deputy Commissioner is responsible for the implementation of MSWR 2000.
- At the municipal level, MSWR 2000 recognizes the following municipal authorities: the Municipal cooperation, the Municipality, Nagar Police, Nagar Nigam, the Municipal council and the notified area committee or any other local body constituted under relevant states. The Municipal Authority is responsible for the implementation of MSWR 2000 at the municipal level, including: collection, storage, segregation, transportation, processing and disposal of municipal solid waste; and organizing awareness programs with citizens to promote community participation in waste segregation and reuse or recycling of segregated materials.
- Formal recycling programs are generally conducted by the private sector. The government has not initiated recycling programs. In the informal sector, ragpickers and Kabaris collect, segregate and transport recyclable waste.
- The range of recycled materials includes paper, shampoo bottles, glass, notebooks, wires, safety pins, mineral water caps and other bottles.

Organizational structure of the Ministry of Environment and Ministry of Health

- The national government departments with official responsibility for health-care waste management are the Ministry of Environment and the Ministry of Health and Family Welfare.
- The overall responsibility for the implementation of laws and guidelines for health-care waste management in the states and Union Territories is of the State Pollution Control Board (SPCB) and Pollution Control Committees (PCCs).
- With regard to health, states and Union Territories have departments and responsibilities similar to the departments of the Central Government. Under the Infection Management and Environment Plan (IMEP) for Reproductive and Child Health Programme, Phase II (RCH-II), the disposal of health-care waste is to be managed at the district level.

Description of the health-care system

The health-care system in India is organized geographically. Three levels of health centers directly serve the population, with organization, administration and management systems at the district, regional, state and national levels.

- Sub-Centers (SCs) are the first place people go for health care and advice. Small staffs of health workers and volunteers offer primary care, health education and basic drugs for minor illnesses. Many also perform deliveries, referring only complicated births to Primary Health Centers. In most places there is one SC per 5,000 people (3,000 in difficult terrain and hilly and desert areas). There are 137,292 Sub-Centers currently functioning.
- Primary Health Centers (PHCs) provide care from a medical officer, health assistants and health workers. SCs refer patients to Primary Health Centers for more complicated health problems; each PHC serves as a referral center for six Sub-Centers. There is one PHC per 30,000 people (20,000 in difficult terrain and hilly and desert areas).
- Community Health Centers (CHCs) provide basic specialty services in general medicine, pediatrics, surgery, obstetrics and gynecology. A CHC is staffed by four medical specialists supported by 21 paramedical and other staff and has 30 indoor beds with X-ray, labor room, operation theater and laboratory facilities. Each CHC is a referral center for four PHCs and provides facilities for obstetric care and specialist consultations. 3027 CHCs are currently functioning.
- There were 683,545 hospital beds in India in 2002.
- Organization, administration and management of the health system takes place at the district, regional, state and national levels. The CHCs, PHCs and SCs are managed at the district level and primarily funded at the state level.
- The Ministry of Health and Family Welfare is responsible for health care at the national level. The Ministry has three departments: Health, Family Welfare, and Indian System of Medicine and Homeopathy.

Related projects

- Toxics Link is an NGO actively engaged in issues of toxics in the health-care sector. Toxics Link emerged from a need to establish a mechanism for disseminating credible information about toxics in India, and for raising the level of the debate on these issues. The goal was to develop an information-exchange and support organization that would use research and advocacy to strengthen campaigns against toxic pollution, help push industries towards cleaner production and link groups working on toxics and waste issues. An important program area is Toxics-free Health Care, in which Toxics Link works towards making health-care delivery hazard-free by replacing toxic products, processes and technologies with cleaner and safer alternatives. Among the long-term objectives of the organization are: to become a major knowledge and training resource on bio-medical waste treatment issues; to act as a central resource for international civil society in the region; and to move towards phasing out the use of mercury in health care.
- The World Bank is engaged in a Health Systems Development Project: Environmental Assessment Plan. The agencies involved are the following: the World Bank; in the national government the Director (AIDS) Ministry of Health, Medical and Family Welfare, and the Urban Development Department; in the state Government the State Pollution Control Board; in the district government the Chief Medical and Health Officers or Principal Medical Officers; and NGOs.
- A website for bio-medical waste management is being developed in Bangalore City. The agencies involved are the Centre for Renewable Energy & Environment Studies (CREES) and the Tata Energy Research Institute (TERI).
- The Center for Environment Education (CEE), which is supported by the Ministry of Environment and Forests (MoEF), is operating several projects. They are:

1. Health-Care Establishments Waste Management and Education Programme (HEWMEP), Delhi;
2. Common Medical Waste Treatment Facility, Gulbarga. Other agencies involved are the Gulbarga District Administration, medical and paramedical establishments and the government of Karnataka;
3. Development of website on hospital waste management (www.bmwmindia.org). The other agency involved is the Sustainable Development Network Program of the Ministry of Environment and Forests, of the national government;
4. National Kit on Educational Materials and Training Manual on Bio-Medical Waste Management;
5. Case study of "Zero Waste Kovalam," a progressive waste management program focused on the best available technology options and materials substitution. The other agency involved is Zero Waste Kovalam; and
6. Health-Care Waste Management (HCWM)–RCH II project. The other agencies involved are the Ministry of Health and Family Welfare, Waste Management Intercharge, State Nodal Officers for RCH-II, the State Pollution Control Board, the Ludhiana Management Association and facilities and staff of all levels of the health system described under the general description of the health system (above), including SCs, PHCs, CHCs and district and regional offices.

- The major efforts by private sector companies in HCWM or municipal solid waste management are Bio Care Technologies Services in Delhi and Synergy Waste Management Private Ltd. in New Delhi.
- Regarding manufacturing interests, two new state-of-the-art alternative technologies ('Logmed' and 'Demolzer') are being considered by the Central Pollution Control Board for approval along with the operational standards.

LATVIA

National Implementation Plan (NIP)

- The Latvia NIP currently estimates that health-care waste incineration accounts for only 2% of dioxin and furan emissions in Latvia air, but this estimate will likely be revisited during Project implementation. During development of the NIP, there was a lack of information on the contributions by the health sector and health sector representatives were minimally involved because of a reorganization taking place. The NIP includes tasks to reduce POPs emissions from fires in waste disposal sites, promote recycling of POPs sources and introduce technologies at POPs emission stationary sources.

WHO Rapid Assessment Tool (RAT) Results - Summary of national HCWM status

	National equivalent percentage	HCWM rating
Large hospitals	4	Excellent
Medium-size hospitals	5	Excellent
Small health facilities	8	Excellent
National rating	**6**	**Excellent***

*Assessor's notes: The results are likely overly optimistic and do not reveal problems within the subject areas of the study. The most substantial problems identified are a lack of training and segregation, treatment of PVC material through incineration, and chemical waste disposed directly into the sewer.

Health-care waste management opportunities and challenges

In order to ensure optimum health-care waste management (HCWM), the following activities are necessary:

- Define HCW and infectious waste and establish a classification system for HCW;
- Develop a HCWM plan at the state level, including legislative acts to regulate activities involving HCW that specify the responsibilities of state, branch and local officials for HCWM;
- Establish separate regulations of the Cabinet of Ministers in relation to the treatment and liquidation of HCW.
- Establish HCW treatment centers to ensure treatment of all potentially infectious waste;
- Develop and publish instructions for HCW producers (medical institution employees) on collection, packaging, labeling, storage and treatment of HCW;
- Improve the organizational system of waste management. Effective coordination among the ministries during their activities does not exist, nor does a clear division of competencies and responsibilities. As a result, responsibilities and functions either overlap or are not covered, and mistakes and shortcomings arise during decision-making and fulfillment of tasks; and
- Distinguish hazardous waste from municipal waste in health-care institutions.

Relevant laws and guidelines

Regulations made by the European Council and European Parliament concerning waste management are incorporated into Latvian legislation in the Waste Management Law, which defines the functions and responsibilities of institutions regarding waste management.

- The Waste Management Law gives responsibility to the Ministry of Environment for coordinating and organizing hazardous waste management. A 2004 amendment allows local governments to be involved in hazardous waste management.
- The Waste Management Law accepts the regulations set out in Cabinet of Ministers No. 529 "Procedure for Management of Specific Kinds of Hazardous Waste."
- Institutions subject to the Ministry of Healthcare do not have legal control over solid waste management, which would be granted through the unapproved order "On Basic Requirements of Hygienic and Anti-epidemic Regime in Medical Institutions" (concerning waste containing polychlorinated biphenyls and polychlorinated terphentyles, oil products waste, used batteries and accumulators containing hazardous substances and titanium dioxide industrial waste).

Environmental laws relating to health-care waste management include:

- The Cabinet of Ministers Regulations Nr.244 "Procedures for calculation and payment of natural resources tax" of 18 June 2002.
- Law on Pollution with amendments of 19 September 2002.

- The Cabinet of Ministers regulations Nr.379 "On emission of air-polluting substances and their limitation and control with respect to stationary air pollution sources" of 2 September 2002.
- The Cabinet of Ministers regulations Nr.377 "Amendments to the Cabinet of Ministers regulations Nr.323 'On requirements for incineration of waste and operation of waste incineration plants'" of 26 August 2002.
- The Cabinet of Ministers regulations Nr.365 "Regulations on use, monitoring and control of sewage sludge and its compost" 26 August 2002.
- The Cabinet of Ministers regulations Nr.340 "On order of import, placing on market and risk evaluation of a new chemical substance" of 09 August 2002.

Other laws regulating waste management are:

- Law "On Waste Management" of 1 March 2001.
- Regulations of the Cabinet of Ministers No.15 "On requirements for sitting of landfills and for management, closure and recultivation of landfills and dumps" of 3 January 2002.
- Regulations of the Cabinet of Ministers No.529 "On order of waste management for particular types of hazardous waste" of 18 December 2001.
- Regulations of the Cabinet of Ministers No. 323 "On requirements for incineration of waste and for operation of waste incineration plants" 17 July 2001.
- Regulations of the Cabinet of Ministers No. 258 "On waste classification and characteristics which makes waste hazardous" of 19 June 2001.
- Regulations of the Cabinet of Ministers No. 191 "On types of waste recovery and disposal" 15 May 2001.
- Regulations of the Cabinet of Ministers No. 316 "Regulations for the use of effluent sludge in the fertilization of soil in organizing territorial public services" of 9 September 1997.
- Regulations of the Cabinet of Ministers No. 324 "Regulations on the application, permitting and reconsideration procedure for the category A permit and category B permit for waste incinerators and on the use of Best Available Techniques" 17 July 2001.
- Regulations of the Cabinet of Ministers No. 432 "On issuing, prolonging and annulling of permits for waste management" of 9 October 2001.

Regulations of the Cabinet of Ministers No. 76 "Regulations on import of waste for recovery and on order to export and transit of waste" of 19 February 2002.

State of municipal waste management and recycling programs

- Municipal solid waste is deposited in municipal landfills that correspond to EU requirements.
- The official responsible for waste management at the national level is the head of the Waste Management Unit of the Ministry of Healthcare.
- Some large hospitals incinerate health-care waste (HCW) or treat it by chemical disinfection or microwaves before it is taken to the landfill. Where these treatment options do not exist, HCW is mixed with other municipal waste and put into the municipal waste landfills. This happens especially in cases where small companies are responsible for solid waste management.
- The only company which treats health-care waste in Latvia is Lautus. It covers the entire country, with operation permits from all of the Regional Environmental Boards. Lautus uses incineration to treat HCW.

Organizational structure of the Ministry of Environment and Ministry of Health

- The national government departments that have official responsibility for health-care waste management (HCWM) are the Cabinet of Ministers, the Ministry of Healthcare, the Ministry of Welfare, the Ministry of Environment and the Ministry of Agriculture. At the regional level, the Regional Environmental Boards have responsibility for HCWM. Local city governments also carry responsibility for HCWM.
- Subject to the Ministry of Healthcare and the Ministry of Welfare, the Social Healthcare Agency oversees infection control, including mass communication with the public when necessary. Subject to these ministries, the State Sanitary Inspection inspects possible carriers of disease and acts to stop the spread of disease in specific instances. The State Labor Inspection is also subject to these ministries.
- The Cabinet of Ministers holds a variety of responsibilities relating to HCWM. It approves the national waste management plan including hazardous waste, and approves the location of new hazardous waste treatment objects and landfill sites. It determines waste classification and characteristics that make waste hazardous. The Cabinet determines the procedure for recording, identifying, storing, packing, labeling and transporting waste. It regulates the construction, management and closure of landfill sites. It also determines the procedure for regulating the management of specific types of hazardous waste and sets regulations for incineration of waste and incineration

facilities.

- The Ministry of Environment (MOE) develops the national hazardous waste management plan and coordinates its implementation through legislation and waste management programs. The MOE organizes the construction and management of hazardous waste treatment facilities and landfill sites. Subject to the MOE, Regional Environmental Boards issue licenses for transportation of hazardous waste and control compliance with regulations concerning transportation and storage of hazardous cargo and waste and the emission of pollutants. The Boards approve permits granted by the local governments for activities involving hazardous waste. They carry out initial environmental impact evaluations of planned activities, provide laboratory work for environmental pollution control and participate in state environmental monitoring.
- The Ministry of Agriculture oversees activities concerning veterinary medicine, including management of veterinary health-care waste.
- Parish, county and local city governments organize the management of municipal waste and choose the locations of new waste treatment facilities and landfill sites.
- The Public Health Department, within the Ministry of Health, is responsible for participating in the development of national policy and organizing and coordinating the implementation of legislation and policies in the public health and health-care sub-sectors.

Description of the health-care system

- As of 2003, there were 131 hospitals and health centers in Latvia, 2494 out-patient care institutions and 263 feldsher-midwives aid posts.

Related projects

- "Environmentally Sound Disposal of PCB-Containing Equipment and Waste in Latvia," a GEF program approved in February of this year, works to avoid the release of PCBs from working and obsolete electrical equipment and to create a firmer legal, policy and knowledge base for well-targeted Persistent Organic Pollutants (POPs) risk reduction measures in the future.
- "Developing Capacities in Education and Research for Strengthening Global Environmental Management in Latvia," currently in the GEF pipeline, will address the improvement of institutional, legislative and policy frameworks in the area of national education and science to mainstream the provisions of UN environmental conventions.

LEBANON

National Implementation Plan (NIP)

- Health-care waste incineration has been listed first among several industries with the potential for relatively high formation and unintentional release of PCBs as a result of thermal processes involving organic matter and chlorine. Geographic areas located around incinerators, specifically hospitals equipped with incineration facilities, are listed as one of two hotspots for dioxin and furan emissions. There are currently two or three licensed medical waste incinerators in Lebanon, but there are many more unlicensed and poorly monitored incinerators. Soil samples taken from one incinerator site revealed high concentrations of dioxins and furans. Using the UNEP 2003 Toolkit, uncontrolled combustion was found to be the major contributor to dioxin and furan emissions with a 124.74 g TEQ/a (75.24% of all emissions). The inventory showed an increased level of emissions after the utilization of the edited UNEP 2003 Toolkit, indicating either higher emission levels (thus more uncontrolled combustion), or simply improved accuracy in data collection.
- Addressing Article 5 of the Stockholm Convention, Activity 7 of the NIP outlines a plan to reduce emissions from health-care waste incineration. Activity 7 states that "[t]here are few industrial establishments in Lebanon that could unintentionally produce POPs. Foremost among them are medical waste incinerators which typically lack quenchers." The first task under Activity 7 lists the following steps regarding HCW incineration:

- Identify the location and status (waste incinerated, quantity, etc.) of existing medical waste incinerators in Lebanon (based on MoPH study);
- Promote good waste management practices in hospitals (e.g., waste minimization, segregation at the source by waste type, wastes recycling);
- Promote appropriate treatment of bottom ashes and residues from flue gas to reduce dioxin and furan releases into the environment during incineration;
- Consider the best available incineration techniques to reduce emissions, remove chlorinated products and heavy metals and ensure good combustion conditions (turbulence, temperature, residence time);
- Ban incineration of PVC and promote its replacement when possible by other non-chlorinated plastics; and
- Provide alternatives to incineration: sterilization (steam, advanced steam, dry heat), microwave treatment, alkaline hydrolysis, or biological treatment, each followed by landfilling.

The Ministry of Environment and the Ministry of Public Health are responsible for implementing these steps. The Central Administration of Statistics is also responsible for the survey.

- Another task under Activity 7 is to ban the co-disposal of health-care waste with the municipal waste stream by encouraging hospitals to adopt cleaner technologies for the treatment and disposal of health-care waste (e.g., autoclaving). The bodies responsible for implementation are the Syndicate of Hospitals, the Ministry of Environment, the private sector and NGOs.

WHO Rapid Assessment Tool (RAT) Results - Summary of national HCWM status

	National equivalent percentage	HCWM rating
Large hospitals	8	Excellent
Medium-size hospitals	25	Good
Small health facilities	38	Satisfactory
National rating	**23**	**Good**

Health-care waste management opportunities and challenges

Opportunities

- One opportunity relates to the ongoing health reform in Lebanon financed by the World Bank. The most important component of this reform relative to health-care waste management is the hospital accreditation program, which has devised three chapters that relate to this issue – waste management, infection control and environmental services. Accreditation is obligatory for all private hospitals, which account for 90% of all hospital beds in the country. Thus this existing educational system can be leveraged to include best practice information learned during the Project.
- In some cases, non-burn waste treatment systems are already in use. There are two companies that treat health-care waste in Lebanon by autoclaving and are licensed from the Ministry of Environment. One is an NGO currently managing one treatment plant in the Bekaa area that covers seven hospitals and can treat 1000 kg per

day. It has also started to operate a new plant in Hotel Dieu de France Hospital in Beirut that covers three hospitals and can handle 1000 kg per day. The other company is private and has one truck that sterilizes waste on site and can process 1000 kg per day. This company currently has a contract with five hospitals and promises to start operating another truck with a larger capacity.

Challenges

- There are no specifically designated landfill sites for health-care waste.
- No contracts currently exist to transport treated health-care waste.
- There is a problem of cost. It is estimated that Lebanon produces 8,000-10,000 kg of health-care waste (HCW) per day. The current rates offered from local companies to manage HCW are 55 to 60¢. This brings the annual cost for HCW to between 1,606,000 and 2,190,000 USD. The current rate paid for room and board in a hospital, reimbursed by the majority of third party payers, does not exceed 22 USD. Three hospitals are licensed by the Ministry of Environment to treat health-care waste. Two use autoclaving, and the third – a public hospital – uses incineration. A May 2005 study showed that 17 private hospitals and 2 public hospitals use incineration as a waste disposal method.

Relevant laws and guidelines

- Decree 8006 was issued on June 2002 and amended by Decree 13389 on September 2004. Decree 8006 discusses classification, segregation, sterilization and storage of health-care waste (HCW). It requires that every health-care institution wishing to install a treatment plant be licensed from the Ministry of Environment after performing an Environmental Impact Assessment, and that treated HCW be dumped in "special" dumping areas separate from the area used for municipal waste.
- Decree 13389 made two main changes to Decree 8006, namely that HCW can be discarded in landfill areas used for municipal waste and that shredding of waste is not obligatory. (It was obligatory in Decree 8006.)

State of municipal waste management and recycling programs

- Municipal solid waste is disposed in sanitary landfills.
- Municipalities are responsible for providing waste collection and disposal facilities.
- The national agencies that regulate municipal solid waste are the Ministry of Health, the Ministry of Environment, the Ministry of Interior and Municipalities and the Council for Development and Reconstruction (CDR).

Major sub-contractors collect and dump municipal waste in Lebanon. The most important sub-contractor in Mount-Lebanon and Beirut is named Sukkleen. It claims to follow British standards.

Portion of the health and/or environmental budget allocated to health-care waste management

- The health expenditure of Lebanon equals 11.5% of GDP.
- It is estimated that Lebanon produces 8,000-10,000 kg of health-care waste (HCW) per day. The current rates offered from local companies to manage HCW are 55 to 60¢. This brings the annual cost for HCW to between 1,606,000 and 2,190,000 USD.

Organizational structure of the Ministry of Environment and Ministry of Health

- At the national level, the Ministry of Environment, the Ministry of Health and the Council for Development and Reconstruction have official responsibility for health-care waste management (HCWM).
- As stated, municipalities are responsible for providing waste collection and disposal facilities. For treatment plans to be licensed, they must be approved by the local municipal authority.
- The Ministry of Environment is responsible for legislation, licensing and monitoring. Within the Ministry of Environment, the Service of Prevention from Technological Impact and Natural Disasters is responsible for HCWM.
- The Ministry of Health is responsible for studying the health impact of any waste management program. The Ministry of Health also governs the hospital accreditation program.
- The Council for Development and Reconstruction (CDR) monitors the execution of all major projects endorsed by the government.
- Other stakeholders that deal with health-care waste include the Syndicate of Private Hospitals, the United Nations Development Programme, the World Health Organization, the Global Environmental Facility, Arc en Ciel (NGO), universities, the Order of Physicians, the Order of Dentists, the Syndicate of Medical Laboratories and the Syndicate of Dental Laboratories.

Description of the health-care system

- The primary health-care system in Lebanon is dominated by the private sector, especially non-governmental organizations (NGOs).
- For an estimated population of 3,826,018, there are 160 hospitals, 110 primary health care centers and 734 dispensaries. Of the 160 hospitals, 136 are private hospitals, accounting for 90% of total hospital beds. NGOs own over 80% of primary health-care centers and dispensaries. Long-term care hospitals exist only in the private sector.
- Many public hospitals have operation problems, and some operate at low capacity; Beirut General University Hospital, the largest public hospital, operates at 10% capacity.
- The ongoing health reform in Lebanon financed by the World Bank focuses on four components: health financing reforms, pharmaceutical reform, public health and primary health care, and quality improvement and accreditation programs. The most important component relative to health-care waste management is the hospital accreditation program, because it has devised three chapters that relate to this issue – waste management, infection control and environmental services. It is worth noting that accreditation is obligatory for all private hospitals. If a hospital fails in the accreditation survey, the Ministry of Health and other third party payers will not contract its services, making the hospital's survival very difficult.

Related projects

- The World Bank had sub-contracted with a company called Sadat International to conduct training for health-care waste management.
- The National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants is being implemented.
- There are two companies that treat health-care waste in Lebanon by autoclaving and are licensed from the Ministry of Environment. One is Arc en Ciel, an NGO that started twenty years ago in Lebanon and has recently entered the field of health-care waste management. It is currently managing one treatment plant in the Bekaa area that covers seven hospitals and can treat 1000 kg per day. It has also started to operate a new plant in Hotel Dieu de France Hospital in Beirut that covers three hospitals and can handle 1000 kg per day. The other is EnvSys, a private company that has one truck that sterilizes waste on site and can process 1000 kg per day. EnvSys promises to start operating another truck with a larger capacity. It currently has a contract with five hospitals.

PHILIPPINES

National Implementation Plan (NIP)

- Hospitals are listed among sectors identified as potential POPs sources, specifically as potential sources of dioxins, furans and PCBs. The sectors on this list are all potential beneficiaries of National Implementation Plan strategies.

WHO Rapid Assessment Tool (RAT) Results - Summary of national HCWM status

	National equivalent percentage	HCWM rating
Large hospitals	41	Satisfactory
Medium-size hospitals	65	Problematic
Small health facilities	84	Critical
National rating	**65**	**Problematic***

*Assessor's notes: The large hospitals were noted to have (relatively) satisfactory practices in terms of their waste management. Most of the health-care waste management (HCWM) problems were observed in small to medium-sized health-care facilities. Service providers for transport, storage and disposal facilities are available in Metro Manila only. Other parts of the country do not have access to proper health-care waste disposal and service providers (except Cebu City). At present, a very limited number of sanitary landfills could serve as final disposal sites for treated health-care waste. Training on HCWM is limited to government hospitals at the regional and provincial levels, and here is a need to expand the training program to include private hospitals and other government health-care facilities.

Health-care waste management opportunities and challenges

Opportunities

- A national ban on incineration exists.
- The Clean Water Act of the Philippines was recently enacted.
- Both Metro Manila and provincial hospitals who participated in Health Care Without Harm's recent conference on mercury are very open to conducting mercury audits in their respective hospitals and to looking for better and more efficient alternatives mercury-containing products.
- Interest has been expressed in trainings and curricula appropriate for other health-care workers.
- The Department of Health health-care waste management manual can be distributed more widely, through translation into different languages, video presentation, etc., with the active campaign to remove pyrolysis as an alternative treatment technology.

Challenges

- Fully implementing and monitoring compliance with the Joint Administrative Orders (Joint AO) of the Departments of Health (DOH) and Environment (DENR). The Joint AO outline the framework for national health-care waste management, and establish guidelines for hospitals and all other generators of health-care waste.
- Fully implementing the ban on incineration.
- Persuading the private sector to participate in health-care waste management and invest in training and facilities for appropriate waste collection, transport and disposal.
- Phasing out mercury in health-care facilities and making mercury-free devices available that are comparable to, or better than, existing mercury-containing devices in terms of price and accuracy.
- Establishing waste treatment and disposal facilities (e.g., approved sanitary landfills) in regional centers through Local Government Units (LGUs) and private sector participation.
- Enforcing the newly enacted Clean Water Act of the Philippines.
- Establishing proper health-care waste management practices in small-scale (primary hospitals and clinics) private and public health-care facilities that operate on meager budgets.
- Sustaining advocacy and continuous training on proper health-care waste management.
- Generating continuous support from incoming politicians and government authorities is needed. In the Philippines the term of political leaders and government authorities is about 3-6 years.
- Creating practical solutions to address the temporary and final disposal of hazardous wastes like mercury.

Relevant laws and guidelines

- The Clean Air Act of 1999 (Republic Act No. 8749) provides for a comprehensive air pollution control policy, including a ban on municipal and health-care waste (HCW) incineration and requiring the promotion of non-burn technologies.
- Ecological Solid Waste Management Act of 2001 (Republic Act No. 9003) provides comprehensive legislation for the entire solid waste management sector. It establishes standards, guidelines and enforcement mechanisms, for source reduction, segregation, recycling, transfer and disposal of solid waste; it empowers local government units to develop and manage their own solid waste management systems; and it requires time-bound solid waste management plans at the national, provincial, Metro-Manila-wide and local government levels.
- An Act to control Toxic Substances and Hazardous and Nuclear Wastes (Republic Act No. 6969) regulates importing, manufacturing, processing, handling, storage, transportation, sale, distribution, use and disposal of all unregulated chemical substances and mixtures in the Philippines, and the storage or disposal of hazardous and nuclear wastes into the country for any purpose.
- Implementing Rules and Regulations on Chapter XVIII "Refuse Disposal" of the Code on Sanitation of the Philippines (Presidential Decree No. 856) mandates that the Department of Health (DOH) promote and preserve public health and upgrade the standard of medical practice. In line with the DOH mandate, a Manual on Health Care Waste Management was formulated to supplement the Implementing Rules and Regulations Chapter XVIII "Refuse Disposal" of the Code on Sanitation of the Philippines. Chapter XVIII requires all cities and municipalities to provide an adequate and efficient system of collecting, transporting and disposing of refuse in their areas of jurisdiction in a manner approved by the local health authority.
- The Clean Water Act of 2004 (Republic Act 9275) provides for comprehensive water quality management and other purposes.
- Environmental Impact Statement (EIS) System (Presidential Decree 1586).
- Pollution Control Law (Presidential Decree 984).
- Pollution Control Law (Republic Act No. 3931), Provision 9, outlaws the pollution, or the allowance of pollution, of the water or air of the Philippines.
- The Philippine Environmental Code (Presidential Decree No. 1152) sets guidelines for waste management; it encourages and promotes efforts to prevent environmental damage and unnecessary loss of resources through recovery, recycling and re-use of waste and waste products; and it provides measures to guide government agencies in establishing sound, efficient, comprehensive and effective waste management. The Code requires all cities and municipalities to provide an adequate and efficient system of collecting, transporting and disposing of refuse in their areas of jurisdiction.
- Department of Health (DOH) Department Circular No. 156-C, s. 1993, provides guidelines on hospital waste management, including requiring satisfactory segregation, treatment, collection and disposal systems.
- DOH Memorandum No. 1-A, s. 2001, requires the Department of Health Central Office, Centers for Health Development and all concerned hospitals to practice proper solid waste management.
- The Hospital Licensure Act (Republic Act No. 4226) requires the licensure of all hospitals in the country and mandates the Department of Health to provide guidelines for hospital technical standards regarding personnel, equipment and physical facilities.
- The Philippine Environmental Policy (Presidential Decree No. 1151) requires all agencies and instrumentalities of the national government, including government-owned or controlled corporations, as well as private corporations, firms and entities to file a comprehensive Environmental Impact Statement (EIS) for any developmental projects that may significantly impact the quality of the environment.

State of municipal waste management and recycling programs

- Local Government Units (LGUs) hold direct responsibility for managing solid waste. LGUs can develop their own regulation on waste management based on the provisions stipulated in the Ecological Solid Waste Management Act of 2001 (RA 9003).
- Common types of land disposal methods include sanitary landfills, controlled dumpsites and open dumps. RA 9003 prohibits the use of open dumps; however, a majority of the LGUs still resort to open dumping due to technical and financial constraints. Some LGUs have improved their open dumpsites into controlled dumps.
- There are waste recycling initiatives from both the private and government sectors, but most of them are not sustained and need to be improved in terms of implementation and coverage.

Organizational structure of the Ministry of Environment and Ministry of Health

- The following national government departments are involved in health-care waste management: the Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB) and its regional offices, the Department of Health (DOH), the DOH Centers for Health Development (CHD), the National Center for Health Facility Development (NCHFD), the Bureau of Health Facilities and Services (BHFS), the Bureau of Health Devices and Technology (BHDT), the Environmental and Occupational Health Office (EOHO) of the National Center for Disease Prevention and Control (NCDPC) and the National Reference Laboratory (NRL)-East Avenue Medical Center, Quezon City.
- Local Government Units (LGUs) are the local governmental entities involved in health-care waste management.
- The Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB) regulates solid waste management at the national level, through the National Solid Waste Management Commission. DENR-EMB is responsible for: policy-making and enforcement related to health-care waste; sampling and monitoring wastewater in health-care and other facilities handling health-care waste; and providing technical assistance and support to LGUs and advocacy programs on health-care waste management.
- The Department of Health (DOH) is the primary department responsible for public health, including maintaining regional hospitals and medical centers. The DOH is responsible for regulating all health facilities through licensure and accreditation and evaluating hospitals' compliance with proper health-care waste management (HCWM) programs. It formulates policies, standards, guidelines, systems and procedures for HCWM. Its Health Operations division contains the National Epidemiology Center, the National Center for Disease Prevention and Control, the National Center for Health Promotion, and the National Center for Health Facilities Development. Its External Affairs division contains the Bureau of Local Health Development.
- The DOH Centers for Health Development are responsible for advocating HCWM practices to Local Chief Executives, key leaders and stakeholders; for monitoring HCWM practices in all health care facilities; and enforcing compliance with HCWM laws, rules and regulations. The Centers are also responsible for providing technical assistance through training and advice on HCWM plans, dissemination of policies and information, monitoring implementation of HCWM and participating in public hearings related to HCWM.
- Local Government Units are responsible for the collection, transportation and disposal of waste within their jurisdictions, and providing local basic solid waste management services.

Description of the health-care system

- The health-care system is composed of public and private health-care facilities. Although the health-care system is extensive, access—especially by the poor—is hampered by high costs and physical and socio-cultural barriers. The Department of Health (DOH) is the principal public health agency in the Philippines.
- The total number of hospitals in 2004 was 1,725, of which 657 were government-operated and 1,068 were private. The DOH also maintains specialty hospitals, regional hospitals and medical centers.
- Following the devolution of health services to Local Government Units in 1992, municipal governments manage rural health units and barangay health stations.
- The private sector provides: clinics and hospitals; health insurance; research and development; human resource development; the manufacture of drugs, medicines, vaccines, medical supplies, equipment and other health and nutrition products; and other health-related services.

Related projects

- A mercury audit in hospitals and dental clinics is taking place as a result of the HCWH mercury conference.
- The National Center for Health Facility Development (NCHFD) is conducting a mercury audit, continuous monitoring of health-care waste management practices and a survey of waste characterization. NCHFD will soon facilitate the establishment of regional waste treatment facilities through private-sector participation.
- The National Center for Disease Prevention and Control (NCDPC) and the NCHFD are working together on several projects. They are currently developing national policy for mercury phase-out. Beginning in 2007, they will update and expand the Manual on Health-Care Waste Management, addressing mercury clean-up, waste handling and storage procedures; and develop policy to ban the use of mercury-containing products in hospitals.
- NCDPC and the DOH Centers for Health Development (CHDs) are evaluating the national training program on health-care waste management (HCWM), and beginning in 2008, will conduct HCWM training and advocacy.
- The Bureau of Health Devices and Technology, the National Reference Laboratory at the East Avenue Medical Center (NRL-EAMC) and NCHFD will soon begin developing implementation guidelines for the Joint Department of Health-Department of Environment and Natural Resources Administrative Order on HCWM.

SENEGAL

National Implementation Plan (NIP)

- Incineration of health-care waste is identified as a source of unintentional POPs release.
- The NIP establishes the goal of reducing unintentional POPs emissions from the burning of medical, municipal and industrial waste by half in the next five years.

WHO Rapid Assessment Tool (RAT) Results - Summary of national HCWM status

	National equivalent percentage	HCWM rating
Large hospitals	35	Satisfactory
Medium-size hospitals	54	Satisfactory
Small health facilities	79	Problematic
National rating	**57**	**Satisfactory**

Health-care waste management opportunities and challenges

Challenges

- Bio-medical waste is mixed with municipal waste, even though bio-medical waste collection and treatment require specific expertise, infrastructure and techniques.
- Thus, because of the lack of funds for waste management and processing in nearly all health facilities in the country, the majority of waste is set directly to landfills or burned inside health centers. Liquid waste is dumped directly into the urban sewage systems.
- Waste management is left to local communities, which lack the financial and technical means to treat waste. This creates a lack of compliance with environmental and technical standards.
- Within hospitals, there is a lack of staff training on waste management, leading to exposure of staff, patients and the community to the risk of infection.

Opportunities

- As a signatory of the Stockholm convention, Senegal must reduce any form of release of dioxins into the environment, in accordance with Article 5 and Appendix C.
- Although bio-medical waste management projects are being implemented, including staff training and sharps collection and destruction, the long-term sustainability and success of these projects are questionable. Therefore, the Project constitutes a significant opportunity to better manage bio-medical waste through the contribution of clean technologies, training on best practices for health-care waste management, and most importantly, the creation of synergy between all actors in the field of bio-medical waste.
- Thus, the Project will create new behaviors and long-term, sustainable changes to protect medical personnel, the population and the environment from contamination from health-care waste.

Relevant laws and guidelines

- There is no law specifically regulating health-care waste. The Environment Code makes the only reference to bio-medical waste in Senegalese legislation. Other laws to strengthen regulation of health-care waste are being drafted.

State of municipal waste management and recycling programs

- Throughout the country, there is a lack of authorized sites for solid waste disposal. All of the sites are open dumps, with open-burn incineration.
- Local communities are responsible for managing solid waste created within their jurisdiction. The majority of local communities has a waste collection service to collect and transport waste to dumps, but the services are often inadequate, posing enormous waste management problems.
- In large cities, for example, in Dakar, Thies and regional capitals, private companies are in charge of solid waste management. The companies collect and deposit solid waste in authorized areas. In Dakar, AMA Senegal collects and manages waste, under the control of the Ministry for Decentralization and Local Communities (APRODAK). In Thiès, the DAP is hired by associations, districts or the Economic Interest Group (GIE) to manage waste, and is partly under the control of the community.
- Re-use is a current practice in the informal sector; plastics, iron and aluminum are commonly re-used.
- There is no regulation regarding the re-use or recycling of materials.

Portion of the health and/or environmental budget allocated to health-care waste management

- Approximately 15% of the national budget is intended for health. There is no specific budget for the management of bio-medical waste; this is handled by the health facilities.

Organizational structure of the Ministry of Environment and Ministry of Health

- The national government departments with official responsibility for health-care waste management (HCWM) are the Ministry for Health and Preventative Medicine, the Ministry for Decentralization and the Local Communities, the Ministry of the Environment and Nature Conservancy and the Ministry of Public Hygiene and Sanitation.
- The state and regional governmental departments with official responsibility for HCWM are the Ministry for Decentralization and the Local Communities (APRODAK), the communes and the hygiene services providers.
- The key departments or offices dealing with hospital and health-care institutions, infection control, hygiene and sanitation, and occupational and environmental health are the Ministry of Health and Preventative Medicine (PRONALIN, Services of Hygiene) and the Ministry for Decentralization and Local Communities (APRODAK).

Description of the health-care system

- Senegal has 768 health stations, 54 health centers and 20 hospitals. Within the framework of the Program of Integrated Development of Health (PDIS), 254 new health stations, two new health centers and two new hospitals are planned.
- The National Plan of Medical and Social Development (PNDS), in effect from 1998 through 2007, has made possible legislative and institutional reforms focused mainly on hospitals, drugs and pharmacies. The PNDS envisions other initiatives in fields such as medical information systems, health financing, the reorganization of the Ministry of Health, the coordination of interventions and the integration of health activities.

Related projects

- Organizations and Ministries involved in international projects related to health-care waste are PRONALIN, Babacar Ndoye of the Ministry of Health, the African Urban Management Institute (IAGU) and the National Committee to Fight AIDS.
- Ama Sénégal is the private sector company involved in health-care waste or municipal solid waste management.

VIETNAM

National Implementation Plan (NIP)

- Heath-care waste management (HCWM) to minimize unintentional POPs release is identified as an urgent and high priority, included in the period from 2006 to 2010 in the implementation roadmap. The program on HCWM is number four of fifteen key programs in the plan.
- Implementing agencies are the Ministry of Health and the Ministry of Natural Resources and Environment. Collaborating Agencies are other relevant ministries, sectors, Urban Environment Companies and Provincial People's Committees. International counterparts are the United Nations Development Programme, the World Health Organization, Health Care Without Harm, the Swedish International Development Cooperation Agency, East Meets West and the Global Environment Facility. The duration of implementation is 2006 to 2010. The estimated cost is 25.4 million USD.
- The objective is to safely manage, reduce and treat health-care waste to prevent and eliminate the unintentional production of dioxins/furans and other toxic chemicals.
- The expected outcomes are:
    1. The unintentional production of dioxins, furans and other toxic chemicals from health-care waste treatment in Vietnam will be assessed;
    2. Models on management and treatment of hospital waste to reduce dioxin and furan releases will be developed, demonstrated and gradually replicated;
    3. The best available technologies and practices for health-care waste treatment to prevent dioxin, furan and other toxic chemical release will be selected, demonstrated and gradually replicated;
    4. Awareness of health-care waste and skills to handle it will be raised.
- According to Priority Program 4, by 2010 the best available technologies and practices for health-care waste treatment to prevent dioxin, furan and other toxic chemical releases will have been demonstrated at three hospitals. By 2020 these technologies and practices will have been replicated at a further 20 health-care units.

WHO Rapid Assessment Tool (RAT) Results - Summary of national HCWM status

	National equivalent percentage	HCWM rating
Large hospitals	10	Excellent
Medium-size hospitals	79	Problematic
Small health facilities	78	Problematic
National rating	**42**	**Satisfactory***

*Assessor's notes: Only Tu Du Hospital (large hospital) is acceptable. Investments in a wastewater treatment facility and solid waste storage are needed for Tu Du Hospital, which has 1000 beds.

Health-care waste management opportunities and challenges

Opportunities

- Incineration is no longer considered a good or effective method of health-care waste (HCW) treatment because of the high risk of dioxin and furan release. Interest has been expressed in the replacement of incinerators by microwave and high-temperature autoclaves to meet environmental standards.
- In recent years, the government has paid special attention to HCW management and treatment. Studies have been carried out to find the best and most appropriate solutions for HCW management and treatment. Through education on health-care waste, the people of Vietnam are partially aware of the harm of HCW to the environment and human health. In addition, the government has issued legislative documents on environmental protection and health-care waste management as the basis for HCWM at all levels (e.g. the Departments of National Resources and Environment and local Urban Environment Companies).

Challenges

- Hospital waste is an urgent environmental issue in Vietnam. Ineffective health-care waste treatment is a public concern and a challenge for government at all levels.
- There are in total 61 HCW incinerators, which are operating at 20-25% capacity. Most hospitals do not have sufficient funds to operate the incinerators.
- Health-care waste treatment needs a large budget. The total estimated investment needed for the development of a

solid, liquid and air waste treatment system is 1.160 billion VND, without taking into account the cost of land use, collection, transport, operation and maintenance. It is necessary to mobilize funds from the Vietnamese government, international organizations, other governments and NGOs.

- Awareness among health facility staff, waste treatment staff and patients about practical waste treatment solutions is low, affecting the quality of waste segregation, collection, transport and disposal. Some hospital directors have not adequately focused on waste treatment practices. Public awareness-raising, education and dissemination are inadequate, and the press has caused excessive fear of health-care waste issues, leading to great pressure on specialized management agencies.
- Legislation is inadequate. The Law on Environmental Protection, the Hazardous Waste Management Regulations and the Health-Care Waste Management Regulations are not consistently followed. Only a few hospitals completely comply with the Health-Care Waste Management Regulations, and many local authorities have not allocated the budget and means necessary to fully implement the regulations.
- Waste treatment methods lack inter-sectoral cooperation in all stages of waste treatment, including between the Ministry of Natural Resources and Environment and the Ministry of Health. This results in loose monitoring of solid waste management.
- Many Urban Environment Companies refuse to transport health-care waste, and regulations do not assign specific responsibilities to ministries and sectors for each stage of health-care waste management.
- Collection, transport and treatment of hazardous waste are inadequate due to a lack of practical research, financial resources, staffing numbers, and supporting policy from the Government. Solid waste monitoring is not systematically carried out in many urban areas.

Relevant laws and guidelines

Laws, decrees, decisions and directives issued by the Prime Minister and National Assembly Office include:

- The Law on Environmental Protection was adopted by the national Assembly on 27 December 1993. It regulates the location of gathering, storage, treatment and transport sites for solid wastes and pollutants, and the treatment of wastewater and solid waste that contain toxic substances, disease sources, flammable substances or persistent substances. It forbids the release of oils, toxic chemicals, radioactive substances, wastes, animal and plant carcasses, micro-organisms or disease agents into the water.
- Decree 175/CP of the Government on the Law on Environmental Protection, dated 18 October 1994, further regulates treatment of liquid and solid waste from production and trade facilities, hospitals, hotels and restaurants.
- Directive 199/TTg of the Prime Minister dated 03 April 1997 provides urgent measures for solid waste management in urban areas and industrial zones.
- Decision 155/1999/QD-TTg of the Prime Minister dated 16 July 1999 addresses the issuance of Hazardous Waste Management Regulations.

Documents issued by the Ministry of Health:

- Hospital Regulations issued pursuant to Decision 1895/1997/BYT-QD dated 19 September 1997, including Waste Treatment Regulations.
- Health-Care Waste Management Regulations dated 27 August 1999, issued pursuant to Decision 2575/QD-BYT.
- The Master Plan on the Health-Care Solid Waste Treatment System, which is the basis for the development of the health-care solid waste incinerators system.

State of municipal waste management and recycling programs

- Open dumps and sanitary landfills are used in Vietnam.
- Urban Environment Companies collect and dispose of solid waste. Each province or city has one company, which operates under the authority of the Provincial People's Committees (PPCs), the Department of Transport and Public Works, or the Department of Construction. Many Urban Environment Companies refuse to transport health-care waste.
- The Ministry of Natural Resources and Environment is the principal agency responsible for environmental issues in Vietnam, with three departments playing major roles in waste management: the Department of Environment, the Department of Environmental Impact Assessment and Appraisal and the Vietnam Environmental Protection Agency. Five other bodies participate in solid waste management on the national level: the Ministry of Construction, the Ministry of Health, the Ministry of Industry, the Ministry of Transport, the Ministry of Planning and Investment and the Provincial People's Committees.
- Recycling takes place in households, industry and trade villages. The most commonly recycled materials are scrap plastic, paper, metal and plastic bags.
- The majority of recycling occurs in the formal private sector, though some Urban Environmental Companies

recycle waste under the management and direction of Department of Transport and Public Works and the Department of Construction. NGOs collect most of the recyclable and reusable waste in urban areas from small businesses. Households sell metals and paper to collectors and compost some vegetable and fruit wastes.

- Organizations participating in solid waste reuse or recycling include: the Institute of Building Materials, of the Ministry of Construction; the Hanoi Urban Environment Company, of the Department of Transport and Public Works; and recycling trade villages.

Portion of the health and/or environmental budget allocated to health-care waste management

- The budget for health care and social assurance in Vietnam in 2004 was 5,000 billion VND, of which governmental investment is 3,700 billion VND.

Organizational structure of the Ministry of Environment and Ministry of Health

- The national agencies responsible for health-care waste management (HCWM) are the Ministry of Health (MOH) and the Ministry of Science, Technology and Environment (MOSTE) (formerly the Ministry of Natural Resources and Environment).
- The Ministry of Health is responsible for issuing HCWM regulations and enforcing these regulations in hospitals, health-care stations and health-care service facilities. Within MOH, the Department of Therapy is responsible for monitoring compliance with HCWM regulation. The Department of Preventive Medicine is responsible for monitoring the quality of waste treatment systems to ensure compliance with environmental hygiene regulations. MOH is also responsible for taking the lead and cooperating with MOSTE and the Ministry of Construction in the planning, construction and operation of the health-care waste incinerator system, in keeping with Vietnamese environmental standards.
- The Ministry of Science, Technology and Environment's (MOSTE) responsibilities include: undertaking the unified governmental management of hazardous waste, including organizing and directing hazardous waste management; developing legislation on hazardous waste management; publishing environmental standards on the selection of and technical standards for landfills for hazardous waste and hazardous waste treatment; guiding and approving environmental impact assessments and carrying out inspections of facilities that handle or dispose of hazardous waste; and disseminating, training and raising awareness about hazardous waste, targeting authorities and the public through the media.
- Provincial Departments of Health (DOHs) direct departmental steering committees for health-care waste management. These committees are responsible for counseling Provincial Departments of Health on local HCWM and on infrastructure investment projects for hazardous HCW treatment.
- At the local level, owners and managers of health-care facilities are responsible for all stages of HCWM, from generation to final disposal.
- Other ministries and departments responsible for hospitals and health-care institutions, infection control, hygiene and sanitation, and occupational and environmental health include: the Ministry of Natural Resources and Environment; the Ministry of Labor, Invalid and Social Affairs; the Department of Plan and Finance; the Department of Legislation; the Department of Science and Education; the Department of Therapy; the Department of Health-Care Equipment and Construction; the Department of Preventative Medicine; the Department of Food Hygiene Safety Management; and the Department of Pharmacy Management.

Description of the health-care system

- There were, in 2004: 856 hospitals, 881 regional polyclinics, 53 convalescence and rehabilitation hospitals, 10,516 ward health-care stations, 789 clinics and health-centers and 54 other facilities. The Ministry of Health (MOH) administers 30 of these facilities, the Provincial Departments of Health 12,259 and other sectors administer 860.
- Plans to modify the health-care system through the MOH Decision 1047/QD-BYT of March 2002 call for a 20% increase in the number of beds per population from the year 2000 to 2010, primarily by increasing the number of beds within existing hospitals. The plan also includes modernization of hospital equipment and facilities.

Related projects

- The Center for Environmental Technology Transmission, Training and Consultancy is involved in two projects: "Healthcare solid waste management and model development" is developing a model for safe HCWM and reducing environmental pollution, and "Hospital hygiene status assessment, hospital solid waste management and model development" is developing possible pollution treatment for public areas.
- Japanese International Co-operation Agency-Vietnam Environmental Protection Agency (JICA-VEPA) is involved in a project to enhance HCWM and control the capacity of hospitals in the list of polluting hotspots pursuant to Decision 64 (FS).
- The Center for Environmental Engineering in Towns and Industrial Areas at Hanoi University of Civil Engineering is developing technology for industrial hazardous waste incinerators, appropriate to the conditions of Vietnam.
- The Department of Health–Hai Duong People's Health Care Committee is involved in a waste treatment project in Hai Duong running from 2005 to 2010.
- PhD Nguyen Thi Hong Tu, et al., are assessing governmental legislation and management systems in health care.
- The Ministry of Health installed 25 medical waste incinerators in hospitals between 2000 and 2003.
- The Vietnam–Sweden Co-operation Programme on Strengthening Environmental Management and Land Administration (SEMLA program) is a project of the Ministry of Natural Resources and Environment, 2004-2009, with 24 million USD Official Development Assistance from SIDA.
- The Sharps Shredder Project is an ongoing project of PATH USA in Ha Tinh province.
- Ministry of Health–BURGEAP France is developing a Master Plan on Health-care Waste Management.
- The European Union has a project focused on Health-Care System Development in Binh Thuan and Thai Binh provinces.
- The World Health Organization funded a project focused on health-care waste management and associated risks from 1995 to 1999, with a budget of 489,000 USD.

TANZANIA
TECHNOLOGY DEVELOPMENT COMPONENT

The technology development component of the Project will be managed from Tanzania, but its objective is to address a need identified by POPs experts from a number of sub-Saharan African countries.

Proper treatment and disinfection of health-care waste is a high-priority concern for most sub-Saharan African countries, in response to the high incidence of HIV, Hepatitis and other infectious diseases that can be spread by infectious wastes. The main approach now promoted by health experts and others for most health-care facilities in sub-Saharan Africa is to encourage treatment of infectious wastes by combustion in small, locally-built incinerators lacking effective pollution controls, and in many cases, to treat health-care waste by open burning or barrel burning.

As a long-term strategy, the World Health Organization, in a policy paper dated August 2004, calls for: "[e]ffective, scaled-up promotion of non-incineration technologies for the final disposal of health-care waste to prevent the disease burden from: (a) unsafe health-care waste management; and (b) exposure to dioxins and furans."[24] In the short term, however, effective non-incineration technologies for health-care waste treatment that are affordable in the African context are not available, especially technologies that can operate in locales where electricity and other utility services are not reliable or are simply unavailable.

This need to identify or develop appropriate technology was raised by experts from several African countries attending the Third session of the Stockholm Convention Expert Group on Best Available Techniques and Best Environmental Practices, held in Tokyo, Japan, 11-16 October 2004. Their concerns are reflected in Annex II of the meeting report,[25] entitled: *Developing Country Concerns Relating to Meeting BAT-BEP Requirements, in Particular, in the Area of Medical Waste, While Contending with other High Priority Socio-Economic Issues*. The Annex states:

> The developing country parties expressed with concern, the difficulties that may be confronting some of their member[s] to meet the BAT-BEP [Best Available Techniques and Best Environmental Practices] standards for persistent organic pollutants in medical waste management due to lack of or inadequacy of capacity and technology while contending with other high priority socio-economic issues. However, we recognize that medical waste may have to be disposed of in a manner that will prevent the spread of infectious diseases arising from the present practice of co-disposal of hazardous medical wastes with other domestic type wastes in the open dump. Therefore, in the absence of sufficient, timely and appropriate international technical and financial assistance, developing country parties may have to be allowed in the short-term the use of the other options which are better than open dumping, including small scale hospital incinerators, even if they are not BAT, even though many aspects of BAT and BEP guidance would still apply and still be useful, especially waste management measures including segregation, and minimization. In this regard, there is need for early provision of financial resources for capacity building and institutional strengthening to enable compliance with BAT-BEP guidelines for POPs management by developing country parties. We note with interest the Global Environment Facility (GEF)/United Nations Development Programme/World Health Organization Medical Waste Management demonstration project under development, and we encourage the GEF, its implementing agencies and others to support and rapidly initiate much more work in this area. This would be greatly facilitated by developing countries making the related BAT/BEP issues an important part of their National Sustainable Development Strategies.
>
> The need for special assistance in meeting BAT and BEP requirements for medical waste management is indicative of broader concerns relative to implementation of BAT and BEP for many developing countries. Implementation of BAT and BEP must be made broadly compatible with sustainable development goals in order to encourage development and poverty reduction while, at the same time, taking needed measures to protect public health and the environment from persistent organic pollutants.

The decision to add a technology development component to the Project was made in response to concerns raised by these and other POPs experts from African countries. In short, Parties to the Stockholm Convention have an

[24] See: http://www.who.int/water_sanitation_health/medicalwaste/en/hcwmpolicye.pdf
[25] See: http://www.pops.int/documents/meetings/cop_1/meetingdocs/en/default.htm

obligation to promote BAT (Best Available Techniques) for Medical Waste Incinerators (MWIs), and have an obligation to ***require*** BAT for new MWIs within four years of Stockholm Convention entry into force. However, the costs and operational requirements of what is generally considered to be BAT MWIs puts BAT incinerators out of reach for virtually all health-care institutions in sub-Saharan Africa. This Project component has been undertaken to address this problem.

The primary partners in the technology development component are the faculty of Mechanical and Chemical Engineering and the Technology Development and Transfer Centre, both affiliated with the College of Engineering and Technology at the University of Dar es Salaam.

The College of Engineering and Technology
The College of Engineering and Technology (CoET) is a semi-autonomous campus College of the University of Dar es Salaam (UDSM). The College is composed of three faculties, namely the Faculty of Mechanical and Chemical Engineering, the Faculty of Civil and the Built Environment and the Faculty of Electrical and Computer Systems Engineering. The College has a population of about 1,500 undergraduate students and 250 postgraduate students in thirteen academic departments. Currently the College offers fourteen undergraduate degree programs and about ten postgraduate programs. The College undertakes technology development and transfer activities through its Technology Development and Transfer Centre (TDTC). Consultancies are done through its Bureau for Industrial Cooperation (BICO). The College has 110 academic staff, 80% of whom are trained to PhD level, and 136 technical staff. The College has modern laboratory and workshop facilities which are essential for this project.

The Faculty of Mechanical and Chemical Engineering
The Faculty of Mechanical and Chemicals Engineering, which will be the major player in this project, is the largest in the College with six academic departments. It offers eight undergraduate programs and about the same number of postgraduate programs, employs approximately 59 academic staff and 30 technical staff, and has a student population of about 700 undergraduate students and 200 postgraduate students. All staff and students who will be involved in the project will come from this Faculty, which has experience in developing small- to medium-scale equipment and technologies.

The Technology Development and Transfer Centre
The Technology Development and Transfer Centre (TDTC) plays the role of coordinating technology development and transfer activities in the College. The basic objective of the Centre is to strengthen the country's industrial competitiveness by promoting the efficient identification, management, development and commercialization of research outputs and of technologies from within and outside the country. The Centre is equipped with a modern mechanical workshop and has access to all laboratories and workshops in the College of Engineering and Technology.

The Centre focuses on the following components:

- In-house technology development, which involves development of research outputs from College faculties and departments; and
- Technology brokerage, which involves developing and transferring technologies using a mediated approach (negotiated contacts or purchase and sale agreements).

Experiences
The technologies that have been successfully developed thus far include grain mill hullers, animal feed mills and mixers, a salt grinder and iodator, sugar processing equipment, edible oils equipment for palm and sunflower oils, fruit juice processing equipment, cassava processing equipment, a wood-fired baking oven, ball mill, manual winch, shaking table, amalgamator, cinva ram (for production of bricks) interlocking brick pre, vibrating block machine, sand-sieving machine, integral solar heater, solar tunnel drier, solar refrigerator, solar photovoltaic system, and a solar water-pumping system.

Technology Incubation
Business and technology incubation provides entrepreneurs with the expertise, networks and tools needed to make their ventures successful, catalyzing the process of starting and nurturing enterprises. In other words, a Technology Incubator promotes the development of small- and medium-sized enterprises through the enhancement of the technology available to and used by the enterprises.

The College, in Collaboration with Tanzania Gatsby Trust, the Ministry of Industry and Trade, and Small Industrial Development (SIDO), is promoting the incubation concept. Currently about ten incubator projects exist in Tanzania. It is believed that an incubator will act as a vehicle to provide an instructive and supportive environment to entrepreneurs who will be ready to take on and commercialize the health-care waste treatment technologies that will be developed by the project. This will consequently guarantee sustainability and replication of Project activities in Tanzania and other countries.

National Implementation Plan (NIP)

- Health-care waste incineration is named among the sources of dioxins and furans in Tanzania.

Health-care waste management opportunities and challenges

Opportunities:

- Further education is needed on the risks posed by health-care waste and on methods for its proper handling and management—for health-care workers, other workers at risk and the general public. In Tanzania, such efforts have just commenced, though the training was chiefly provided for waste handlers and operators of the medical waste incinerators. Instruction is also needed for health-care workers and housekeeping staff exposed to health-care waste.
- Research is required to establish a database of information and statistics on health-care waste sources, generation, collection, transportation, treatment and disposal. This will form the basis for planning, designing and implementing waste management programs. Technology development in HCWM systems must be encouraged for successful WM in the future.

Challenges:

- Few options exist for treating health-care waste. Generators of HCW use open-pit burning, incineration and pit burying. In areas with incinerators, open-pit burning is still used because of incinerators' low capacity, complaints from local communities about the smoke from incinerators, the lack of fuel for the start-up of combustion, and the building of incinerators without the consent or participation of intended users.
- There is resistance to a complete technology transfer away from incineration because most types of health-care wastes can be treated by incineration, and incineration reduces the volume and weight of waste more than alternative treatment methods.
- The HCWM system needs a waste classification system and techniques for handling health-care waste other than those used for municipal solid waste management.
- Regulatory activities must be prioritized whereby the government, industry and the public must address these problems using limited resources.

Relevant laws and guidelines

- There are currently no clear laws related to HCWM in Tanzania. Regulations which mention HCWM include: The National Health Policy of 1990, the National Environment Policy (NEP) of 1997, the Public Health Act (draft) of 2001, the Draft Waste Management Guidelines of 2002 and more recently proposed environmental standards. The Draft Waste Management Guidelines of 2002 have remained guidelines only.

State of municipal waste management and recycling programs

- Municipal solid waste is commonly burned in open pits and buried in pits.
- Recycling: Glass is recycled by a small number of glass container manufacturers in Tanzania. Glass container manufactures use crushed recycled glass (from hospital or municipal waste) combined with soda ash, limestone, sand and minor ingredients to create "new" glass. The knowledge about glass recycling is still rare in Tanzania, and very few individuals are involved in the glass recycling business.

Related projects

- The Ministry of Health, the WHO and University of Dar es Salaam (UDSM) are involved in establishing a municipal waste management system in Tanzanian hospitals and solving waste incineration problems.
- The Ministry of Health and the WHO conducted two studies of the HCWM system in 2000 and 2001. From the studies, it was established that hospitals did not have proper means of managing HCW.

ANNEX 3:
BASELINE DATA ON DIOXINS AND MERCURY
FROM THE HEALTH-CARE SECTOR

ANNEX 3A: BASELINE DIOXIN DATA FROM THE HEALTH-CARE SECTOR
ANNEX 3B: BASELINE MERCURY DATA FROM THE HEALTH-CARE SECTOR

ANNEX 3A: BASELINE DIOXIN DATA FROM THE HEALTH-CARE SECTOR

Dioxin baseline data were obtained for five of the seven Project countries. Final data for India were not available during the PDF B phase. The data summarized in the table below show that dioxin releases from health care have been estimated as accounting for 4% to 19% of the total dioxin releases of the participating countries, ranging from less than 1 to 92 g TEQ per year. These figures are most likely underestimations since open burning, burning in pits and incineration in drums or other make-shift burners tend to be under-reported or not reported at all. Thus it is difficult to estimate their contributions to the overall dioxin baseline even though these practices are known to take place and generally release high levels of dioxins and other pollutants. The low percentage computed for Latvia may also reflect a lack of information at the time the estimates were made on the contributions of the health-care sector to dioxin releases.

Vietnam had data to make projections of dioxin formation based on the total amount of health-care waste generated in the country. National dioxin releases from health care are based on the currently operating incinerators. Assuming that all health-care waste in Vietnam is burned in incinerators with good air pollution control, annual dioxin releases increase by 139%. However, if all health-care waste is burned in incinerators of the types used today, that is, with no air pollution control, annual dioxin releases increase by 401% (from the current amount of 12.7 g TEQ per year to 63.6 g TEQ per year). Similarly, increased use of low-cost incineration in health-care waste management in participating countries like Argentina, India, Latvia and Senegal could be assumed without the intervention of this GEF Project. This would lead to even higher levels of dioxin releases than indicated below.

Dioxin/furan baseline summary
Based on Dioxin Assessments

Country	Dioxins/furans (g TEQ per year)	% of dioxins from health-care in relation to total dioxin releases in the country
Argentina	92.5	4.4
Latvia	0.94	4.1
Lebanon	32.2	19.4
Philippines	37.9	7.1
Senegal	11.0	n/a
Vietnam	12.7	n/a

Dioxin baseline information by country
(Other than the "health-care dioxin/furan emissions as percentage of total," the numbers below are taken directly from country reports and are not rounded off.)

Argentina	
Method of estimation	UNEP Toolkit
Source	Incinerators
Number of sources	--
Current throughput rate	26,870 tons per year
Air emissions	79.53 g TEQ per year
Fly ash	12.53 g TEQ per year
Bottom ash	0.43 g TEQ per year
Total dioxin/furan emissions from health care	92.5 g TEQ per year
Total dioxin/furan emissions	2110.9 g TEQ per year
Health-care dioxin/furan emissions as percentage of total	4.4%

Dioxin baseline information by country (cont.)

Latvia	
Method of estimation	UNEP Toolkit (and emission measurements)
Source	Medical waste incinerators
Number of sources	--
Current throughput rate	310 tons per year
Air emissions	0.93 g TEQ per year (0.57 g TEQ per year)
Fly ash	--
Bottom ash	0.006 g TEQ per year
Total dioxin/furan emissions from health care	0.94 g TEQ per year (0.57 g TEQ per year)
Total dioxin/furan emissions	23 g TEQ per year
Health-care dioxin/furan emissions as percentage of total	4.1%
Lebanon	
Method of estimation	UNEP Toolkit
Source	Medical waste incinerators
Number of sources	21
Current throughput rate	2,141 tons per year
Air emissions	32.09 g TEQ per year
Fly ash	--
Bottom ash	0.161 g TEQ per year
Total dioxin/furan emissions from health care	32.2 g TEQ per year
Total dioxin/furan emissions	165.8 g TEQ per year
Health-care dioxin/furan emissions as percentage of total	19.4%
Philippines	
Method of estimation	UNEP Toolkit
Source	Medical waste incinerators
Number of sources	30
Current throughput rate	3,577 tons per year
Air emissions	37.7 g TEQ per year
Fly ash	--
Bottom ash	0.20 g TEQ per year
Total dioxin/furan emissions from health care	37.9 g TEQ per year
Total dioxin/furan emissions	534.06 g TEQ per year
Health-care dioxin/furan emissions as percentage of total	7.1%
Vietnam	
Method of estimation	UNEP Toolkit
Source	Incinerators
Number of sources	61
Current throughput rate	5,533 tons per year
Air emissions	10.277 g TEQ per year
Fly ash	2.351 g TEQ per year
Bottom ash	0.060 g TEQ per year
Total dioxin/furan emissions from health care	12.7 g TEQ per year
Future scenario: all health-care waste burned in high-tech incinerators with sophisticated air pollution control	3.2 g TEQ per year
Future scenario: all health-care waste incinerated with good air pollution control	30.3 g TEQ per year
Future scenario: all health-care waste incinerated with no air pollution control	63.5 g TEQ per year

ANNEX 3B: BASELINE MERCURY DATA FROM THE HEALTH-CARE SECTOR

During PDF B, an attempt was made to estimate mercury releases from two major sources in health care: the improper disposal of mercury thermometers and sphygmomanometers. Data from four of the participating countries showed fairly consistent results, giving an average emission factor of 1.7 grams of mercury per bed per year from broken thermometers. Data on broken sphygmomanometers were available from two countries, giving an emission factor of 1.1 grams of mercury per bed per year. Mercury baseline estimates were obtained using total beds in all the countries and an emission factor of 2.8 grams of mercury per bed per year from both thermometers and sphygmomanometers. As shown in the table at right, the estimated total annual releases range from 15 kilograms in Senegal to 1,600 kilograms in six states in India.

Mercury Baseline Summary
Estimated Mercury Releases from Health Care (Broken thermometers and sphygmomanometers)

Country	Estimated releases (kg Hg per year)
Argentina	430
India (6 states)	1,600
Latvia	49
Lebanon	31
Philippines	235
Senegal	15
Vietnam	550

Mercury Baseline Information from ARGENTINA

Health-care facility	# thermometers purchased or broken per week
30-bed clinic	1 – 2
Small pediatric hospital with 250-300 patients/month	20 – 30

[Source: Dr. Maria Della Rodolfo, Health Care Without Harm (HCWH)]

Argentina imported 903,950 clinical thermometers in 2004. [Source: Statistics Department]

Mercury Baseline Information from INDIA

# beds in hospital	Average # of thermometers purchased per month	Average # of thermometers broken per month	# sphygmomanometers purchased per year	Mercury used to refill sphygmomanometers per year
550 beds	550*	55**	240 BP units***	
500 beds	80 – 100	4 – 5 per ward	10 – 12 BP units	500 g
300 beds	70	70	24 – 36 BP units	500 g
70 beds	2 – 3		12 BP units	

*90% of thermometers purchased are given to patients on discharge.
**The hospital minimized handling of thermometers to reduce breakage.
***Breakage rate: 1 – 2 BP units per ward per month.
[Source: Ratna Singh, HCWH. Data collected by Toxics Link for published report *Lurking Menace: Mercury in the Healthcare Sector*, www.toxicslink.org/docs/06041_Mercury_in_healthcare_Report.pdf]

At a 600-bed hospital (St. Stephen's Hospital, New Delhi), five to six sphygmomanometers were refilled per month during maintenance, and 1600 g of spilled mercury was collected from broken thermometers in one year.

In dental clinics (from 15 dentists interviewed), 4608 grams of contact amalgam and 9216 grams of non-contact amalgam was going to waste. Delhi may be generating around 51 kilograms of mercury from amalgams each year (thrown in the general bins or drained into sewers).

In summary, an average-sized hospital in Delhi may break 70 thermometers per month, contributing around 840 grams mercury per year through thermometers alone. Taking into account BP apparati, assuming a leakage of only around one-third of the total amount of mercury in a unit (60 g) and assuming two spills per month, around 480 grams of mercury may be wasted per year. Considering mercury wastage due only to thermometers

and sphygmomanometers and ignoring all other sources, an average-size hospital is accountable for an environmental mercury burden of 1,320 grams per year. A similar hospital with a dental wing may release 2.8 kilograms of mercury.

Mercury Baseline Information from LATVIA

Luminescent bulbs and other mercury-containing waste (Waste class No: 200121)

	1997	1998	1999	2000	2001	2002	2003	2004	Total
Total mercury waste* from health care (tons)	4.72	4.60	3.42	8.12	3.52	3.84	2.21	2.83	33.26
Proportion of total mercury waste from health care (%)	0.9	0.9	1.3	17.7	6.7	12.6	6.0	8.7	2.2
Total mercury waste (tons)	549.09	523.12	268.51	45.90	52.36	30.37	37.01	32.59	1538.93

*The figures above represent the total weight of luminescent bulbs, not of pure mercury.

The average amount of mercury-containing waste produced from 1997 to 2004, including luminescent bulbs, is 4.16 tons per year.

Number of thermometers and sphygmomanometers collected from the health-care sector per year

	2003	2004	2005*
Thermometers	159	2871	2483
Sphygmomanometers			253

*Including January 2006

Mercury Baseline Information from LEBANON

Net weight and quantity of liquid-filled mercury thermometers imported to Lebanon over the last five years
*Fever thermometers contain approximately 0.5 grams of mercury
[Source: Interstate Mercury Education & Reduction Clearinghouse (IMERC) Mercury-Added Products Database]

Year	Imported	
	Net weight (kg)	Quantity
2001	8,916	228,282
2002	7,364	487,259
2003	5,847	168,563
2004	15,233	730,245
2005	10,478	523,237

Mass of mercury imported

Year	Quantity imported	Mass of mercury (g)
2001	228,282	114,141
2002	487,259	243,630
2003	168,563	84,282
2004	730,245	365,123
2005	523,237	261,619
Total mass of mercury imported in Lebanon since 2001		**1,068,793 g**
		1069 kg

According to the Lebanese Customs website (www.customs.gov.lb), liquid-filled mercury thermometers are recorded under HS Code 90.25.11. The Customs database does not specify the nature of liquid-containing thermometers, whether laboratory, industrial or fever. Assuming the majority are fever thermometers (i.e., disposable, provided to every new hospital patient), Lebanon would have imported the equivalent of about 1 ton of mercury over the past five years, ranging from 84 kilograms in 2003 to 262 kilograms in 2005.

Mercury Baseline Information from the PHILIPPINES

Quantity of equipment/supplies containing mercury procured per year, by hospital

Item	2001	2002	2003	2004
Amang Rodriguez Medical Center, Tertiary Hospital, 150 beds				
Sphygmomanometer (pcs)	none	none	none	none
Thermometer (pcs)	1200	1320	2520	2112
Dental filling (amalgam 50/box)	none	none	none	2 boxes
Jose Reyes Memorial Medical Center, Tertiary Hospital, 450 beds				
Sphygmomanometer (pcs)	50	none	2	30
Thermometer (pcs)	275	266	331	396
Dental filling	no data	no data	no data	no data
Ospital ng Maynila, Tertiary Hospital, 300 beds				
Sphygmomanometer (pcs)	none	none	none	21
Thermometer (pcs)	none	none	none	none
Dental filling	12 lbs	60 lbs	21 lbs	12 lbs
San Lazaro Hospital, Tertiary Hospital, 500 beds				
Sphygmomanometer (pcs)	none	none	none	none
Thermometer (pcs)	none	4	none	100
Dental filling	none	none	none	none
Pangasinan Provincial Hospital (San Carlos City), Tertiary Hospital, 150 beds				
Sphygmomanometer (pcs)	2	none	none	none
Thermometer (pcs)	116	264	168	212
Dental filling (amalgam 50/box)	no data	no data	no data	no data

Mercury released per bed per year*

Hospital beds	Grams mercury from thermometers per bed per year	Grams mercury from sphygmomanometers per bed per year
500	0.77	0
450	0.43	2.7
300	0.03	1.0
150	7.3	0.2
150	-	0
Average	**2.1**	**0.7**

*****Assumptions: Procurement indicates the replacement of broken devices; 60 g mercury is lost with each sphygmomanometer (no recovery); and 0.61 g mercury is lost per thermometer.

Mercury Baseline Information from VIETNAM

Data from a survey of 18 hospitals where the Rapid Assessment Tool was applied show that for non-resident patients or clients, about 20 to 30 thermometers are used in each facility (of which 15 to 20 are frequently used), and 2 to 4 thermometers are broken per month. Ministry of Health regulations state that each resident patient should use 1 thermometer, but the actual number is lower due to budget. The majority of thermometers are imported from China due to their cheap price. Many patients buy new thermometers to compensate for broken ones.

No facility has a standard procedure for separating mercury-containing waste for treatment. Mercury waste is generally collected and incinerated together with other health-care waste in hospital incinerators or central incinerators, or disposed in municipal landfills. Some facilities collect broken thermometers and dispose of them on-site.

Mercury release from surveyed health-care facilities

Health-care Facility	Official number of beds	# of patients	# of thermo-meters used	# of broken thermo-meters per month	Percentage being broken per month
Viet-Duc University Hospital, Hanoi	450	500	480	120	25.00
National Hospital of Pediatrics, Hanoi	580	500-800	614	135	21.99
Bach Mai Hospital, Hanoi	1340	1500	1300	232	17.31
Tu Du Hospital, HCMc	1000	1250	1200	166	13.83
Tropical Diseases Hospital, HCMc	500	450	553	100	18.08
Nguyen Tri Phuog Hospital, HCMc	550	604	608	110	18.09
General Hospital, Ninh Binh province	450	100	510	115	22.55
General Consulting Clinic, Hoa Lu district, Ninh Binh province	10	7	10	2	20.00
Health-care station, Ninh Hai commune, Hoa Lu district, Ninh Binh province	5	2	8	3	37.50
Health-care station, Ninh An commune, Hoa Lu district, Ninh Binh province	8	1	8	3	37.50
General Hospital, Nam Dinh province	500	510	572	92	16.08
Maternity Hospital, Nam Dinh province	150	115	163	23	14.11
Health-care station, Dong Duong commune, Dong Hung district, Thai Binh province	7	2	7	2	28.57
Le Loi Hospital, Vung Tau city	350	350	450	92	20.44
General Hospital, Ba Ria-Vung Tau province	500	440	557	86	15.44
General Hospital, Hai Duong province	600	681	632	102	16.14
General Hospital, Bac Ninh province	450	652	465	112	24.09
General Hospital, Ha Tay province	400	450	450	134	29.78
Total	**6510**	**6114**	**8627**	**1629**	**18.88**

In summary, the total number of broken thermometers at the 18 facilities is 1,629 per month or 20,304 per year. The rate of breakage is 18.88% per month. The estimated total number of broken thermometers nationwide is 447,588 per year (extrapolated from the 18 facilities, based on the total number of 196,311 beds in use nationwide).

Overall Summary of Mercury Baseline Information

Estimated mercury releases from broken thermometers*

Country	Grams mercury per bed per year
Argentina	
30-bed clinic	1.6
India	
600-bed hospital	2.7
550-bed hospital	0.73
500-bed hospital	1.3
300-bed hospital	1.7
70-bed hospital	0.22
Average	1.3
Philippines	
500-bed hospital	0.77
450-bed hospital	0.43
300-bed hospital	0.03
150-bed hospital	7.3
Average	2.1
Vietnam	
1500-bed hospital	1.3
1000-bed hospital	1.2
600-bed hospital	1.2
580-bed hospital (pediatric)	1.7
550-bed hospital	1.5
500-bed hospital (tropical diseases)	1.5
500-bed hospital	1.3
500-bed hospital	1.3
450-bed hospital (university)	1.9
450-bed hospital	1.9
450-bed hospital	1.8
400-bed hospital	2.4
350-bed hospital	1.9
150-bed hospital (maternity)	1.1
10-bed clinic (provincial)	1.5
8-bed health station	2.7
7-bed health station	2.1
5-bed health station	4.4
Average	1.8
Global average	**1.7**

* Assumptions: All mercury from broken thermometers eventually gets released to the environment; and 0.61 g mercury is released per thermometer.

Global average of mercury released from broken thermometers: 1.7 grams per bed per year

Estimated mercury releases per bed from sphygmomanometers*

Country	Grams mercury per bed per year
India	
600-bed hospital	2
500-bed hospital	1
300-bed hospital	1.6
Average	1.5
Philippines	
500-bed hospital	0
450-bed hospital	2.7
300-bed hospital	1.0
150-bed hospital	0.2
150-bed hospital	0
Average	0.8
Global average	**1.1**

*Assumptions: For India, a third of mercury from broken sphygmomanometers eventually gets released into the environment (i.e., one third of 60 grams), and the rest is recovered; for the Philippines, it is assumed that procurement is indicative of replacement of broken devices and that all the mercury is eventually released into the environment.

Global average of mercury released from sphygmomanometers: 1.1 grams per bed per year

Global average of mercury released from thermometers plus sphygmomanometers:
2.8 grams mercury per bed per year

Estimated total annual mercury releases from broken thermometers and sphygmomanometers*

Country	Total beds	Estimated Releases (kg mercury per year)
Argentina	153,065	430
India (6 states)	586,389	1,600
Latvia	17,355	49
Lebanon	11,000	31
Philippines	84,040	235
Senegal	5,300	15
Vietnam	196,311	550

*Estimates are based on 2.8 g mercury per bed per year (for thermometers and sphygmomanometers only).
Assumption: This emission factor applies to all participating countries.

ANNEX 4:
ALTERNATIVE HEALTH-CARE WASTE MANAGEMENT TREATMENT TECHNOLOGIES

ANNEX 4: ALTERNATIVE HEALTH-CARE WASTE MANAGEMENT TREATMENT TECHNOLOGIES

Type of technology	Description	General operating process	Range of capacities	Approximate capital cost
Standard gravity-fed autoclave	Technology consists of a pressure vessel, typically cylindrical or rectangular, with or without outer steam jacket and designed to withstand elevated pressures. Steam is introduced by gravity displacement.	• Waste is placed inside the autoclave. • Pressurized steam is introduced at a minimum of 121°C. • Waste is exposed to the steam. • Steam is removed as condensate. • Waste is removed and processed in a shredder if desired.	20 kg/hr to 3000 kg/hr; smaller units are available	30,000 to 200,000; small units cost about 100
Standard pre-vacuum autoclave	Technology consists of a pressure vessel, typically cylindrical or rectangular, with or without outer steam jacket and designed to withstand elevated pressures. A vacuum is used to remove air and then steam is introduced.	• Waste is placed inside the autoclave. • A vacuum is used to remove air. • Pressurized steam is introduced at a minimum of 121°C. • Waste is exposed to the steam. • Steam is removed as condensate. • Waste is removed and processed in a shredder if desired. • Some technologies compact the waste.	15 kg/hr to 1000 kg/hr	30,000 to 500,000
Pulse vacuum autoclave	Technology consists of a pressure vessel, typically cylindrical or rectangular, with or without outer steam jacket and designed to withstand elevated pressures. Two or more cycles of vacuum and steam injection are used.	• Waste is placed inside the autoclave. • A vacuum is used to remove air. • Pressurized steam is introduced at a minimum of 121°C. • Waste is exposed to the steam. • Two or more cycles of vacuum and steam injection are used. • Steam is removed as condensate. • Waste is removed and processed in a shredder if desired.	21 kg/hr to 84 kg/hr	120,000 to 240,000
Rotating autoclave	Technology consists of a cylindrical pressure vessel with an internal rotating drum lined with sharp vanes and designed to withstand elevated pressures.	• Waste is placed in the rotating autoclave. • A vacuum is used to remove air. • Steam is introduced at about 147°C. • Internal drum rotates causing waste containers to break and mix. • Steam is removed as condensate and waste is cooled. • Waste is removed and processed in a grinder.	90 kg/hr to 2000 kg/hr	380,000 to 900,000
Hydroclave	Technology consists of a cylindrical pressure vessel with an outer steam jacket and an internal mixing arm, designed to withstand elevated pressures.	• Waste is placed in the hydroclave. • Steam is injected in the outer jacket until the inner chamber is heated to 132°C. • Internal mixing arm breaks the waste containers and mixes the waste. • Steam is removed as condensate. • Waste is removed and processed in a shredder.	20 kg/hr to 1000 kg/hr	70,000 to 550,000

Type of technology	Description	General operating process	Range of capacities	Approximate capital cost
Steam treatment with internal shredding	Technology consists of a cylindrical or hemispherical pressure vessel with an internal shredder and outer steam jacket. Some systems are designed as mobile units.	• Waste is placed in the vessel. • Steam is introduced at 132° or 138°C. • Waste is shredded internally and exposed to steam. • Steam is removed as condensate. • Waste is cooled. • Waste is removed.	40 kg/hr to 200 kg/hr	190,000 to 470,000
Steam treatment with continuous internal maceration	Technology consists of a rectangular container with a treatment vessel connected to a pump-grinder and liquid separator.	• Waste is placed in the vessel. • Steam and hot water are introduced. • Waste slurry is re-circulated through the grinder and held at 138°C. • Cold water is injected and the slurry is passed through a liquid separator to filter out the waste. • Waste solids are captured in disposable bags.	68 kg/hr	200,000
Semi-continuous steam treatment	Technology consists of a hopper, shredder, rotating auger, dehydrator and discharge section.	• Waste is automatically dumped into a sealed hopper. • Waste passes through an internal shredder and a horizontally inclined rotating auger where it is exposed to steam. • The dehydrator at the end of the auger removes excess liquid. • The waste is discharged directly into a compactor.	140 kg/hr to 1800 kg/hr	300,000 to 1,800,000
Large-scale microwave treatment	Technology consists of a hopper, shredder, rotating auger, microwave generators, holding tank, secondary auger and shredder.	• Waste is automatically dumped into a sealed hopper. • Waste passes through an internal shredder and a horizontally inclined rotating auger where it is exposed to steam and microwave energy. • An optional second shredder at the end of the auger shreds the waste to a smaller size. • The waste is discharged into a container.	100 kg/hr to 250 kg/hr	600,000 and higher
Small-scale microwave treatment	Technology consists of a treatment chamber and one or more microwave generators.	• Waste is placed inside the treatment chamber. • Water or steam is added. • Waste is exposed to microwave energy which generates heat inside the chamber. • Waste is removed and shredded if desired.	3 kg/hr to 200 kg/hr	12,000 to 85,000
Electro-thermal deactivation	Technology consists of size-reduction equipment, a conveyor and a high-voltage radio-frequency generator.	• Waste is placed on a conveyor. • Waste passes through a shredder. • Shredded waste is sprayed with water, compacted and then exposed to low-frequency radio waves which heat the waste. • Waste is discharged.	450 kg/hr to 2700 kg/hr	Not available

Type of technology	Description	General operating process	Range of capacities	Approximate capital cost
Electron beam irradiation	Technology generally consists of a conveyor, beam accelerator and shielding.	• Waste is placed on a conveyor. • Waste passes through a treatment section where it is exposed to an electron beam at doses that destroy pathogens. • Waste is discharged and passed through a shredder.	180 kg/hr to 250 kg/hr	500,000 to 1,500,000
Dry heat treatment	Technology generally consists of a treatment chamber, resistance heater and fan to re-circulate hot air.	• Waste is placed in the treatment chamber. • Heated air at 177°C is circulated through the waste for a prescribed time. • Waste is cooled and then discharged.	0.15 kg/hr	5000
Alkaline hydrolysis or alkaline digestion	Technology consists of a cylindrical pressure vessel with an outer jacket and an internal spray assembly or mixer, a heat source, alkali solution, load cells, pump and piping and controls. The technology is designed for digesting tissues, organs, body parts and animal carcasses.	• Waste is placed in the pressure vessel. • Sodium or potassium hydroxide solution is added to the vessel. • Steam or heated oil is circulated in the outside jacket. • Waste is exposed to a heated alkali solution for several hours until the digestion is complete. • Wastewater is neutralized if desired and discharged to the sewer or solidified and used as fertilizer. • Solid waste residues are discarded or used as soil conditioner.	14 kg to 4500 kg per cycle	30,000 to 900,000 and higher
Chemical disinfection technologies	Technologies typically consist of a treatment chamber and internal shredder and mixer, and some use a solid-liquid separator.	• Waste is passed through an internal shredder. • A chemical disinfectant is mixed with the waste (e.g., calcium oxide, calcium hydroxide, peracetic acid or ozone). • Some technologies discharge the waste disinfectant; some remove and reuse the disinfectant solution; and others neutralize any residual disinfectant.	20 kg/hr to 1000 kg/hr	30,000 to 400,000 and higher

ANNEX 5:
MONITORING AND EVALUATION (M&E)

ANNEX 5: MONITORING AND EVALUATION (M&E)

Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be provided by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF. The Logical Framework Matrix in Table 6 provides *performance* and *impact* indicators for project implementation along with their corresponding *means of verification*. These will form the basis on which the project's Monitoring and Evaluation system will be built.

Monitoring and Reporting

Project Inception Phase

A Project *Inception Workshop* (IW) will be conducted in each country and will include the participation of the full National project team, relevant government counterparts, co-financing partners, the UNDP-CO, representation from the GET and representation from UNDP-GEF-HQ as appropriate.

The fundamental objective of the IW will be to allow the National project team to take ownership of the Project's goals and objectives, as well as finalize preparation of the Project's first Annual Workplan (AWP) on the basis of the Project's logframe matrix (indicators, means of verification and assumptions) and in a manner consistent with the expected outcomes for the Project.

Finalized during the IW, the *Annual Project Workplan* (AWP) will describe in detail the provision of inputs, activities and expected results for the project in a given year, indicating schedules and the persons or institutions responsible for providing the inputs and producing results. The AWP will be updated and revised each year by the National Project Manager in consultation with stakeholders and the UNDP-CO.

Additionally, the IW will: (i) detail the roles, support services and complementary responsibilities of the UNDP-CO vis à vis the project team; (ii) fine-tune the specific targets for the first-year implementation progress indicators together with their means of verification. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the Annual Workplan. Targets and indicators for subsequent years would be defined annually as part of the internal evaluation and planning processes undertaken by the project team; (iii) define means of measuring impact indicators related to global benefits. The measurement of global benefits will be undertaken through subcontracts or retainers with relevant institutions or through specific studies that are to form part of the Project's activities; (iv) provide a detailed overview of UNDP-GEF- and GEF-specific reporting and monitoring and evaluation (M&E) requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs), the Annual Project Report (APR), Tripartite Project Review Meetings (TPR), as well as mid-term and final evaluations; and (v) provide an opportunity to inform the project team on UNDP Project-related budgetary planning, budget reviews and mandatory budget re-phasings.

The IW will also provide an opportunity for all parties to understand their roles, functions and responsibilities within the Project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff and decision-making structures will be discussed and finalized in order to clarify each party's responsibilities during the project's implementation phase.

Monitoring responsibilities and events

A detailed schedule of project reviews meetings will be developed by the project management, in consultation with project implementation partners and stakeholder representatives, and incorporated in the Project Inception Report (IR). Such a schedule will include: (i) tentative timeframes for Tripartite Reviews and Steering Committee Meetings (or relevant advisory and/or coordination mechanisms), and (ii) Project-related M&E activities.

Day-to-day monitoring of implementation progress will be the responsibility of the Project Coordinator, Director or Chief Technical Advisor (depending on the established project structure) based on the project's AWP and its indicators. The Project Team will inform the Project Coordinator and UNDP-CO of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.

Periodic monitoring of implementation progress will be undertaken by the UNDP-CO through quarterly meetings with the National Project Coordinator, or more frequently as deemed necessary. This will allow parties to take stock and to troubleshoot any problems pertaining to the Project in a timely fashion to ensure smooth implementation of project activities.

UNDP Country Offices and UNDP-GEF-HQ, as appropriate, will conduct yearly visits to projects that have field sites, or more often based on an agreed-upon schedule to be detailed in the project's IR/AWP to assess project progress first-hand. Any other member of the Steering Committee (SC) may also accompany, as decided by the SC. A Field Visit Report will be prepared by the UNDP-CO and circulated no less than one month after the visit to the project team, all SC members, the Project Coordinator and UNDP-GEF-HQ.

Annual Monitoring will occur through the *Tripartite Project Review* (TPR). This is the highest policy-level meeting of the parties directly involved in the implementation of the Project. The Project will be subject to Tripartite Review (TPR) at least once every year. The first such meeting will be held within the first twelve months of the start of full implementation. The National Project Coordinator with the support of UNDP-CO will prepare an Annual Project Report (APR) and submit it to the UNDP-GEF-HQ at least two weeks prior to the TPR for review and comments.

The APR will be used as one of the basic documents for discussions in the TPR meeting. The National Project Coordinator will present the APR to the TPR, highlighting policy issues and recommendations for the decision of the TPR participants. The National Project Coordinator also informs the participants of any agreement reached by stakeholders during the APR preparation on how to resolve operational issues. Separate reviews of each project component may also be conducted if necessary.

The *Terminal Tripartite Review* (TTR) is held in the last month of project operations. The National Project Coordinator is responsible for preparing the Terminal Report and submitting it to UNDP-CO and UNDP-GEF-HQ. It shall be prepared in draft at least two months in advance of the TTR in order to allow review and will serve as the basis for discussions in the TTR. The TTR considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to the sustainability of project results, and acts as a vehicle through which lessons learned can be captured to feed into other projects under implementation of formulation.

Project Monitoring Reporting

The National Project Coordinator in conjunction with the national project teams will be responsible for the preparation and submission of the following reports that form part of the monitoring process. The Inception Report, Annual Project Report, Project Implementation Review, Quarterly Progress Reports and Project Terminal Report are mandatory and strictly related to monitoring, while the Project Publications item has a broader function, and the frequency and nature is project-specific to be defined throughout implementation.

Inception Report (IR)

A Project Inception Report will be prepared by each national Project Manager, in conjunction with the Project Coordinator and the UNDP-CO, immediately following each Inception Workshop (IW). It will include a detailed first-year AWP, divided into quarterly timeframes, detailing the activities and progress indicators that will guide implementation during the first year of the project. The Report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the AWP, as well as any M&E requirements to effectively measure project performance during the targeted 12-month timeframe.

The IR will include a detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project-related partners. A section on progress to date on project establishment and start-up activities and an update of any changed external conditions that may effect project implementation should be included.

When finalized, the report will be circulated to project counterparts who will be given a period of one calendar month in which to respond with comments or queries. The IR is due at the beginning of project implementation (month 6).

Annual Project Report (APR)

The APR is a UNDP requirement and part of UNDP's Country Office central oversight, monitoring and project management framework. Each UNDP-CO and National Project Coordinator will prepare an APR on an annual basis prior to the Tripartite Project Review (TPR), to reflect progress achieved in meeting the Project's AWP and assess performance of the Project in contributing to intended outcomes through outputs and partnership work. Preparation of the APR is the responsibility of each National Project Manager, with assistance provided by the UNDP-CO.

The format of the APR is flexible but should include the following:

- an analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome,
- the constraints, if relevant, experienced in the progress towards results and the reasons for these,
- the AWP,
- budget and full expenditure reports,
- lessons learned, and
- clear recommendations for future orientation in addressing key problems in lack of progress.

Project Implementation Review (PIR)
The Project Implementation Review is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. To minimize paperwork and processing time, the PIR will be held in conjunction with the APR (see above). The annual PIR reviews financial status, procurement data, impact achievement and progress in implementation.

The GEF M&E Unit provides the scope and content of the PIR. In light of the similarities of the APR and PIR, UNDP-GEF has prepared a harmonized format for reference. The harmonized APR/PIR report is prepared each year between June and September under the leadership of the UNDP-CO together with other project stakeholders (including the Global Project Coordinator/Technical Advisor) and with the support of UNDP-GEF-HQ and the GEF Monitoring and Evaluation Team. The Annual PIR prepared by the UNDP-CO, integrated into a global package intended for submission to the GEF, is an annual obligation to the GEF Secretariat. The PIR is the main tool used by the GEF for monitoring its portfolio. Additional progress reports and reviews may be requested, if necessary, during the Project's implementation.

Quarterly Progress Reports (QPR)
Short reports outlining main updates in project progress will be provided quarterly to the local UNDP-CO, who in turn will provide them to the Global Project Coordinator/Technical Advisor. The Global Project Coordinator/Technical Advisor will submit one global Quarterly Progress Report to UNDP-GEF-HQ.

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

Project Publications (project-specific, optional)
Project Publications will form a key method of crystallizing and disseminating the results and achievements of the Project. These publications may be scientific or informational texts on the activities and achievements of the Project, in the form of journal articles, multimedia publications, etc. These publications can be based on technical reports, depending upon the relevance, scientific worth, etc., of these reports, or may be summaries or compilations of a series of technical reports and other research. The project team will determine if any of the technical reports merit formal publication, and will also (in consultation with UNDP, the government and other relevant stakeholder groups) plan and produce these Publications in a consistent and recognizable format. Project resources will need to be defined and allocated for these activities as appropriate and in a manner commensurate with the Project's budget.

Independent Evaluation
The project will be subject to two independent external evaluations as follows:

<u>Mid-term Evaluation</u>
An independent Mid-term Evaluation will be undertaken at the end of the second year of implementation. The Mid-term Evaluation will determine progress being made towards the achievement of outcomes and will identify course correction if needed. It will: focus on the effectiveness, efficiency and timeliness of project implementation; highlight issues requiring decisions and actions; and present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the Project's term. The organization, Terms of Reference and timing of the Mid-term Evaluation will be decided after consultation between the

parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP-CO based on guidance from the Global Project Coordinator/Technical Advisor and UNDP-GEF-HQ.

Final Evaluation

An independent Final Evaluation will take place three months prior to the terminal tripartite review meeting and will focus on the same issues as the Mid-term Evaluation. The Final Evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The Terms of Reference for this evaluation will be prepared by the UNDP-CO based on guidance from the Global Project Coordinator/Technical Advisor and UNDP-GEF-HQ.

Audit Clause

The Governments of each participating country will, periodically, provide the Resident Representative with certified financial statements, as well as with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds according to the established procedures set out in the Programming and Finance manuals. The Audit will be conducted by the legally recognized auditor of the Government, or by a commercial auditor engaged by the Government.

Indicative monitoring and evaluation workplan and corresponding budget

Type of M&E activity	Responsible parties	Budget (US$) *Excluding project team staff time*	Timeframe
Inception workshop	• Global Expert Team • UNDP-CO	None	Within first six months of project start-up
Inception report	• UNDP-CO	None	Immediately following IW
APR and PIR	• National Project Coordinator • UNDP-CO	None	Annually
TPR and TPR report	• National Project Coordinator • UNDP-CO	None	Annually, upon receipt of APR
Global Steering Committee meetings	• Project Coordinator • UNDP-GEF-HQ	Costed into project activities	Twice during project implementation
Quarterly progress reports	• National Project Consultant	None	Each quarter
Mid-term external evaluation	• UNDP-GEF-HQ • External consultants	40,000	At the mid-point of project implementation
Final external evaluation	• UNDP-GEF-HQ • External consultants	60,000	At the end of project implementation
Terminal report	• UNDP-CO	None	At least one month before the end of the Project
Lessons learned	• National Project Consultant	None	Annually
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	• UNDP-CO	Costed into project activities	As required
Total indicative cost *Excluding project team staff time and UNDP staff and travel expenses*		**100,000**	

Indicative monitoring and evaluation plan

	Year 1				Year 2				Year 3				Year 4			
	Quarter															
Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Inception report																
Annual Workplan (AWP)																
Annual Project Report (APR)																
Tripartite review (TPR)																
Project Implementation Review (PIR)																
Mid-term Evaluation																
Audit																
Final Evaluation																
Terminal Report																
Terminal Tripartite Review																

ANNEX 6:
PROJECT PARTNERS

ANNEX 6A: WORLD HEALTH ORGANIZATION ACTIVITIES AND BUDGET
ANNEX 6B: HEALTH CARE WITHOUT HARM ACTIVITIES AND BUDGET
ANNEX 6C: GREAT LAKES CENTER ACTIVITIES AND BUDGET

ANNEX 6A: WORLD HEALTH ORGANIZATION ACTIVITIES AND BUDGET

The World Health Organization (WHO)
The objective of the World Health Organization is the attainment by all peoples of the highest possible level of health. Health, as defined in the WHO Constitution, is a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity.

WHO and health-care waste management (HCWM)

WHO guiding policy principles
In view of the challenges represented by health-care waste and its management, WHO activities related to health-care waste management are oriented by the following guiding principles:

- preventing the health risks associated with exposure to health-care waste for both health workers and the public by promoting environmentally sound management policies for health-care waste;
- supporting global efforts to reduce the amount of noxious emissions released into the atmosphere to reduce disease and defer the onset of global change;
- supporting the Stockholm Convention on Persistent Organic Pollutants (POPs); and
- supporting the Basel Convention on hazardous and other waste.

Strategy
To better understand the problem of health-care waste management, WHO recommends that countries conduct assessments prior to choosing health-care waste management methods. Tools are available to assist with the assessment and decision-making process so that appropriate policies lead to the choice of adapted technologies. WHO proposes to work in collaboration with countries through the following strategies:

- support to countries in developing a national guidance manual for sound management of HCW;
- support to countries in the development and implementation of a national plan, policies and legislation on health-care waste;
- promotion of the principles of environmentally sound HCWM; and
- support to allocate human and financial resources to safely manage HCW.

This annex provides details of WHO's global and national activities in the Project and budget and co-financing details.

WHO activities on Project-related issues and co-financing

WHO activities on Project-related issues (not specifically in collaboration with the Project)	Duration	Associated-financing, (US$)
Headquarters		
Guidelines: Thirteen guidelines, policy papers, fact sheets and emergency response supports have been developed. Three more will be finalized in 2006. Headquarters was also involved in reviewing or contributing to a good number of documents from regional offices or HQ related to other health activities such as blood transfusion activities, HIV/AIDS, epidemics and emerging diseases.	2003-2006	180,000
Technical support to and in countries: Ongoing activity. HQ provides regions and countries with support on technical issues, activities, emergency responses and mass immunization campaigns.	2003-2009	100,000
Coordination meeting / partner network: A strong partnership remains a key component in bringing HCWM issues to the attention of high-level stakeholders and in ensuring that HCW is managed according to safety principles.	Ongoing activity	30,000
Health-care waste website: www.healthcarewaste.org and www.who.int/water_sanitation_health This tool provides users with access to databases, management options, case studies and technologies. It promotes practical, safe and sustainable solutions by providing practical information on HCWM options that are potentially suitable for developing country situations. It also provides country information, news, links and online documents.	Ongoing updates	20,000

WHO activities on Project-related issues (not specifically in collaboration with the Project)	Duration	Associated-financing, (US$)
Research and studies on technologies: In collaboration with partners, research is developed to create safe and affordable technologies for sound waste management.	Ongoing research	40,000
Relevant regional offices		
India (Southeast Asia)		
Provision of financial support and technical guidance for the development of the ten- volume curriculum for a first-ever regional distance-learning six-month certificate course, in close collaboration with the Indira Gandhi National Open University (IGNOU), India	2005	45,000
Preparation of guidance and posters on HCWM in emergency situations for India and all other tsunami-affected countries	2005	15,000
Provision of support to Maldives in developing a national HCWM strategy and training of all concerned health staff (60 people) in India	2005	40,000
Hosting of one annual regional HCWM seminar, training of 300 IGNOU students per year, provision of technical support to and in countries, and integration of HCWM into "Patient Safety" strategy	2006	20,000
Provision of ongoing technical support	2003-2009	120,000
Philippines (Western Pacific)		
Production of guidelines and documentation on HCWM ("Risks and Costs Associated with the Management of Infectious Wastes;" and "Overview of the Management of Health Care Waste in the Western Pacific Region")	2003	40,000
Provision of ongoing technical support	2003-2009	140,000
Egypt (Eastern Mediterranean) **Jordan (Eastern Mediterranean / CEHA - Centre for Environmental Health Activities)**		
Provision of ongoing technical support (5 months)	2003-2009	80,000
Production of regional guidelines	2005	10,000
U.S.A. (Pan American) **Peru (Pan American / CEPIS - Center for Sanitary Engineering and Environmental Sciences)**		
Provision of ongoing technical support	2003-2009	80,000
Provision of guidelines, training, software, information and consultant work for the analytical regional evaluation	2003-2005	15,000
Zimbabwe and Congo (Africa)		
Provision of technical support on immunization activities	On-going	30,000
Rome and Copenhagen (Europe)		
Implementation of pilot project on monitoring non-incinerating options (use of needle cutter, autoclaving and plastic recycling) in health-care facilities in Ukraine	2003-2005	50,000
Testing of the WHO HCWM Rapid Assessment Tool in Turkmenistan	2005	10,000
Testing of the WHO HCWM National Plan of Action tool in Moldova	2004	10,000
Participating countries		
Argentina		
Country assessment and information production for the regional evaluation reports and consultancy time	2003-2005	5,000
Analytical country report optimization, information training and consultant work	2005-2009	20,000
India		
Implementation of a WHO-supported project to strengthen HCWM in ten hospitals (non-burn technology-based supplies and training) in tsunami-affected areas in South India	2005-2006	80,000
Contribution to the development of national policies to handle wastes from immunization campaigns, in close collaboration with DFID and included in the RCH II programme, India	2006-2010	10,000
Development of guidance for the management of sharps wastes for measles campaigns, India	2006	10,000
Latvia		

WHO activities on Project-related issues (not specifically in collaboration with the Project)	Duration	Associated-financing, (US$)
Injection safety assessment, including waste management rapid assessment	2003	10,000
Lebanon		
Technical assistance and problem solving	2006-2007	5,000
Provision of expertise	2006-2007	4,000
Creation of training materials	2003-2004, and 2008-2009	11,000
Regional activities	2008-2009	10,000
Senegal		
Technical and administrative support	On-going	50,000
Philippines		
Technical and administrative support	On-going	70,000
Vietnam		
Technical and administrative support	On-going	70,000
Total		**1,430,000**

The activities listed below will be developed at the country level and will be supported by regional and national offices according to the offices' expertise and resources. Competency on health-care waste management does not always exist within national WHO offices; for this reason, the budget combines national and regional offices. The funds allocated to activities will be shared based upon which office provides support and the amount of time spent.

The allocation of co-financing will be based on technical support through human resources. This expertise will help in decisions such as the choice of technology, the choice of sites or the assessment of the project development. Some support through secretarial work will be necessary, as will logistical support throughout the Project's development to arrange meeting rooms, transport and, if necessary, the printing of documents. The Project will benefit also from existing health-care waste management training programs, such as the Indira Gandhi National Open University (IGNOU) training component in India, and from existing WHO guidelines and tools.

WHO Project-related activities, budget and cofinancing

GEF-related WHO activities	Project-supported activities 2006-2009 (US$)	Co-financing (US$)
Headquarters In Geneva the support to the overall Project will be directed to coordination meetings, help in research and allocation of potential external resources or co-financing, development of partnerships, facilitation of training sessions, dissemination of information, assessments, decisions on technically sound options, and maintenance of a coherent WHO intervention in the various Project components. Besides playing a coordination role, WHO Geneva also serves as a technical resource to regions and countries. • Participation in and facilitation of national workshops • Active participation in national meetings • Assistance and active involvement in training sessions • In-kind co-financing (technical support, logistical support, availability of WHO meeting room, etc.) • Follow-up in the implementation of activities	50,000 per year: participation costs (80%) activities (20%) **Total: 150,000**	Secretarial work: 2,000 per year **Total: 6,000** 5% x 1 person for additional technical expertise **Total: 57,000**

GEF-related WHO activities	Project-supported activities 2006-2009 (US$)	Co-financing (US$)
Relevant regional offices • Technical expertise and support in the Project development phase • Support in the allocation of resources • Support in the development of tools • Training facilitation and expertise • Dissemination of information	WHO country activities: 20,000 per year x 7 countries **Total: 420,000**	Secretarial work: 2,000 per year, per country **Total: 42,000** Technical support: 10,000 per year, per country workshop (30%) training (40%) production and dissemination of tools (10%) technical expertise in the selection of options (20%) **Total: 210,000** Logistical support (meeting room, transport, etc.) **Total: 32,000**
National activities • Technical expertise and support in the Project development phase • Technical support in the development of alternative technologies • Support in the allocation of resources • Support in the development of tools • Training facilitation and expertise • Dissemination of information • Networking with partners • Facilitation of potential co-financing • Oversight of the full GEF Project activities		Secretarial work: 2,000 per year, per country **Total: 42,000** Technical support: 5,000 per year, per country workshop (40%) training (40%) production and dissemination of tools (10%) technical expertise in the selection of options (10%) **Total: 105,000** Logistical support (meeting room, transport, etc.): 2,000 per year, per country **Total: 42,000**
Total	**Estimated grand total needed: 570, 000***	**Estimated co-financing for 3 years: 536,000**

** Please note that the total amount allocated to WHO activities INCLUDES the agency's 13% support cost fees.*

ANNEX 6B: HEALTH CARE WITHOUT HARM ACTIVITIES AND BUDGET

Health Care Without Harm (HCWH)
Health Care Without Harm is an international coalition of 443 organizations in 52 countries. HCWH's mission is to transform the health-care industry worldwide, without compromising patient safety or care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment.

HCWH and health-care waste management (HCWM)

HCWH Goals
To fulfill its mission, HCWH activities are oriented toward achievement of the following goals:
- the elimination of medical waste incineration in favor of safer non-burn treatment technologies;
- replacement of mercury in the health-care setting with non-toxic alternatives;
- minimization of the amount and toxicity of all waste generated;
- promotion of safer waste treatment practices; and
- the securing of a safe and healthy workplace for all health-care workers.

Strategy
As a Principal Cooperating Agency, HCWH will engage in the following global and national activities for this Project:
- assure engagement and participation of relevant NGOs in participating countries;
- provide technical support and expertise on best techniques and practices as well as mercury elimination;
- develop materials;
- disseminate Project results through its members and networks;
- work to replicate the Project's successes at national and regional levels during and beyond the Project timeframe; and
- work to assure continuity of the Project beyond the funding window.

This annex provides details of HCWH's global and national activities in the Project and budget and co-financing details.

HCWH activities, budget and co-financing for PDF A , PDF B and Full Project phases of the Project

HCWH activities	Duration	Budget (money to HCWH, US$)	Co-financing amount and type (US$)
PDF A activities HCWH led the writing and submission of the Concept Document. HCWH also funded travel and daily expenses for nine of the participants at the PDF A meeting.	2003	---	65,000 Cash
PDF B activities PDF B funding was approved in February 2005. HCWH funded all PDF B activities prior to this approval. These expenses included time and travel expenses of Mr. Jack Weinberg, Dr. Jorge Emmanuel, Dr. Glenn McRae and Ms. Firuzeh Mahmoudi for all Project activities from March 2003 through January 2005.	2003-2005	64,000	140,000 Cash
Direct engagement in Project activities • Provision of national support in planning, coordination, dissemination and monitoring and evaluation of Project activities in countries with HCWH membership or regional presence • Participation in and help convening national working groups and steering committees • Provision of HCWH expertise on HCWM and mercury reduction • Cross-fertilization of experiences between the GEF Project activities and other national and regional health-care waste management and sustainable hospital initiatives, and the building of synergy between these efforts • Provision of strategic support based on a decade of experience on changing waste management systems in the health-care sector (e.g.,	2002-2009	55,000 per year for 3 years **Total: 165,000**	280,000 In-kind

HCWH activities	Duration	Budget (money to HCWH, US$)	Co-financing amount and type (US$)
challenges, needs and ways to change) • Assistance with policy review of national and hospital-specific health-care waste policies • Provision of sister-program support to some of the model hospitals from key hospital members in the U.S. and Europe • Provision of expert guidance on technology and sharps container design for the Technology Development component • Assuming that the Project Coordinator/ Technical Advisor position continues in the Full Project to be based in the San Francisco Bay Area, HCWH will provide office space to the coordinator as a component of its in-kind co-finance for the Project.			
Dissemination and networking • Mobilization of NGO and health-care sector participation in the Project • Dissemination of information on Project activities and goals, Project outcomes, GEF-related training materials, nursing training programs and other information, both nationally and regionally • Presentation of GEF Project-related material, outcomes and activities at international and regional meetings, such as the Safe Injection Global Network (SIGN), Global Alliance for Vaccines and Immunization (GAVI), Strategic Approach to International Chemical Management (SAICM), CleanMed Europe, CleanMed US, UNEP Governing Council and other relevant governmental, intergovernmental and non-governmental forums • Organization of regional training workshops in Latin America, Southeast Asia, Eastern Europe, Africa and South Asia	2003 Onwards	20,000 per year for 3 years **Total: 60,000**	220,000 In-kind
Materials development and expertise • Development of training materials for the nursing sector • Development and sharing of methods for data assessment related to the Project • Development of resource materials on alternative health-care waste management technologies • Development of other relevant and collaborative reports and documents	2003-2009	15,000 per year for 3 years **Total: 45,000**	210,000 In-kind
Mercury • Hosting of mercury conferences in two or three of the GEF countries • Provision of expertise on mercury-free policies and practices in health-care institutions globally as well as nationally • Conduction of research on viable methods of disposal for mercury equipment in developing countries • Conduction of research on the viability and quality of non-mercury equipment in developing countries • Provision of support and materials for the purpose of debunking the perception held by health-care officials that mercury equipment is superior	2006-2009	35,000 per year for 3 years **Total: 105,000**	90,000 UNEP In-kind
Continuity • Work to assure continuity of the Project beyond the funding window • Work to replicate the Project's successes at national and regional levels during and beyond the Project timeframe.	2008 Onwards	15,000 per year for 2 years **Total: 30,000**	150,000 In-kind
Total		**405,000**	**1,315,000**

ANNEX 6C: GREAT LAKES CENTER ACTIVITIES AND BUDGET

The Great Lakes Center (GLC)
The Great Lakes Center (GLC) at the University of Illinois at Chicago Center for Global Environmental and Occupational Health is a National Institutes of Health Fogarty Centre for "International Research and Training in Environmental and Occupational Health." The Health Fogarty Centre engages in training, research, consultation and capacity-building activities with partner institutes around the world.

GLC and health-care waste management (HCWM)

GLC activities
To fulfill its mission, GLC activities include the following:
- helps realize the WHO Declaration of Occupational Health for All and the PAHO Regional Plan for Workers' Health as a WHO/PAHO Collaborating Centre in Occupational and Environmental Health;
- hosts Visiting Scientists from its partner institutes for training in the United States;
- supports collaborative conferences, symposia and workshops on occupational and environmental health throughout the world;
- chaired the training task force of the WHO Collaborating Center 2001-2006 Workplan and is currently the interim manager for the Education, Training and Technical Information Activity Area for the 2006-2010 workplan; and
- shares expertise in occupational and environmental safety and health, curriculum design, evaluation and delivering training programs. Over the past five years the GLC has conducted over 400 courses for almost 9000 participants on five continents. International experiences include a NATO conference in Ukraine and courses or conferences in Ukraine, Russia, Belarus, Bulgaria, South Africa, Turkey, Costa Rica, Nicaragua and Cuba and curriculum development projects with WHO-Geneva and ILO-Turin.

Strategy
As a partner in this Project, GLC will engage in the following activities:
- serve as a member of the Global Expert Team;
- assist with the modification and generalization of facility-level training courses as part of the model hospital program;
- assist with the development of a course on hazardous waste management for facility managers;
- assist with the identification of organizations and st.fructures for institutionalization and supporting implementation;
- assist in conducting training courses;
- assist in developing the toolkit for dissemination of the program; and
- participate in national conferences and program evaluation.

This annex provides details of GLC's global and national activities in the Project and budget and co-financing details.

GLC activities on Project-related issues, budget and funding sources

GLC activities on Project-related issues	Duration	Amount (US$)	Funding source(s)
Fulfillment of responsibilities as chair of the WHO Collaborating Center's task force on training and education portfolio, including curricula and training on hospital environmental health and safety issues	2002-2005	100,000	State budget
Curriculum development for WHO – "Introduction to Occupational Health" – including course on hospital health and safety	2002-2004	50,000 25,000	WHO NIOSH State Funding
Development of GEOLibrary, an internet-based resource to house and disseminate curricula on environmental and occupational health and safety issues	2004-2005	100,000	Fogarty Abbott U.S. Centers for Disease Control and Prevention (CDC) State Budget

Consultation on dioxin and mercury health issues in developing countries	2003-2005	40,000	State Funding
Participation on planning committee for PDF B	2005	15,000	State Funding
Participation in WHO Collaborating Center Network meetings	2005	20,000	NIOSH State Funding
Implementation and management of GEOLibrary	2005-2010	230,000	State Funding CDC NIOSH
Participation in Global activities related to hospital waste, dioxins and mercury reduction including the World Federation of Public Health Associations	2006-2010	40,000	State funding
Development of curriculum for hospital waste transporters	2006-2010	20,000	Foundation grant
Fulfillment of responsibilities as Manager/Deputy Manager of WHO Collaborating Centers 2006-2010 workplan "Activity Area 4: Education, Training and Technical Materials"	2006-2010	150,000	NIOSH State Funding CDC
Total		**615,000**	

GLC Project-related activities, budget and co-financing

GEF-related GLC activities	Duration	Budget (money to GLC from Project, US$)	Co-financing amount (In-kind, US$)
Support to Global Expert Team GLC will support the overall Project through participation in meetings, facilitation of training sessions, dissemination of information, assessments and replication. • Active participation in national meetings • Assistance in training sessions • In-kind co-financing (technical support, logistical support and faculty content expertise) • Follow-up in the implementation of activities	2007-2010	15,000	46,500
Outcome 1 • Consultation on development of health-care waste management plan with special focus on training component • Assistance in evaluation of demonstration project at model hospital	2007-2010	15,000	6,900
Outcome 5 • Creation of syllabus for Hospital Waste Management training course including target audience, competencies, objectives, delivery methods and assessment and evaluation • Identification of institutions to offer the program • Tailoring of course to fit mission of sponsoring institution and national needs • In conjunction with sponsoring institution, the piloting of the course for key personnel from health-care facilities • Finalization of course curriculum	2007-2008	50,000	50,000

GEF-related GLC activities	Duration	Budget (money to GLC from Project, US$)	Co-financing amount (In-kind, US$)
Outcome 7 • Work with DOE, DOH and NWG in developing a mechanism for dissemination by identifying "home" for dissemination • Development of information about importance of model program and ways to implement in facilities, for policy makers, hospital administrators and other health care providers, to include nature of problems as well as published studies validating technology recommendations, data and studies from other countries • Development of public information campaign • Development of a self-completion, guided workbook for program assessment and implementation • Development of curriculum for dissemination training and pilot dissemination of the model program manual and methodology through seminars, workshops and technical assistance	2007-2010	50,000	150,000
Outcome 8 • Inclusion of curricula, model program manual and guided workbook into GEOLibrary and listserve, making program and training materials available online at www.geolibrary.org • Creation of a hard copy of model program and guidebook for dissemination at school libraries or other appropriate local resources • Making materials available for purchase from DOE or DOH • Provision of information on communication channels • Leveraging of networks for disseminating model program information	2007-2010	20,000	211,600
Total		**150,000**	**465,000**

ANNEX 7:
REVIEWER COMMENTS

ANNEX 7A: WORLD BANK PDF B PHASE COMMENTS AND RESPONSE
ANNEX 7B: STAP REVIEW COMMENTS AND RESPONSE
ANNEX 7C: UNEP CONCEPT PHASE COMMENTS AND RESPONSES
ANNEX 7D: UNDP COMMENTS TO GEF SECRETARIAT: WORK PROGRAM ENTRY REVIEW
ANNEX 7E: COUNCIL MEMBER COMMENTS AND RESPONSES AT FULL PROJECT ADMISSION

ANNEX 7A: WORLD BANK PDF B PHASE COMMENTS AND RESPONSE
The World Bank, Global Environment Facility Operations
MSN MC4-419, 1818 H Street, N.W., Washington, DC 20433
December 08, 2004

Comment	Response
Overall Assessment of Project Design and Objectives	
Comment 1. While we believe the Project addresses an issue of major global concern, namely the reduction of dioxins, furans (D&F) and mercury emissions from improper disposal of healthcare waste (HCW), the proposal is overly ambitious in its scope, and its goals will be difficult to achieve. The approach presented tends to oversimplify the complexity of achieving adequate management of HCW, even at the single hospital level. The Project proposes to put in place separation and waste reduction programs at the national and regional levels, with a goal of ultimately decreasing D&F and mercury emissions. While reducing emissions would indeed be a great achievement, the preliminary step of developing efficient HCW management at a national level would be, in itself, a tremendous accomplishment. This will require: a. Policy changes, development and implementation of legal and regulatory framework for the management of HCW, and designation of responsible agencies (e.g. Ministries of Health, of Environment, Municipalities, etc.). b. Investments in training and development of national guidelines for HCW management and training of staff at healthcare facilities and staff at agencies or firms that provide waste management services (e.g. collection and disposal). c. Investments in equipment and infrastructure, including, but not limited to bags, bins and containers, safety gear, storage areas for waste at healthcare facilities, collection trucks, waste treatment equipment, landfill sites. d. Management training and incentives: engaging the management of healthcare facilities in HCW management initiatives is critical to their success. Close supervision and monitoring of staff performance is also paramount. e. Cost-recovery considerations: the feasibility of waste disposal methods and technologies, as well as their long-term sustainability are tightly linked to the effectiveness of their financial arrangements. Municipal versus private sector arrangements for waste management service provision, and costs of services need to be set up in order for HCW management systems to be effective.	The proposed approach and expected outcomes are explicitly designed to establish successful pilot programs and models in specific facilities or clusters of facilities. These pilot programs will demonstrate best practices relevant to local and national contexts and work to ensure that Project outputs are achieved. National dissemination will take place through specifically identified policy and educational channels. The investigation under the PDF B phase has not only identified a more consistent and user-friendly set of tools, guidance materials and standards produced internationally (e.g., by WHO and international aid agencies), but has also been instrumental in identifying and nurturing expertise beyond the Global Expert Team that will be enlisted in the full Project. The technical experts engaged by the Global Expert Team in the PDF B phase represented a wealth of experience in training, systems design, technology selection and HCW management on an institutional and policy level that allowed for discernment of and planning for the complexity of Project elements. This expertise is reflected in the composition of the Global Expert Team for the full Project, and in the composition of the NPSCs and NWGs in participating countries. In India and the Philippines in particular, there are already enough people with on-the-ground experience in "achieving adequate management of HCW" at the level of a single hospital, as well as in immunization campaigns and other activities, to sufficiently guide further development of the Project and ensure long-term sustainability. Full details on how the Project will successfully address the complexity of achieving adequate management of HCW are detailed in the full proposal. Specifically, however, policy change is addressed in Component 6; the development and implementation of legal and regulatory frameworks for the management of HCW are addressed in Components 6 and 7, Outcome 6 and 7, and Outputs 6 and 7; investments in training and development of national guidelines are addressed in Components 5-7, Outcome 5, and Output 5; investments in equipment and infrastructure are addressed in Components 1-3, Outcomes 2-4, and Outputs 2-4; and cost-recovery considerations are addressed in Components 2 and 3.

Comment	Response
Comment 2. Focusing on seven countries of such varying contexts and development levels may provide a diverse range of experiences and lessons-learned that can later be replicated in other countries. However, at the same time, it will limit both the financial and human resources available to effectively carry out Project objectives and may reduce the overall impact and success of the Project. A more gradual approach that considers individual countries may be easier to coordinate and supervise, and therefore ultimately more effective.	The PDF B activities undertaken to develop the Project provide an excellent template on which to build systems to track, manage and adequately resource the many activities in each individual country. As the nature of the Project is that of a global demonstration project, the seven principle countries were selected to provide the best basis for learning and demonstration. These national examples will serve as a global resource, drawing widely applicable lessons from a diverse set of cultures, languages, scales and development levels. The management experience from the PDF B phase has provided a solid base of experience that will reduce the cost and time burdens of coordinating such an enterprise, and the plan for use of web-based communications, information and resource sharing, distance learning and consultative activities will allow for an efficient expenditure of resources to reach the desired results. The partnering of HCWH and WHO as principal cooperating agencies brings a valuable set of global and local collaborators to the participating countries that the Project will not have to replicate.
Technical background	
Comment 3. It would be beneficial to define what exactly is understood by waste separation, and how this will lead to the decrease of D&F and mercury. It is clear that HCW needs to be separated into risk and non-risk waste. However, will the Project only concentrate on the treatment of the separated fraction of risk-waste (as defined by WHO standards) or will it also consider the treatment of non-risk HCW? Will the Project recommend additional separation of non-risk waste in countries where all HCW is incinerated?	The technical aspects of the Project in establishing best practices at model facilities, as described in Component 1, follow WHO standards and guidance on proper waste management that clearly identify waste segregation as a critical component in waste management processes as a means to limit risks to workers and releases of environmental pollutants. The identification and provision of non-combustion treatment for the infectious waste component will have a significant impact on reducing the creation of D&F as an unintended consequence of treatment of wastes from health care. Similarly, the identification and segregation of wastes containing mercury, and the proper handling and disposal of materials that do not allow for releases to waste water or to the air through vaporization or combustion, will significantly decrease the contribution of health-care activities to global mercury pollution. As noted in Component 4, a holistic approach to waste management will be developed that will start with an evaluation of procurement policies and materials management so as to reduce or eliminate those materials that are used in health care that contribute to the release of mercury. This approach will be followed by management efforts stressing careful segregation and waste management, and will be further encompassed in wider waste treatment approaches that reduce these releases. With regards to "non-risk" waste, principles of waste minimization, environmentally preferable procurement, source reduction, recycling, reuse, composting, etc. will be applied and, where available, sanitary landfill sites will be employed.

Comment	Response
Comment 4. Healthcare facilities do not typically treat their waste on site, unless they are sufficiently large. The provision of waste management services (i.e. collection and disposal) is thus a responsibility of the municipalities or of the private sector, depending on country's regulations and on the specific arrangements made by healthcare facilities. Separate collection and disposal are not always guaranteed, and therefore achieving effective waste management at the healthcare facilities does not necessarily ensure that the waste will arrive separated at the disposal/treatment point. The proposal only focuses on emissions from healthcare facilities and should also consider other scenarios of HCW treatment.	The connection of health-care facilities to a municipal or private sector waste collection, treatment and disposal system varies from country to county. In some countries or regions, treatment and disposal of all wastes onsite is not an uncommon practice, as observed during the PDF B phase investigation. As a result, the Project is designed, in part, to explore and develop models that respond to existing infrastructure (or lack thereof) that includes onsite management, treatment and possible disposal options, as well as waste reduction activities. For example, in Argentina and the Philippines, treating infectious waste onsite and rendering them non-infectious allows treated waste to be collected and disposed of as domestic waste. In Lebanon, mobile treatment systems will treat waste onsite at multiple locations using one treatment unit while achieving the same results as a permanently installed onsite system. This will be complemented in other parts of the country where the infrastructure allows collection and centralized treatment in an alternative treatment system. In addition, models will be established that incorporate both private sector and municipal services that collect, treat and dispose of waste off-site for multiple facilities in both rural and urban settings. (See Table 1. Model facilities, under Project Rationale.) The Project focus on the review and development of new national guidelines and regulations, as addressed in Component 6, will also include this provision for offsite collection, treatment and disposal in order to ensure further that a framework is established for countries to move toward an infrastructure that supports proper management of wastes from health care. Examples of this developing infrastructure supported by new regulatory regimes were noted in the investigations pursued in most of the countries during the PDF B phase.
Comment 5. Finally, the proposal presents a general objective of eliminating practices of incineration from future HCW management projects of all implementing agencies (page 14). This is not a pertinent objective, nor is it recommendable. While the use of batch HCW incinerators with no emissions control should be controlled and ultimately stopped, recommending an end to HCW incineration, with no analysis of the context, the technologies, or the alternatives, is misleading.	The Project intends to demonstrate that the practice of burning HCW is not necessary to ensure that public health goals are met, and that viable alternatives, established under very diverse conditions and contexts, are available and may be adopted to replace these practices. The purpose of a Global Demonstration Project of this kind is to support a comprehensive contextual analysis, ensure access to and information about appropriate technologies, and provide the education necessary to make this broader goal achievable. When the demonstration project is finished, and when its results are available and analyzed, the global community will be in a better position to further evaluate and contextualize the circumstances under which HCW incineration may or may not be considered to be "recommendable." Undertaking this Project in numerous countries in different regions and at different stages of development will add to the usefulness and global applicability of the results.

Comment	Response
Specific questions on the establishment of model facilities	
Comment 6. Estimates of D&F emissions will likely be made through the use of UNEP's toolkit. Will the toolkit be sufficient to capture a potential decrease in D&F releases as a result of the Project?	During the baseline assessments at the start of full project implementation, estimates of dioxin and furan emissions at the model facilities will be made using actual activity rates and emission factors based on data from technical reports and published scientific papers, rather than on the more generalized emission factors in the UNEP Toolkit. Selection of emission factors will be based on equipment type, various design parameters, throughput capacity, types of air pollution control devices, operating parameters, etc., in order to closely match the emission factors of existing sources. Even though no actual testing of dioxins and furans will be carried out due to the cost of testing, the use of more accurate emission factors should provide good estimates of decreases in dioxins and furans at the facility as the result of the Project. It should also be pointed out, however, that the main objective of the Project is not to reduce all dioxin and furan emissions from health care in the country. Rather, the Project is intended to demonstrate barrier reduction leading to replication of best environmental practices and technologies in facilities nationwide. While the implementation of best environmental practices and technologies at the facility level will result in reductions of dioxins and furans at the local level, the widespread replication of these practices and other barrier reduction strategies, such as national training programs and information dissemination, have the potential of producing even greater decreases in dioxin and furan releases nationwide.
Comment 7. Will the initiatives at the selected hospitals be coupled with work with the municipalities or with the private sector, such that HCW management outside of the healthcare facilities is also considered? There is a strong possibility that after the staff of a given hospital has undergone training and has managed to decrease the volume of risk waste produced, the lack of waste management service provision (either municipal or private) will ultimately result in risk and non-risk wastes re-mixed at collection and disposal.	Multiple models involving municipalities and the private sector will be established. Many of these models will incorporate systems that are in place through municipal or private sector structures, including transportation, treatment and disposal of wastes. In some cases, the Project will also work with centralized HCW management facilities. (See Table 1. Model facilities, under Project Rationale.)

Comment	Response
Comment 8. Selection and deployment of waste treatment technologies (as suggested in Activity #7) should not be done on a hospital basis but should be done as an integrated approach for the town, or the city in question. This will avoid the need to provide each facility with equipment for treatment of their waste and with resources for training of staff and operation of equipment. Centralized treatment facilities, or private sector HCW treatment companies are in a large majority of cases more economically and technically feasible than the distribution of waste treatment equipment to individual healthcare facilities. Distribution of equipment on a city-wide or national basis is not feasible nor sustainable.	There are a wide variety of contexts in which models will be established. As suggested, where local and regional infrastructures allow, the economies of scale for regional treatment facilities will be leveraged. Model facilities may in fact be regional treatment centers, especially for small institutions in geographically contiguous areas in which there is no municipal or private sector alternative. In more rural or isolated areas, onsite treatment and disposal using lower cost but effective treatment technologies may prove to be the most sustainable. During the PDF B stage of investigation, examples of many different approaches already being explored were catalogued and evaluated in designing the model approach under Component 1. (See also Table 1. Model facilities, under Project Rationale, for the variety of approaches proposed.)
Comment 9. Is there an estimate of the expected duration of this first component?	The establishment of the model facilities is scheduled to be completed in the first year of the Project. The model system will be refined, further developed and monitored and evaluated throughout the remainder of the Project. (See the Project Activity Timeline and Workplan in Tables 9 and 10.)
Specific question on training	
Comment 10. WHO has regional training facilities and has developed training materials on HCW management tailored to each region. These should be used as much as possible to avoid duplication of efforts and wasted resources in the development of additional materials, as suggested in Activity #2.	As a principle cooperating agency of the Project, WHO has helped to identify resources for training in the participating countries. WHO materials and guidance documents provide the primary resource for establishing relevant training models in each of the various country contexts, allowing for continuity in curricula while accommodating specific national and regional differences. As addressed in Component 5, training activities will be grounded in locally or nationally recognized facilities. Support for all of these activities will be provided through the WHO collaborating center at the University of Illinois in order to ensure that quality and proper evaluation are incorporated into this component.
Specific questions on the incorporation of the Project experience into national awareness, training and policy	
Comment 11. Although the stakeholder approach presented is appropriate to create national awareness and to develop country-level policy, it will likely not be sufficient to achieve results at the hospital level, and therefore to ultimately lead to emission reductions. Experiences in many countries have shown that national guidelines and procedures do not suffice to reduce the amounts of HCW produced by healthcare facilities, or to achieve consistent waste separation results. Healthcare facilities in developing countries often have difficulties implementing the simplest three-bin-separation method for risk and non-risk waste, unless there is close supervision and strong commitment from management and staff. Incentives may need to be built in to the programs, to encourage healthcare facilities to participate.	Component 1, on the establishing of model facilities, Component 5, on the establishing of training programs and Components 6 and 7, on the setting of national policy, will all address incentives in order to ensure that best practices are adopted and implemented. The experience of countries that have achieved some of the Project goals (e.g., countries of the European Union as well as the United States) shows that a combination of incentives and requirements built in over time are necessary to ensure that practices will change and be sustained. The Project specifically seeks to incentivize and encourage deeper participation through the following methods: incorporate training and education into the established curriculum at medical and nursing schools; establish, where appropriate, certificates in health-care waste management that might be tied to employability and income enhancements; and develop national standards and regulations that reinforce and require that these practices become standard both within hospital facilities and throughout the waste management infrastructure.

Comment	Response
Comment 12. The group of stakeholders proposed does not include representatives from environmental regulatory agencies, from municipal service provision agencies, or from private sector companies involved in HCW collection and treatment. Representatives from these sectors need to be included in the discussions, to ensure that all steps of HCW management are taken into account. The participation of these groups will act as an incentive to management of healthcare facilities in cities where separate collection and disposal of HCW is not guaranteed.	The stakeholders that were identified in the PDF B process of establishing National Working Groups and National Project Steering Committees include representatives from environmental regulatory agencies, municipal service provision agencies and private sector companies involved in HCW collection and treatment. For the full Project, the TOR for the National Project Steering Committees and the guidance for the continued work of National Project Working Groups will explicitly include these entities.
General Comments on PDF B Proposal	
Comment 13. It is not clear whether funds will be provided to cover the costs of staff, at the country level, working on the implementation of Project preparation activities. PDF B funds assigned to cover the costs of the Global Expert Team (1 Global Project Coordinator/Technical Advisor, 2 Advisors and 2 Global Technical Consultants) are clearly shown in the budget table, but no information is given on the cost, or on the source of funds for the Country Project Expert, the Government Experts and the Project Consultants. Although it is understood that in-kind counterpart funds will be used to partly cover the costs of the Country team, without a concrete budget, it will be challenging to achieve progress in Project activities.	In each participating country, national experts received compensation in the range of eight to fifteen thousand USD to complete the national activities. This rate was designed to pay for six months full-time equivalence of work. Further, all Project-related costs incurred by national and government experts were paid through Project funds. Similar support will be provided during the implementation phase of the Project.
Comment 14. Project preparation activities are based on inputs expected from a National Steering Committee (NSC), composed of high-level government representatives, and from a National Advisory Committee (NAC), which will include technical advisors. No budget is shown in the proposal for financing meetings of these committees. The NSCs will likely meet to finalize policy-level discussions, but it is to be expected that these high level representatives will not have the time to meet on a regular basis to provide inputs for the Project. On the other hand, members of the NACs will also likely have full schedules, and unless some budget is assigned to these meetings, they will probably not take place with the frequency needed to move forward Project preparation activities. Finally, country Project teams, unless adequately supported will not have the capacity to conduct all the activities planned, in particular, those involved with activities in the pilot healthcare facilities (determination of baselines, monitoring and supervision).	As discussed in the response to Comment 13, time and costs of national and government experts were covered directly by the Project during the PDF B phase. Further, all meeting, conference and travel expenses incurred by the Project stakeholders in the NPSC and NWG were paid using Project funds.

Comment	Response
Comment 15. The travel budget for the Global Expert Team (roughly 40% of the cost of PDF B activities) could be significantly reduced and the funds could instead be used to build up local capacity to carry out planned activities.	The GET agrees that Project funds would be most effectively spent in resource and capacity development at the national level. Travel expenses of the GET comprised less than 7% of the overall PDF B budget. All airplane tickets purchased for GET travel were basic economy class in order to keep travel-related costs to a minimum.
Comment 16. No activities have been designed to integrate future Project components to municipal or national waste management strategies. It is proposed that D&F and mercury emissions from healthcare facilities at the national level in the seven countries considered will be reduced (and eventually eliminated) by promoting sound HCW management and final treatment methods that do not involve combustion of the waste. It is not feasible to equip every healthcare facility with non combustion treatment technologies for its waste, nor would it be of priority or even desirable. It is therefore suggested that PDF B activities include the development of terms of reference for feasibility studies that can be conducted in cities around the seven countries, to determine the most cost-effective method of HCW treatment and final disposal, which would include an evaluation of public versus private sector involvement. In order to develop sustainable solutions to HCW disposal, these terms of reference should also include financial analyses (e.g. willingness to pay, cost-recovery and others) that would need to be evaluated alongside the most viable technical options.	Both the national and global expert teams acknowledge that the success of the Project is dependent on full and thoughtful integration of Project activities with relevant municipal waste programs. Regardless of the HCWM systems and technologies used, the final disposal and transportation of HCW remains the responsibility of the municipal waste sector. Thus, in all participating countries (except Tanzania), relevant members of municipal and national waste management programs are involved in NPSCs and/or NWGs. In Argentina, India, Lebanon, Senegal and Vietnam, private and public municipal waste handlers are Project partners. (In Tanzania, the Project activities are limited to technology development and thus do not require participation with national stakeholders.) Further, the Tanzania component was specifically included in the Project to address the mentioned challenges in Comment 16 and to develop viable cost-effective technology options appropriate to the needs of sub-Saharan Africa.

ANNEX 7B: STAP REVIEW COMMENTS AND RESPONSES

Ed Krisiunas, MT(ASCP), CIC, MPH
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March 13, 2006

1. General Overview
This proposal is the culmination of years of trial and error at addressing Health-care Waste Management issue and their impact on the environment. While the term culmination implies an end, it also conveys a sense of moving on to another phase. That is in fact what this proposal presents. The next steps and phases that need to be implemented are presented in very good detail and with extensive objective rationale. Additionally: a. A tremendous amount of groundwork has already been laid in the countries that will be participating. It is exciting to read of the progress made as well as the issue still at hand. Therefore, this project is well out of the starting blocks and the momentum needs to be continued. b. The proposal does a very good job of identifying and stratifying the issues. This is clear when reviewing the various Outcomes and Outputs. Especially important items include the implementation challenges and assumptions and risks. This perspective could only have been gained from actual field work. This perspective already allows the project participants to be thinking of methods to minimize risk, many of which are provided in the proposal. c. The proposal identifies importance of the replacing mercury containing devices with equally or better products that will improve patient care as well as reduce pollution to the environment. We know certain practices are engrained within the healthcare industry and objective scientific information needs to be provided for new devices to have buy-in from the end user. d. The inclusion of a technology development component, specifically in Tanzania is a very positive personal, professional and national enhancing aspect to the proposal.
Comments: No response necessary.

2. Specific comments, observations and questions	
STAP Comments	**Responses to STAP Comments and Corresponding Changes in the Document (in bold)**
a. Examples of successful programs in locations other than the United States and Western Europe Reference is made to comparable successful programs in the United States and Western Europe. While the issues and challenges can in fact be very similar in the locations as well as in the countries selected for this project, the one overriding difference is the level of income. The United States and countries of Western Europe are considered high income while the project deals with low to middle income countries. Can reference be made to other low to middle income countries with successful programs? This would provide better realistic examples and applications.	Four examples are provided here. In Durban, South Africa, groundWork (an NGO affiliated with Health Care Without Harm) has worked with rural and semi-rural hospital institutions for the past five years to address health-care waste management. groundWork assisted facilities in conducting needs assessments and identified several key facilities with whom to collaborate to create health-care waste management models to demonstrate for other institutions. At each model facility, groundWork obtained the support of top management, involved staff in the development of the model system, worked with a key employee to ensure change within the facility and monitor progress, and consulted with municipal officials. groundWork helped develop institutional policies, provided training, facilitated deployment of an on-site autoclave treatment unit, and made sure that health-care waste management received a sufficient budget annually. The New Delhi-based NGOs Srishti and ToxicsLink have been supporting health-care facilities regarding health-care waste management problems since 1996. The NGOs identified the leading administrator whose influence and authority could produce successful policy and systemic change. This key person also ensured the implementation of good practices and the resulting economic benefits to the hospital. The NGOs also

2. Specific comments, observations and questions	
STAP Comments	**Responses to STAP Comments and Corresponding Changes in the Document (in bold)**
	worked with medical and nursing staff, encouraged a team effort, helped develop regular and tailored training programs for personnel, and worked with the Delhi Pollution Control Committee and private vendors. A recycling program for scrap material was initiated. Today these hospitals have good established health-care waste management systems because of their ongoing commitment since the late 1990s. In the Philippines, a successful model for management of sharps waste from a mass immunization campaign was demonstrated in 2004. The Philippine Measles Elimination Campaign generated an estimated 19.5 million syringes nationwide, collected in 162,000 safety boxes in a little over a month. The model system entailed development of a guidebook, micro-planning, training, storage and transport, treatment in autoclave or microwave technologies and/or cement encapsulation or burial. The results were documented in nineteen sites representing urban areas, urban poor communities, rural areas, remote villages, mountainous areas, indigenous communities, coastal towns and small islands. About 406,300 children were vaccinated in the nineteen sites. A report on the collaboration of HCWH and the Philippine Department of Health, with the cooperation of WHO-Philippines, is found in: http://www.noharm.org/details.cfm?type=document&id=926 In Uttaranchal in the Himalayas, the Himalayan Institute Hospital Trust (HIHT) has developed a successful model for sharps waste management in remote rural areas. Sharps waste is generated during immunizations and other health services provided to poor communities in remote mountainous areas in Garhwal, Kumaon and other villages. The waste is collected in reusable metal sharps containers. The containers are then brought to the main 750-bed hospital in Uttaranchal where they are treated in a locally manufactured autoclave. The treated waste is then shredded and the shredded parts are allowed to fall into a bin filled with water. The water separates the plastic pieces which float to the top while the metal pieces fall to the bottom. A scoop is used to recover the materials and the plastics are taken to a plastics fabrication plant in India for recycling, while the shredded metal pieces are buried. HCWH visited the site and obtained data on their system which will be used as a model in the Project.
b. National Consultants / Oversight For the National Consultants, their efforts will be very imperative to the continued forward movement and success of this project. The selected individuals tasked with this job need to clearly understand their roles and responsibilities and be committed to this project for the term selected.	The National Consultants are indeed key to the success of the Project. The Terms of Reference will specify the duration of work and potential consultants' commitment to the Project will be evaluated as much as possible. It is possible that some of the national consultants will already be familiar with the Project through prior involvement during the PDF B phase. At the start of the Project, a meeting of National Consultants and the Global Expert Team is planned to ensure that the roles and responsibilities are clearly understood.

2. Specific comments, observations and questions	
STAP Comments	**Responses to STAP Comments and Corresponding Changes in the Document (in bold)**
c. Incentives The use of "incentives" is mentioned several times throughout the document. However, these incentives are not described in any detail i.e. monetary award, job promotion, supplies etc. The types of incentives may vary based upon local conditions and social norms. It is recommended to include some examples of what the incentives will be.	The specific forms of incentives on the local and national levels will vary in each country and according to a specific level of intervention. Individual incentives will be very important in some countries. An example of this might be the designation of individuals as environmental champions and recognition by their peers. Recognition of environmental champions in an award ceremony, coverage in local media or institutional communication forums, annual designation of environmental champions and engraving their names in a plaque, letters of acknowledgment from upper management, etc, are all techniques that might be applied. Some facilities may choose to provide financial incentives in the form of bonuses or monetary awards. Obtaining a certificate after the successful completion of a training program could provide an incentive for individuals to gain a basic competence in health-care waste management. In some countries, the certificate may be linked to future promotions or higher salary levels. The website for this GEF Project could also be used to highlight individuals and describe their accomplishments as another specific incentive. For health-care institutions, the specific acts leading to cost savings as a result of waste minimization, proper management and increased regulatory compliance will provide another type of incentive. Similarly, reductions in nosocomial infections and in occupational injuries due to proper waste management are added incentives to participate for infection control and safety officers as well as health workers in general. In regions where health-care tourism is emerging, market definition as "environmentally friendly institutions" may prove to be important. In the process of forging relationships with "model" facilities and networks, many of these incentives have been discussed and already built into the rationale for institutional participation in the program.
d. Health-care waste – Diagram of specific categories The document provides several flow diagrams related to various issues i.e., Page 14, Figure 1. Problem Analysis Tree to Indicate Cause-Effect Relationships for Challenges Faced. There is extensive detail related to the subject matter in each of the diagrams. Would it be possible to include a diagram of the categories of Health Care Waste being discussed in this project? They are not very well defined and a simple diagram could be included.	A simple diagram (Figure 3) showing the general categories of health-care waste and providing examples within each category has been added to the section "Alternative Systems Approach" of the Project Document.

2. Specific comments, observations and questions	
STAP Comments	**Responses to STAP Comments and Corresponding Changes in the Document (in bold)**
e. Competing projects This is more of a recommendation. Efforts should be taken by National Consultants to be aware of projects funded by other entities that could compete with the effort of this project. It seems unlikely given the existing infrastructure and efforts to date. However, there have been situations where international development banks from different countries fund a project that is similar in design and content to others already underway.	One of the tasks of National Consultants during the PDF B phase was to investigate other related projects including projects of multilateral lending institutions and development agencies, explore possible synergies and avoid duplication with the GEF Project (see Annex 2). This task will continue to be part of the job function of National Consultants during the Full Project implementation.
f. Comments of the World Bank and response I concur with many of the comments and perspectives of the World Bank. There is a response on page 133 to a World Bank comment which discusses the approach to managing the "non-risk" wastes. The reply is still too broad in its attempt to specifically answer the question. If the scope of the project intends to cover the universe of healthcare waste (identification, segregation, and disposal/treatment), then it needs to be clarified or stated as such. Or it needs to be stated that this is limited to certain aspects of healthcare waste (infectious, chemo and path waste) and mercury containing material as the alternative technologies mentioned are used primarily for infectious waste. Some additional clarification may be needed at the beginning of the proposal. The remaining responses, with the exception of the items mentioned in this review are very appropriate and address the concerns of the World Bank. The extensive groundwork clearly provides a better vision of the way forward.	In general, with the possible exception of wastewater or sewer discharges, the Project will cover the universe of health-care waste at the facility level with regards to identification, minimization, containment, segregation, handling, on-site storage and transport. For non-risk wastes, the Project at the facility level will also cover recovery, reuse, recycling and disposal as appropriate. For infectious and pathological waste, the Project will include treatment and disposal. However, for chemotherapeutic waste, an alternative technology will be tested and demonstrated only in Argentina. Except for chemotherapeutic waste in Argentina, treatment and disposal of the small amounts of hazardous chemical waste from health care will depend on existing laws and available infrastructure for storage, treatment and disposal. Facility-level training and national training programs will include information on the proper management of the universe of health-care waste. **An explanation of health-care waste categories addressed by the Project has been added to section "Alternative Systems Approach" of the Project Document.**

2. Specific comments, observations and questions	
STAP Comments	**Responses to STAP Comments and Corresponding Changes in the Document (in bold)**
g. Financial resources A very important element of this project will be the availability of financial resources to sustain various components that need to be implemented. Not to lessen the importance of the support and buy-in of all stakeholders, the reality is a strong long-term financial resource will more likely carry this project forward towards fruition.	The overall budget, including co-financing, should provide sufficient financial resources to implement the various components for the duration of the full Project. The portion of GEF funding, however, will decrease during the second half of the Project as local and national stakeholders raise the funds necessary to sustain the work in the long term. In some cases, the funds will come from budget allocations by local or national governments as well as by health facilities, a commitment that will be reflected in the MOUs. In other cases, such as central treatment facilities operated by the private sector, the revenue stream from providing treatment services will sustain the activities. Where appropriate, recommended policies and regulations will incorporate provisions to generate financial resources to sustain various Project components such as the national training program. During the last year of the Project, assistance will be provided to seek other sources of funds to ensure sustainability.
h. Health-care waste management – A genuine priority The most challenging aspect of this project will be for each country to view Health-care Waste Management as a genuine priority. In these low and middle income countries issue of waste management will compete with a host of issues including but not limited to the delivery of healthcare services with limited supplies, limited or unskilled healthcare professionals, social and political issues. It would be prudent to further contemplate and include within this proposal what methods could be employed to in fact attract the attention and interest of the waste producer (healthcare provider) and the public instead of pursuing them for their attention. This is the genuine challenge.	The challenge of other competing needs and priorities is well recognized and acknowledged. The participation of local and national stakeholders in Project planning and implementation will help preserve the interest and commitment of health providers. Working with representatives of the Ministries of Health and Environment in the National Project Steering Committee will help maintain a high priority for health-care waste management which could be reflected in national policies, plans and budget allocations. Training and national dissemination, such as a national conference, are components of the Project which would lead to greater awareness and interest among health workers and policy-makers. As a result of their involvement in the National Working Group, environmental and health NGOs could influence public discourse and policy towards keeping a high priority on health-care waste management. During the early part of the Project, public education through announcements and media releases, where appropriate, could also attract public attention to the problems related to health-care waste. It is important to note that a good health-care waste management system could help address some competing needs, such as infection control, health worker safety and environmental protection.

3. Conclusions
With the above items incorporated and/or considered in the proposal, this project for reducing Health-care waste to avoid environmental release of dioxins and mercury is well constructed and thought through. I strongly support allowing it to move forward.
Comments: No response necessary.

ANNEX 7C: UNEP CONCEPT PHASE COMMENTS AND RESPONSES

Comment	Response
With relevance to the Stockholm Convention and thus, to dioxins and furans:	
Countries have just started to develop their National Implementation Plans. Therefore, the national release inventories for dioxins (and furans) are not yet quantified; Based on the outcome of the national release inventories and other considerations, the action plan on dioxins and furans has to be established. It needs to be seen if hospital waste management/incineration comes out as a priority in these countries;	All the governments participating in the Project are Parties to the Stockholm Convention and have agreed to implement this Project in close consultation with their Stockholm National Implementation Planning committee. All participating countries that have completed their NIP have identified HCWM as a top priority (see below). For more information please refer to Annex 2. **Argentina** is currently in the inventory stage, and the NIP will be completed in December 2006. Health-care waste management (HCWM) is an identified high priority, and the final plan will include language encouraging the use of non-burn technologies for waste treatment and disposal. **India** is in the process of developing an NIP. No information is available at present. The **Latvia** NIP currently estimates that health-care waste incineration accounts for only 2% of dioxin and furan emissions in Latvia air, but this estimate will likely be revisited during Project implementation. During development of the NIP, there was a lack of information on the contributions by the health sector and health sector representatives were minimally involved because of a reorganization taking place. The NIP includes tasks to reduce POPs emissions from fires in waste disposal sites, promote recycling of POPs sources and introduce technologies at POPs emission stationary sources. In **Lebanon** NIP, health-care waste incineration has been listed first among several industries with the potential for relatively high formation and unintentional release of PCBs as a result of thermal processes involving organic matter and chlorine. Geographic areas located around incinerators, specifically hospitals equipped with incineration facilities, are listed as one of two hotspots for dioxin and furan emissions. In the **Philippines** NIP, hospitals are listed among sectors identified as potential POPs sources, specifically as potential sources of dioxins, furans and PCBs. The sectors on this list are all potential beneficiaries of National Implementation Plan strategies. In **Senegal**'s NIP, incineration of health-care waste is identified as a source of unintentional POPs release. The NIP establishes the goal of reducing unintentional POPs emissions from the burning of medical, municipal and industrial waste by half in the next five years. Health-care waste incineration is named among the sources of dioxins and furans in **Tanzania**. **Vietnam** has identified HCWM as a key priority in its NIP. Heath-care waste management (HCWM) to minimize unintentional POPs release is identified as an urgent and high priority, included in the period from 2006 to 2010 in the implementation roadmap. The program on HCWM is number four of fifteen key programs in the plan.
The Secretariat of the Basel Convention has developed guidelines for hospital waste management, which have been adopted by the Conference of the Parties. These	The Basel Convention guidelines have been reviewed and incorporated into the Project document and plans.

Comment	Response
must be taken into account;	
Guidelines and guidance on BAT and BEP are not yet available. The Stockholm Convention INC6 has established an Expert Group on BAT and BEP, which will develop such guidance for the Conference of the Parties. These guidelines will provide the overarching framework for addressing dioxin/furan releases from such facilities;	The Project is consistent with the draft Guidelines on best available techniques that were considered at Stockholm COP1. It is noted that Stockholm COP1 (in decision SC-1/19) recognized the usefulness of those draft guidelines, and decided that it encourages Parties: "*to take the draft guidelines and provisional guidance into consideration, where practicable and feasible, in the development of action plans and other activities related to unintentionally produced persistent organic pollutants*." The Project Team will remain informed of developments within the current Stockholm Expert Group on BAT and BEP noting that its recommendations will not be considered before Stockholm COP3 in 2007. (One member of the team is a member of that EG.) The team will assure that any relevant new emerging views on the EG will be reflected in Project implementation. Many countries participating in the Project consider improving their health-care waste management systems to be a matter of some urgency and prefer to take actions consistent with the draft guidelines than to defer action, or to proceed along the baseline scenario that will likely make it more difficult in the future to conform to Stockholm Guidelines. Parties are obliged to require BAT for new or significantly modified medical waste incinerators at the latest, four years after entry in force of the Convention. For many, this will be May 2008. One purpose of this demonstration project is to develop new information based on practical experiences in a developing country context that Parties can take into account in deciding how to fulfill their obligations. To delay approval of this Project until after Stockholm COP3 would, therefore, decrease the value of the intended Project outputs. The Basel Secretariat is invited to be part of the Global Project Steering Committee. At the Third Session of the Stockholm Convention Expert Group on BAT/BEP meeting in Tokyo on 11-16 October 2004, developing countries expressed concern regarding the difficulties in meeting BAT/BEP standards with regards to health-care waste management due to lack or inadequacy of capacity and technology. Direct reference was made to this Project: We note with interest the Global Environment Facility (GEF)/United Nations Development Programme/World Health Organization Medical Waste Management demonstration project under development, and we encourage the GEF, its implementing agencies and others to support and rapidly initiate much more work in this area. This would be greatly facilitated by developing countries making the related BAT/BEP issues an important part of their National Sustainable

Comment	Response
	Development Strategies.
With relevance to Mercury:	
There are no reliable estimates of the quantities of mercury emitted from this source category in these countries, and so the relative importance of mercury emissions from these sources is quite uncertain.	Significant efforts have been made during the PDF B phase of the Project to gather data on mercury emissions from the health care sector. Please see Annex 3B.
The major agencies identified in this project proposal are UNDP and WHO and an NGO (HCWH). It should be noted that UNEP has the mandate to address releases of dioxins and furans (UNEP Governing Council decisions 19/13(c) and 22/4(II)), to assess mercury pollution and to provide technical assistance and capacity building activities to support the efforts of countries to take action regarding mercury pollution, (UNEP Governing Council Decision 22/4 V, February 2003, UNEP Chemicals), and to address hazardous waste, including medical waste (Secretariat of the Basel Convention). Yet UNEP has not been identified as a participant in this project proposal. If this project proceeds ahead, UNEP must be involved, as a member of the Global Steering Committee, Global Expert Team, and/or other roles, as appropriate.	UNEP is invited and strongly encouraged to become a fully participating member of the Project Steering Committee. In January 2006, UNEP Chemicals co-sponsored with HCWH and the Philippine Department of Health (DOH) a South-East Asia Conference on Mercury in Health Care (which is considered to be a co-financing event for this Project). In this instance, one appropriate role for UNEP in the Project was found. The Project Team is very open to working with UNEP to identify other useful roles it may wish to play.
GEF funding of projects of such size should require that the beneficiary countries are Parties to the Stockholm and Basel Conventions.	All participating countries are Parties to the Stockholm and the Basel conventions.
A concentrated and concerted joint effort is necessary to address the environmentally sound management of health care materials/practices and wastes that should involve ALL relevant UN organizations and address a cradle-to-grave approach starting with acquisition of goods and materials to be brought into a hospital, through the application/use phase until final disposal or reuse. The management of these wastes must address environmental issues, but even more importantly, it must provide safe and effective decontamination of infectious materials to prevent spread of disease.	The Project invites UNEP, the Stockholm Convention Secretariat and the Basel Convention Secretariat to participate in the Project Steering Committee. WHO and UNDP are already actively participating. The only other UN organization that might be considered to be relevant is UNIDO. UNIDO too would be welcome to join and participate. The Project utilizes a cradle-to-grave approach starting with acquisition of goods and materials to be brought into a hospital, through the application/use phase until final disposal or reuse. The Project addresses environmental issues and provides safe and effective decontamination of infectious materials to prevent spread of disease. In all the above regards, the Project will implement state-of-the art practice.
With regard to mercury, UNEP has started a new	There is an urgent global need to strengthen the political will to reduce Hg emissions, as indicated

Comment	Response
Mercury Program that will initially focus on awareness raising, capacity building, data gathering, information sharing, the identification of priorities, and related activities. It may be premature to start a major effort to address one sector of sources of mercury emissions until we get a better understanding of the priorities of various countries and regions for addressing mercury, and how best to address these sources. In particular, it is not at all clear from the concept that mercury release from these sources is even an issue, and if so whether there is either a connection with pollution of international waters or a priority compared with the countries' other mercury sources.	by the fact that governments have made no binding commitments to date. The health sector has been shown to be receptive to campaigns towards Hg pollution prevention and is therefore one good starting point. UNEP, apparently, has reached a similar conclusion in that it agreed to co-sponsor and to help fund the Mercury in Health Care Conference as indicated above. As long as the health sector does not address its own Hg releases, efforts to obtain the support of the health community for broader national and global endeavors regarding mercury pollution would be undermined. On the other hand, engaging the health sector towards Hg elimination in health care would build technical expertise, create advocates that could bolster the political will of countries, and increase support for global Hg reduction activities. Thus, even though Hg emissions from health care are of smaller significance compared to other sources, the attendant benefits of engaging the health sector could be considerable.
Detailed Comments:	
The project is put under the main objective to "minimizing the generation of health care waste" (para 7; para 9.2 – Alternative). Without proper caveats and explanation, this is a dangerous statement since the reduction of waste generated from clinical operations could result in an increase of infections, transmittable diseases, *etc.* In the sector of hospitals and related activities, the first principle of waste management practices, namely to reduce wastes at the source, does not apply. The protection of the health of personnel and the protection from infections should be the primary goal of all operations. Obviously it is very important to ensure that syringes, gloves, and other potentially infectious materials are not reused. Promotion of reuse can pose serious problems in the health care sector (para 7). Minimizing waste from this sector is a worthy goal, but it must be achieved without increased risks of infection.	There is growing international concern about health-care wastes as a source of bloodborne pathogens and other infectious agents. Proper treatment of infectious health-care waste must be part of a facility-wide systems approach to waste management. The objective "minimizing the generation of health care waste" is always understood to mean that this will be done consistent with good patient care and consistent with best practices in infection control. This is stated several times in the Project Document. Any proper facility-wide HCWM system effectively addresses infection control. Moreover, a HCWM structure within a facility necessarily involves and is often led by the infection control officer. If properly segregated, roughly 15% of waste produced at health-care facilities is infectious waste. By segregating and minimizing the amount of waste that needs to be treated as infectious, personnel end up handling smaller amounts of infectious waste. The reduced volume of infectious waste makes it more manageable and allows personnel to focus attention more effectively on exposure reduction. Proper HCWM also means segregation of sharp waste in puncture-resistant or puncture-proof containers. Although roughly only 1% of HCW by volume, sharps are responsible for an estimated 90% of disease transmission from HCW. Often, prior to the establishment of a HCWM system, sharps are disposed with all other waste and can protrude from plastic garbage bags and other containers. Rigorous segregation and containment reduce chances of needle-stick injury and other exposures. In short, proper HCWM decreases exposure to bloodborne pathogens. Infectious waste is never recycled or reused. The remaining 85% of waste, that is non-infectious and non-hazardous, could be recycled or reused. Source reduction, when coupled with segregation, can also reduce infectious waste. For example, packaging waste (including cardboard), which is the largest single component of the health care waste stream, is often discarded with infectious waste.

Comment	Response
	Good procurement practices can result in products with less packaging. Combining source reduction and segregation minimizes the overall amount of waste as well as the volume of infectious waste. Inventory control and proper storage are also aspects of source reduction. For example, minimizing the amount of expired or spoiled vaccines through good inventory control and storage reduces the amount of potentially infectious waste and hence, the potential for exposure. Thus, waste reduction and infection control can and often are accomplished as twin goals. In sum, good health-care waste management practices include all of the following components: pollution prevention; waste minimization; correct classification and segregation; proper containerization and color-coding; safe handling and collection of waste; labeling and signage; and proper storage, transport and final disposal of waste. Priority in this Project will be given to pollution prevention and waste minimization, the latter entailing environmentally preferable procurement practices, source reduction, material substitution, safe reuse, recycling and composting of waste where possible.
Section 7.3.3 states that the release of dioxins and mercury will be reduced though application of new management, training and technology options. However, in the proposal there are no examples given on what concrete actions or changes the releases will be based on.	Please see Section 2 of the Project Document: Project Rationale and Objectives.
In section 10, under Outcome B: What does it mean to "certify" experts. How would an appropriate training and certification program be established? Who would be the authority providing such program?	For overall information on "certification programs", please go to Table 6: Logical Framework of Overall Project Strategy and Table 9: Project Activity Timeline and Workplan. For country-specific information on "certification programs" please see Annex 1: Country-Specific Project Components and Table 10: Country-Specific Activity Timelines and Workplans.
Section 10: It is likely that various equipment, building construction, air pollution control technologies, and other capital will be needed to achieve the overall goals of emissions reductions. Have the costs of this capital been considered in the development of the proposal? How will these substantial costs be addressed?	Costs of necessary equipment, construction, and technologies have been included in the Project budget. The budget and the co-financing can adequately fund these costs.
Minor Editorial Comments:	
Section 10, paragraph 4, 2nd sentence: Mercury is not "produced." The word "production" should be changed to "emissions" or "releases".	Noted and incorporated into the current Project document.
Section 7.3, paragraph. The fourth sentence should be revised as follows: "Mercury affects the nervous system and is particularly harmful to the fetus and young children"	Noted and incorporated into the current Project document.

ANNEX 7D: UNDP COMMENTS TO GEF SECRETARIAT: WORK PROGRAM ENTRY REVIEW

Country/Region:	Global (Argentina, India, Lebanon, Philippines, Senegal, Vietnam, Latvia, Tanzania)
Project Title:	Demonstrating and Promoting Best Techniques for Reducing Health-care Waste to Avoid Environmental Releases of Dioxins and Mercury
GEFSEC Project ID:	1802
UNDP Project ID:	2596
Operational Program:	14
Implementing Agenc(ies):	UNDP
Anticipated project financing ($ million):	PDF $ 0.72 / GEF Project Allocation $ 10.33 / Total Project Cost: 24.60
Target Work Program Date:	May 2006
Program Manager:	Laurent Granier
IA Contact Person:	Suely Carvalho

GEF SEC Review Comments	UNDP-GEF Responses to GEF SEC Review Comments
1. COUNTRY OWNERSHIP: Endorsement	
I can't find the endorsement for Tanzania.	The endorsement from Tanzania was provided on April 26th, 2006.
2: PROGRAM AND POLICY CONFORMITY: Program Designation and Conformity	
Eligibility of the Hg component needs to be further elaborated.	The Project aims to demonstrate and promote replication of best environmental practices and techniques for health-care waste management and to reduce barriers to national implementation of these strategies. During project preparation it became clear that, an additional, low-cost benefit could be achieved by incorporating a mercury component into the project, thereby reducing releases of this substance in tandem with the dioxin reductions. This would be accomplished by reducing the quantity of broken mercury-containing devices improperly discarded or burned by health care institutions/providers, thereby contributing to the broader goal of minimizing the amount of health-care waste generated and limiting the amount of waste burned in medical waste incinerators. The concern raised by the GEF Sec regarding possible ineligibility is understood - mercury is not a POP. The project has been submitted under GEF Operational Program (OP) #14 on POPs, with linkages to OP #10 on International Waters to acknowledge the mercury component. The mercury elimination component of the proposed project represents US $384,000 of the total project budget. UNDP has explored the possibility of funding the mercury component activities with co-financing generated for the project. Unfortunately, given the complex project structure, and its related complex financial structure, this option will not be feasible. A second possibility could be to secure bilateral co-financing to support the project's mercury component. UNDP has initiated contact with a possible bilateral donor. A concern with regard to this approach rests on the fact that bilateral co-financing agreements, should UNDP be successful in

<table>
<tr><th>GEF SEC Review Comments</th><th>UNDP-GEF Responses to GEF SEC Review Comments</th></tr>
<tr><td></td><td>securing a commitment, can often take time to negotiate and may lead to delays in approval of a project.</td></tr>
<tr><td>The significance of Hg emissions seems smaller (1%?), which in fact justifies the emphasis on unintentionally produced POPs in this project, Hg reduction being almost a "side-benefit" with low additional cost.</td><td>There is an urgent global need to strengthen the political will to reduce Hg emissions, as indicated by the fact that governments have made no binding commitments to date. The health sector has been shown to be receptive to campaigns towards Hg pollution prevention and is therefore a good starting point. As long as the health sector does not address its own Hg releases, efforts to obtain the support of the health community for broader national and global endeavors regarding mercury pollution would be undermined. On the other hand, engaging the health sector towards Hg elimination in health care would build technical expertise, create advocates that could bolster the political will of countries, and increase support for global Hg reduction activities. Thus, even though Hg emissions from health care are of smaller significance compared to other sources, the attendant benefits of engaging the health sector could be considerable.</td></tr>
<tr><td>However small, it would be good to have an estimate of the actual direct UPOPs/ Hg reduction expected from the detailed description of the type of management options and interventions that will be undertaken.</td><td>Estimated Reductions at Local Model Facilities, Clusters and Programs Due to Project Intervention
<table>
<tr><th>Country</th><th>g TEQ / yr</th><th>kg Hg / yr</th></tr>
<tr><td>Argentina</td><td>0.71</td><td>2.7</td></tr>
<tr><td>India</td><td>32</td><td>170</td></tr>
<tr><td>Latvia</td><td>0.21</td><td>1.7</td></tr>
<tr><td>Lebanon</td><td>1.8</td><td>2</td></tr>
<tr><td>Philippines</td><td>0.61</td><td>1.3</td></tr>
<tr><td>Senegal</td><td>0.44</td><td>0.95</td></tr>
<tr><td>Vietnam</td><td>2.8</td><td>2.4</td></tr>
</table></td></tr>
<tr><td colspan="2">2: PROGRAM AND POLICY CONFORMITY: Monitoring and Evaluation</td></tr>
<tr><td>The section on "key indicators of success" should be strengthened. It would be desirable to include some sort of results table with a limited number of quantitative or semi-quantitative indicators and targets, including baseline data, to facilitate the later judgment as to whether or not the project is a success and why.</td><td>Please refer to Table 8.</td></tr>
<tr><td>The table for M&E workplan looks comprehensive but includes too many "responsible parties". To be meaningful, that column should only list the main "Party" responsible for the particular M or E activity, not all the people involved.</td><td>Please refer to the modified table: Annex 5.</td></tr>
</table>

<table>
<tr><th>GEF SEC Review Comments</th><th>UNDP-GEF Responses to GEF SEC Review Comments</th></tr>
<tr><td colspan="2">3. FINANCING: Financing Plan</td></tr>
<tr><td>Cost-effectiveness should be strengthened. As it is, we have a statement that this is a cost-effective way to reduce releases of unintentionally produced POPs.</td><td>Cost-effectiveness calculations were conducted using annualized costs per annual reduction in UPOPs emissions. These calculations are based on generic simulations corresponding to 5,448 beds. These calculations are provided in order to inform the readers. During the Full Project implementation, actual cost computations will be documented.

Cost Effectiveness of Alternative Treatment Systems
<table>
<tr><th>Technology and Cost Comparison</th><th>Cost Effectiveness (in $/g TEQ reduced)</th></tr>
<tr><td>A. Comparison of Technologies and Practices:</td><td></td></tr>
<tr><td>High-Tech Incineration With Best Practices</td><td>3192</td></tr>
<tr><td>Alternative Treatment Technology With Best Practices</td><td>1300</td></tr>
<tr><td>B. Comparison of Technologies Only:</td><td></td></tr>
<tr><td>High Tech Incinerator</td><td>2200</td></tr>
<tr><td>Alternative Treatment Technology</td><td>300</td></tr>
</table>
Notes: Calculations were based on waste from a cluster of health facilities corresponding to 5,448 beds. Annualized costs include direct costs (labor, utilities, maintenance, disposal, consumables, and other operating costs) and indirect costs (capital recovery, overhead, administrative and other fees). Part (A) above includes the costs of developing and maintaining model facilities employing best practices (e.g., segregation and waste minimization) and takes into account the reduction in the amounts of waste that need to be treated as a result of best practices. Section (B) compares only the annualized costs of imported technologies for the same amount of health-care waste to be treated. Costs of the alternative technology were based on an autoclave-shredder system. In countries where the alternative technology will be locally manufactured (e.g., Philippines and Tanzania), installed capital costs of alternative technologies would be lower and consequently, alternative treatment systems would be even more cost effective. In all cases, the baseline used for calculating UPOPs emission reduction was a cluster of health facilities corresponding to 5,448 beds wherein all health-care wastes (with no segregation) are burned in an uncontrolled incinerator with no pollution control, as is done in many developing countries.</td></tr>
<tr><td colspan="2">5. RESPONSE TO REVIEWS: Other IAs and RDBs</td></tr>
<tr><td>WB comments are appropriately responded to. I can’t find response to UNEP comments.</td><td>Please refer to Annex 7C.</td></tr>
</table>

ANNEX 7E: COUNCIL MEMBER COMMENTS AND RESPONSES AT FULL PROJECT ADMISSION JUNE AND JULY 2006

UNITED STATES
Comment
#73: Global ($10.33m), (Argentina, India, Lebanon, Philippines, Senegal, Vietnam, Latvia, Tanzania) UNDP Demonstrating and Promoting Best Techniques and Practices for Reducing Health-care Waste to Avoid Environmental Releases of Dioxins and Mercury. Project appears to express preference for non-incineration technology. Should be best and cheapest technology to achieving purpose. Is this something that could be changed?
Response
The purpose of the Project is to demonstrate the effectiveness of non-burn health-care waste treatment technologies, waste management practices and other techniques to avoid environmental releases of dioxins and mercury in seven countries. Project activities will include (see Project Document Page 2), inter alia, "demonstrating viable and cost-effective alternatives to the processes and practices that lead to the release of POPs." To directly answer the important question raised by the United States, the approaches that this Project will demonstrate will be cheaper and better than approaches utilizing medical waste incineration assuming the following are taken into account: 1. The specific circumstances of the countries and the health care facilities where Project activities are planned to occur; and 2. The understanding that in making cost comparisons, only waste incinerators that can reasonably be considered as meeting Stockholm Convention BAT requirements will be used as a basis for comparison. The Project addresses avoidance of dioxin releases in the context of implementing obligations under the Stockholm Convention on Persistent Organic Pollutants. It is a global demonstration Project whose design and GEF-eligibility are based primarily on the following Stockholm Convention Provisions: • The Convention (Annex C) lists medical waste incinerators as what it terms a "Part II Source Category." Facilities in the category are considered to have the potential for comparatively high formation and release of dioxins. • Article 5 paragraphs (d) and (e) instruct Parties to require Best Available Techniques for new medical waste incinerators, and to promote Best Available Techniques and Best Environmental Practices for all medical waste incinerators. • Article 5 (c) encourages Parties to promote the development of substitute or modified processes to prevent the formation and release of dioxins. • Annex C, Part V (A) addressing general guidance on Best Available Techniques and Best Environmental Practices, states that priority should be given to the consideration of approaches to prevent the formation and release of dioxins. • Annex C, Part V (B) (b), addressing Best Available Techniques instructs Parties that when considering proposals to construct new facilities or significantly

modify existing facilities using processes that release dioxins, priority consideration should be given to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of dioxins.

- Annex C, Part V (A)(f) states that when considering proposals to construct new waste disposal facilities, Parties should give consideration to alternatives such as activities to minimize the generation of medical waste, including resource recovery, reuse, recycling, waste separation, and promoting products that generate less waste.

The non-combustion technologies this Project will demonstrate do not generate or release dioxins to the environment. They are alternatives that should receive priority consideration over incinerators insofar as they are cost-effective, available, safe, and provide similar usefulness.

The Project, however, does not focus on technology alone. Only about 25% of the total GEF resources used in this Project across seven countries will be for the purchase and deployment of technologies. This is less than what one might pay for a single, large-scale central incinerator in one country that might arguably be considered in compliance with Stockholm Convention BAT obligations. The Project puts heavy emphasis on establishing training and management systems whose outcomes will be: to minimize the total waste generated; to efficiently separate potentially infectious wastes from ordinary wastes; and to promote resource recovery, reuse, recycling, and products that generate less waste.

World experience (including experience in the United States) demonstrates that to build and operate a medical waste incinerator with strict controls on dioxin formation and release is costly; and to retrofit an old incinerator to satisfactory dioxin-release standards has generally been cost-prohibitive.

On page 11, the Project Document notes that, for example, in 1988, the number of medical waste incinerators in the United States was estimated at 6,200. By 2004, the number had dropped to 111. As of August 2006, the total number was 72 medical waste incinerators for the whole country. The number in the United States continues to fall, mainly because of cost considerations associated with operating a medical waste incinerator to standards that minimize dioxin formation and release. At the same time, the utilization of autoclaves and other non-combustion methods for treatment of medical waste has greatly increased, based largely on cost-considerations.

Most countries participating in the demonstration project have already made national decisions to move away from the incineration of medical waste for environmental and other reasons. These countries have decided to participate in this Project to help them effectively implement their national decision consistent with good health care practices and consistent with meeting their Stockholm Convention obligations.

Some participating countries are still considering the pursuit of several options. These countries are participating in the Project to get practical experience in the approaches the Project will demonstrate in order to help them better understand what approaches work best in their country consistent with Stockholm Convention obligations.

Finally, it should be recognized that while the Project provides practical assistance to the participating countries, it was designed to be a global demonstration project. One important Project output will be to generate good data and information on the costs and effectiveness of the approaches the Project will demonstrate across countries of different regions and at different states of development. This will enable developing countries and GEF Implementing and Executing Agencies to base future decisions related to healthcare waste management on a better understanding of the costs and effectiveness of different approaches.

The data, information and experience that will be produced by this Project will be very important. Poorly-controlled incineration and open-burning of medical

waste is a widespread practice in many developing countries; it has been actively promoted as necessary to prevent the spread of diseases. Many countries have identified this to be a significant national dioxin source in their Stockholm Convention dioxin inventories. Therefore, it is anticipated that the GEF will receive numerous requests for assistance from eligible countries to help reform current health care waste management practices to make them compliant with Stockholm Convention obligations. We expect the experience garnered by this Project to be very helpful in enabling us to respond to such requests in ways that are most practical and cost-effective, consistent with Stockholm Convention obligations and consistent also with the needs of patient care and infection control.

FRANCE

Comments

67. Global (Argentina, India, Lebanon, Philippines, Senegal, Vietnam, Latvia, Tanzania): Demonstrating and Promoting Best Techniques and Practices for Reducing Health-care Waste to Avoid Environmental Releases of Dioxins and Mercury.

GEF Agency: UNDP
GEF Financing: US$ 10,330,000
Duration: 4 years

The project is proposed by 8 Parties of the Stockholm Convention on POPs and is aiming at the development and the promotion of non- incineration equipments and materials in the case of health-care waste management. This approach is in line with article 5 (c) of the Stockholm Convention which gives priority to the promotion of the development and, where it deems appropriate, the requirement of the use of substitute or modified materials, products and processes to prevent the formation and release of the chemicals listed in its annex C. Medical waste incineration belongs to priority source categories identified in the Stockholm Convention ("part II" category).

The project will focus on the deployment and evaluation of appropriate commercially available technologies (except in the case of Tanzania where low-cost technologies will be targeted). Moreover the alternative techniques listed in the Annex 4 of the project document are very close to the BAT and BEP developed by the Expert Group on BAT/BEP under the Stockholm Convention. Argentina, Latvia and the Philippines are actual members of this Expert Group, which should result in an optimal consideration of the Expert Group work into this project.

The proposed methodology is a bottom-up approach which seems very relevant to fulfill the objectives. The first part of the project deals with the establishment of model facilities using BAT/BEP. Nominative hospitals or clinics (associated with alternative techniques) are already identified in each country, which is a very good starting point. On this concrete basis, capacity-building programs, national policies reviews/updates and results dissemination for awareness- raising will be achieved. This part of the project is very ambitious; however the proposed management arrangements should ensure an efficient progress of the work.

The different baselines in each country are well described, as well as the risk of a "business as usual" scenario (i.e. growing trend toward the combustion of wastes in very bad conditions: open burning or poorly performing incinerators). In the case of a BAU scenario, releases of dioxins are expected to continue at an estimated 187 g / year. This should be confident estimations as at least half of the countries (Argentina, Vietnam, Lebanon, and the Philippines) were first users of the PCDD/Fs toolkit developed by UNEP. On the whole, countries proposing this project have a high level of awareness of PCDD/Fs issues at least at the institutional level. To give another example, Senegal is hosting COP3 of the Stockholm Convention.

Favourable opinion.
Response
No response necessary.

GERMANY	
Comment	**Response**
Comments received from the German Council member indicated support for the project without any need for further comment or clarification.	No response necessary.

SWITZERLAND	
Comment	**Response**
From our point of view, some of these indicators are until now too general to be appropriate for project monitoring. For instance, a 50% reduction of overall waste at those facilities that do not currently practice segregation does not necessarily minimize the amount of dioxin and mercury indicated in the project proposal. Specific indicators for these releases should be included and the real values measured with spot checks.	While actual measurements of dioxins would have been ideal, the Project team decided that using measurements of dioxin reductions as indicators was too expensive due to the high costs of dioxin sampling and testing. Measurements of mercury in random samples of waste bags pose a hazard due in part to the need to open infectious waste bags (either for vapor sampling or visual inspection) which could result in aerosolization of pathogens. For these reasons, indirect indicators are proposed. For example, measurements of waste reduction through segregation reflect the level of segregation in the facility, which in turn gives an indication of the extent that mercury is kept out of the waste stream leaving the facility. Or if mercury is eliminated in a facility, it should not show up in the waste stream. The Project will take into account the interconnection of outputs and the indicators will be cross referenced and evaluated as a whole. Thus, segregation is a first-level indicator, which will be evaluated in relation to training (e.g., specific knowledge indicators of workers) and material substitution (e.g., replacement of mercury-containing devices or PVC-containing substances through procurement).
Comment	**Response**
Furthermore, the installation of one alternative treatment technology in all countries as indicator does not prove its effective and efficient operation. This has to be considered with specific quantitative indicators.	Noted and incorporated into the project document. (see 1 below)
Comment	**Response**
Moreover, the indicator for training programs should be adjusted. The counting of participants in training courses is simple but an increase of the number of personnel trained on best practices in HCWM is no guarantee for the use of proper methods. Indicators targeting realized improvements in e.g. hospitals are more result-oriented	Noted and incorporated into the indicators for Outcome 1 in the project document. (see 2 below)

SWITZERLAND	
and more appropriate to measure the outcome.	
Comment	**Response**
Also, the indicators regarding policy improvement remain so far rather vague and are not quantitative. The initiation of a policy dialogue in a certain country is hard to measure. If national governments are involved it is likely that policy dialogue will result in revised or further developed policies that can be measured quantitatively.	Noted and incorporated into the indicators for Outcome 6 in the project document. (see 3 below)
Comment	**Response**
From the project description it is unclear why so far only dioxins and mercury are included in the minimization program. Other substances such as chemotherapeutic, pharmaceutical or radioactive medical waste, should also be considered if they have a significant environmental impact. This evaluation should be done in fact during a preliminary investigation. … It is very welcome that not only POPs are considered, but that the program also focuses on mercury as a toxic substance. However, we suggest that all other problematic components of health-care medical waste should also undergo a preliminary evaluation to show their contribution to the overall environmental impact of health-care waste.	The section on Alternative Systems Approach specifically includes chemical and radiological wastes (paragraphs 1 and 4, and Figure 3), and mentions in particular pharmaceutical waste (paragraph 1) and chemotherapeutic waste (paragraphs 6 and 10). These other waste streams are considered in the initial baseline assessment and in the minimization activities of the Project. While reductions and better management of these other waste streams are an added benefit of the Project and will be tracked and documented, the reduction of dioxin and mercury releases is the central focus of this demonstration project and the basis for evaluation of its success.
Comment	**Response**
However, by using wet thermal treatment systems (e.g. steam autoclaves) instead of incineration methods for bio-hazardous waste (pathogenic agents) the detoxication of organic substances in pharmaceutical waste (expired drugs), chemotherapeutics, laboratory waste etc. is not guaranteed. Also, chemical treatment methods, as e.g. hydrolysis, can not handle all remaining categories. It would therefore be reasonable to combine both non-incineration and incineration methods for separated waste treatment. From that point of view, standardization of technologies for specific waste streams would be an asset. Other options at the national level for the use of existing	Except for the treatment of chemotherapeutic waste in an alternative technology in Argentina, treatment and disposal of the small amounts of hazardous chemical waste from health care will depend on existing laws and available infrastructure for storage, treatment and disposal in each country. Laws and regulations dealing with hazardous chemical waste are generally separate from medical waste laws and guidelines. Many developing countries do not as yet have the laws, infrastructure, and technologies in place to treat hazardous chemical wastes, such as expired drugs or spent laboratory solvents, in a manner consistent with the requirements under the Stockholm Convention. In countries where such systems exist, the Project will evaluate and utilize the existing technologies where appropriate. Where they do not exist, such approaches as "return to manufacturer," safe long-term storage, immobilization, or encapsulation options will be considered.

SWITZERLAND	
alternative incineration capacities in the countries involved are not yet mentioned. Cement kilns could handle some of the waste categories and eliminate a significant amount of hazardous organic compounds, even chlorine containing substances, if operated at an adequate temperature level. … National or even local conditions in the countries will definitely influence the way how waste is finally treated and should be considered. Alternative technologies and their owners who could prove their environmentally sound operation, such as e.g. cement companies, should be considered.	
Comment	**Response**
The dissemination of the information gained during the project phase to other developing countries or countries in transition, this in a pursuit to reduce the global impact of the substances addressed, is not yet clearly addressed in the project, but should be specifically included in the program.	The dissemination of information from the Project to other developing countries and countries in transition is Outcome 8 and is described in Tables 6 and 7.
Comment	**Response**
Against the background that the development, purchase and implementation of new and adjusted non-incineration technology are rather sophisticated, the allocation of only 37% of the total project budget (Table 12) to these activities seems to be underestimated.	Installation and equipment costs for alternative technologies were based on past price quotes. Except for the advanced steam systems and alkaline hydrolysis, the standard waste autoclaves are relatively inexpensive, have simple designs, and do not entail sophisticated installation, commissioning and operation. The budget and the co-financing can adequately fund these costs.

1 – Under Table 8, for #2, 3rd column, a footnote has been added that reads: "Fully operational means that (1) all infectious waste is treated in the treatment technology before leaving the facility, (2) infectious waste is rendered non-infectious as shown by four consecutive weekly tests following the standard protocol for microbial inactivation efficacy, and (3) the treatment technology is operating daily or at the normal duty cycle for at least three months."
2 – Under Table 8, for #1, 3rd column, the first bullet point now reads: "Policies requiring best practices existing in all model facilities, including training requirements and measurable goals."
3 – Under Table 8, for #6, 3rd column, the first bullet point now read: "All participating countries have initiated dialogue on national health-care waste management policies, as indicated by at least one meeting or conference involving key policy-makers and stakeholders"

NOTE: These changes can be found on pages 56-57 of Project Document.

SIGNATURE PAGE
[Note: leave blank until preparing for submission for CEO endorsement]

Country: _____

UNDAF Outcome(s)/Indicator(s): _____
(Link to UNDAF outcome., If no UNDAF, leave blank)

Expected Outcome(s)/Indicator (s): _____
(CP outcomes linked t the SRF/MYFF goal and service line) _____

Expected Output(s)/Indicator(s): _____
(CP outcomes linked t the SRF/MYFF goal and service line) _____

Implementing partner: _____
(designated institution/Executing agency)

Other Partners: _____

_____

Programme Period:_____
Programme Component:_____
Project Title:_____
Project ID: _____
Project Duration: _____
Management Arrangement: _____

Total budget: _____
Allocated resources: _____
- Government _____
- Regular _____
- Other:
  - Donor _____
  - Donor _____
  - Donor _____
- In kind contributions _____

Agreed by (Government): _____
Agreed by (Implementing partner/Executing agency):_____
Agreed by (UNDP):_____

Notes:

UNDAF Outcome and Indicator(s)
The signature page details the UNDAF outcome(s) as well as the Outcome(s) and Output(s) related to the project. If the UNDAF lists outcomes, they should be included in the signature page. When UNDAF outcomes are not clearly articulated, country teams may decide to either revisit the UNDAF to clarify the outcomes or leave the field blank.

UNDAF Outcome indicators should be listed here.

Expected Outcome(s) and Indicator(s)
Expected Outcomes are Country Programme (CP) outcomes. They should reflect MYFF/SRF outcomes and ACC sector, which will be in the ERP).

Outcome indicator(s) should be listed here.

Expected Output(s) and Indicator(s)
Expected Outputs are Country Programme outputs. They should reflect MYFF/SRF outputs.

Output indicator(s) should be listed here.

Implementing partner:
Same as designated institution in the simplified project document – name of institution responsible for managing the programme or project (formerly referred to as executing agency). Implementing partners include Government, UN agencies, UNDP (see restrictions in Programming Manual Chapter 6) or NGOs.

Other partners:
Formerly referred to as implementing agencies in the simplified project document—partners that have agreed to carry out activities within a nationally executed project. This would include UNDP when it provides Country Office Support to national execution. Private sector companies and NGOs hired as contractors would generally not be included. The agency (i.e. Government, UN agency) that contracts with the private sector company and/or NGO is the responsible party. 'Other partners' can also apply to other execution modalities.

When an NGO contributes to an output, it can be noted along with the responsible party with which it contracts (e.g., UNDP/NGO, Govt/NGO). Consistent with current practice the rationale for selecting an NGO as a contractor, must be documented.

Programme period: Refers to the Country Programme period

Programme component: MYFF Goal

Project title, project code, project duration (self explanatory)

Management arrangement: Indicate NEX, AGEX, NGO Execution, DEX

Budget: Total budget minus the General Management Services Fees

General Management Services Fees: This was formerly COA (Country Office Administrative fee) for cost sharing and UNDP Administstative Fee for Trust Funds.

Total budget: Includes the budget and General Management Services Fees. In-kind contributions can be listed under 'other' resources. Unfunded amounts cannot be committed until funds are available.

Signatures:
The Implementing partner is the institution responsible for managing the programme or project. (The institution now commonly referred to as the "executing agency" but will now be referred to as the "implementing partner")

UNDP is the UNDP Resident Representative.

The Government counterpart is the government coordinating authority.