



# **Inception Workshop of Environmentally Sustainable Management of Medical Wastes in China**

## **Conference Documents**



**Stockholm Convention Implementation Office  
State Environmental Protection Administration**

**Beijing, China**

**19<sup>th</sup>~20<sup>th</sup> March, 2008**

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## Environmentally Sustainable Management of Medical Wastes in China

### Agenda for Inception Workshop

(Mar.19-20 2008, Xiyuan Hotel, Beijing, China)

<b>March 19</b>	
08:30-09:00	Registration
09:00-10:00	<p>Opening ceremony                      Addressed by  <i>Mr. Zhuang Guotai</i>, Director General of FECO, SEPA  <i>Ms. Guo Yanhong</i>, Director, Department of Medical Administration, MOH  <i>Mr. Laurent Granier</i>, Coordinator, GEF Secretariat  <i>Mr. Sajjad AJMAL</i>, UNIDO Representative and Head, Regional Office in China  <i>Mr. Tang Guogang</i>, Director General, Chongqing Municipality EPB</p> <p>Chaired by <i>Mr. Yue Ruisheng</i>, Deputy Director General, SEPA</p>
10:00-10:20	Group photo and coffee break
10:20-10:40	Progress of Stockholm Convention Implementation in China by <i>Madam Yang</i> , CIO, SEPA
10:40-11:10	Introduction on implementation of National Plan for Construction of Facilities for Hazardous and Medical Wastes Disposal by <i>Mr. Fang Zhi</i> , Director, Department of Planning and Finance, SEPA
11:10-11:40	Current Situation and Requirement of Medical Waste Management in China, by <i>Mr. Du Kexiong</i> , Department of Pollution Control, SEPA
11:40-12:10	Introduction on medical waste management within medical institutions, by <i>Madam Gong Yuxiu</i> , National Institute of Hospital Administration, MOH
12:00-14:00	Lunch
14:00-14:40	International experience of medical waste management and treatment by <i>Mr. Zoltan Csizer</i> , UNIDO expert
14:40-15:10	Project design by <i>Mr. Zhengyou Peng</i> , Industrial development officer, Environmental Management Branch, UNIDO
15:10-15:30	Coffee break
15:30-16:00	Introduction on detailed activity arrangement of project implementation by <i>Mr. Sun Yangzhao</i> , Senior Project Officer, CIO/SEPA
16:00-16:20	UNIDO requirement in project management by <i>Mr. Zoltan Csizer</i> , UNIDO expert

16:20-16:40	Procurement management of FECO/SEPA by <i>Mr. Cheng Tianjin</i> , Division Chief, FECO/SEPA
16:40-17:00	Financial management of FECO/SEPA <i>Ms. Wu Xian</i> , Division Chief, FECO/SEPA
17:00-17:30	Discussion and conclusion of the Workshop
18:00-19:30	Banquet
<b>March 20 Expert Panel meeting</b>	
09:00-09:40	Introduction on related policies and project outputs for the management and disposal of medical waste by <i>Mr. Chen Yang</i>
09:40-09:50	Discussion
09:50-10:00	Coffee break
10:00-10:40	Introduction on the application and development of the technologies for medical waste treatment and disposal in China by <i>Mr. Wu Shunze</i>
10:40-11:00	Discussion
11:00-11:40	Introduction on project work plan for health sector by <i>Ms. Chen Juan</i>
11:40-12:00	Discussion
12:00-13:30	Lunch
13:30-14:10	Introduction on draft standard for the selection of demonstrated sites and technologies by <i>Ms. Jiang Chen</i>
14:10-14:30	Discussion
14:30-14:50	Coffee Break
14:50-15:20	Investment and Management Mechanism of medical waste treatment and disposal by <i>Mr. Hou Guiguang</i>
15:20-15:30	Discussion
15:30-16:10	The mechanism for monitoring, inspection and assessment measurements of project by <i>Mr. Jiang Feng</i>
16:10-16:20	Discussion
16:20-17:00	Conclusion

# Latest Progress of the Implementation of Stockholm Convention on POPs in China

POPs CIO, SEPA  
Mar. 19, 2008



国际持久性有机污染物工作组中国办事处  
<http://www.china-pops.org>

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- 1 Introduction of Stockholm Convention
- 2 Steps of Convention implementation
- 3 Main progress
- 4 Challenges
- 5 task 2008



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## Introduction of Stockholm Convention

- Firstly addressed POPs: 12
- Signatures: 152
- Parties: 152
- Characteristics :
  - Definite elimination, deduction obligations and schedule
  - Effectiveness evaluation periodically
  - Broadly extended scope
  - Open control lists, 11 new POPs in waiting list



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## Steps



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## Main Progress

- National Coordination mechanism was established
- NIP was approved and submitted to Convention Secretariat
- Plan for implementation action and operational management was preliminarily approved.
- Revision of some regulations and standards
- Start with a number of demonstration projects
- Actively participated the convention project to establish the image of large country with will carry out the duty for environmental protection
- Continued to promote the POPs inventory investigation of China
- Preliminarily established information management system for conventional implementation, conducted a series of activities for capacity building and public awareness raising



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## 1. Completed mechanisms for Convention implementation coordination

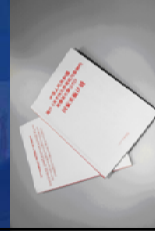
- **National level :**
  - 2004, NIP development Leading team among 11 ministries, SEPA as leader
  - 2005, National Convention Implementation Coordination Group (NCICG) was established
  - 2007, State Administration of Work Safety and General Administration of Quality Supervision, Inspection and Quarantine were added into NCICG
- **Ministry level :**
  - 2003, Convention Implementation Leading Team in SEPA
  - 2004, POPs CIO was established
- **Local level :** POPs Convention implementation team was established in Chongqing, Shanghai, Shandong, Zhengjiang, Liaoning, Anhui, and Jiangsu provinces



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## 2. NIP approved

- The compiling work has been finished after nearly 4 years of hard efforts
- Both China and the foreign institutions and countries have participated in: 13 ministries, scientific research institutes, the relevant associations, local governments, enterprises, the institutions of the UN, the World Bank, main bilateral cooperative countries, and etc.
- On April 4, 2007, the National Implementation Plan was approved, and the National Starting Conference was held on July 3
- The Convention implementation strategy, action plan and tasks of China in the future 10 years have been confirmed



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## NIP Overall Objectives

- **Overall Objectives: 2007-2015**
  - Eliminate the production, use, import and export of chlordane, mirex and DDT by 2009, except for the production and use of DDT as a closed-system site-limited intermediate and for acceptable purposes; and achieve the environmentally sound management of currently used equipment containing PCBs in demonstration provinces and identified high-risk equipment containing PCBs currently used by 2015;
  - Apply BAT/BEP measures for new sources in key sectors with unintentional POPs release by 2008, and apply prioritized BAT/BEP measures for existing Dioxin release sources in key sectors of key regions, and basically control the increasing trend of dioxin release by 2015;
  - Improve supporting systems for the environmentally sound management and disposal of POPs wastes by 2010 and begin to achieve the environmentally sound management and disposal of identified POPs wastes by 2015.



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## Dioxin reduction objectives

- Reduction or elimination of releases of unintentionally produced POPs:
  - (a) Begin to establish a management system for effective implementation of BAT/BEP in key industries unintentionally producing POPs, accomplish the application of BAT for new sources of key industries, and promote BEP by 2008;
  - (b) Give priority to updating the inventory of sources in key industries unintentionally producing POPs and estimates of their releases, and establish a relatively complete inventory of unintentionally produced POPs by 2010;
  - (c) Establish a relatively complete management system for the implementation of BAT/BEP for existing sources of unintentionally produced POPs in key industries, and complete relevant demonstration activities by 2010.



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## 3. Plan for implementation action and operational management

1. Establish the coordination and supervisory evaluation mechanism for convention fulfillment
2. Carry out the fundamental research, perfecting the law framework for convention implementation of policy, regulation and standard
3. Support the work of contact office for Stockholm convention fulfillment in China
4. Evaluate the performance of the domestic convention fulfillment in accordance with the requirement of Stockholm convention



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## 3. Plan for implementation action and operational management

5. Tailor after the latest POPs research, raise the countermeasures and proposal based on the situation of China
6. Establish and perfect the technical assistance system in accordance with the convention
7. Develop a multiple-way financing and investing mechanism for POPs projects
8. Broadening information exchange, propaganda to encourage the public participation
9. Solve the problem of historic POPs waste and POPs contaminated sites



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## 4. Policies, regulations and standards

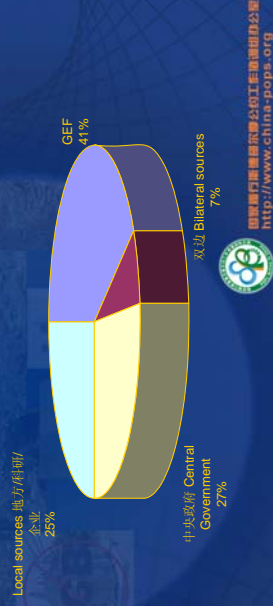
- Since the signature on May 23, 2001, some POPs related policies, regulations, standards etc have been established or revised, and requirements have been listed into for establishment and revision.
  - One industrial policies
  - 11 standards
  - 5 technical criterions
  - product list, export and import regulations
- More than 90 standards, guidelines and specifications have listed in China 11th five plan



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## 5. Initiated serious demonstration projects

- Abroad international cooperation, introducing advanced management concept, experience, technologies and funding from developed countries; with the support from GEF, initiate pesticide, PCBs and dioxin field demonstration projects



## Overall review of demonstration projects

Approved full-size projects

- NIP Development (UNIDO)
  - PCB Management and Disposal Demonstration (WB)
  - Demonstration of Alternatives to Chlordane and Mirex in Termite Control (WB)
  - Alternatives to DDT Usage for the Production of Anti-fouling Paint (UNDP)
  - Environmentally Sustainable Management of Medical Waste in China (UNIDO)
  - Strengthening Institutions, Regulations and Enforcement Capacities for Effective and Efficient Implementation of the National Implementation Plan (NIP) in China (UNIDO)
- Projects under preparation
- Improvement of Production Technology of Dicolof from DDT and Introduction Technology for Leaf Mites Control (PIF approved, UNDP)
  - Environmentally Sound Management and Disposal of Obsolete POPs Pesticides and Other POPs Wastes (PIF approved, UNIDO)
- 国际项目管理中心  
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## The significance of demonstration projects

- Strengthen national and demonstrated regional management and supervision capacities;
  - Promote establish and revise national and local related policies, regulations and standards;
  - Introduce environmental friendly, advanced, economic efficient alternatives/technologies/control and disposal techniques in demonstrated area; promote realize POPs substances elimination and substitution in demonstrated area; active promote BAT/BEP application in key industries;
  - Close related enterprises which produce POPs products, realize elimination target, and clean up the contaminated equipments and sites;
  - According with the experience of demonstration projects, establish national Convention implementation replication plan.
- 国际项目管理中心  
<http://www.china-pops.org>

## 6. Participating related work with Convention

- Active participating expert group on BAT/BEP, expert group on toolkit, POPRC, effectiveness evaluation, and expert group on DDT;
  - Start investigation on production, utilization and pollution situations of New POPs, and then preliminarily analysis the social-economic impact of New POPs to China;
  - Timely initiate effectiveness evaluation in China;
  - Submit country report on Convention implementation on time
  - Tracking the progress of Convention and participated in the COPs
- 国际项目管理中心  
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## 7. Continuous developing POPs inventory investigation

- Combine with national pollution investigation, investigate POPs production, utilization and emission;
- Initiate special funding plan, take one more step to completely investigate dioxin emission and pollution situation;
- Choose demonstration sites to deeply investigate circulating field stockpiled pesticides POPs and abandon situations.



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## 8. Strengthen information system construction and awareness rising

- Preliminary complete POPs MIS, strengthen management capacities of convention implementation three-tier information system
- Various promulgate plans, awareness rising, developing favorable social atmosphere of Convention implementation
  - ✓ CCTV, China National Radio etc.
  - ✓ Column in China Daily, China Environment News etc.
  - ✓ CIO website, New letter and posters
  - ✓ Technical coordination meeting, regional symposium, coordinators meeting, international/national meeting.



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## Challenges

- **Financing:** According to estimation in NIP, total US\$ 4.3 billion was needed before 2015, among which US\$ 1.75 billion was identified as incremental cost.
- **Policies, regulations and standards:** NIP has listed many policies, regulations and standards to be established, or revised, which needs much time to survey, while taking into account of current situation in China, as well as the requirement of the Convention.



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## Challenges

- **Technologies:** It is a systematic and technical program to phase-out, reduce and control POPs. Without much support from basic R&D, technologies have been something of bottleneck for the Convention implementation in China.
- **Management:** POPs is still something new to Chinese government, industrial sectors and research institutions etc. Few successful experience could be used for reference.
- **Awareness:** Although some awareness raising activities has been conducted in China, due to limited finance and time, awareness raising of general public, local officials and technicians etc in national level are still weak.



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## Dioxin Reduction Gaps in Convention implementation

- Information about enterprises with release sources and data from actual monitoring of release intensity are inadequate, and the mechanism for data collecting and reporting on release sources and quantities and an ongoing inventory database system have not yet been established;
- At present, no systematic practice regarding reduction of unintentionally produced POPs releases has been carried out in China, resulting in a lack of relevant experience;
- The management requirements of the Convention on new sources have not been integrated in the current management system, and corresponding technical specifications and emission standards are not complementary and systematic;
- Policies, laws and standards for the control of existing sources are insufficient; and
- A long-term effective mechanism for pollution control and continued reduction of unintentionally produced POPs needs to be established.



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## Task 2008

- In stages, prepare convention implementation 2008 annual work plan, hold coordinator meeting
- By industry: initiate the Convention implementation work on six high potential emission industrial recourses (medical wastes incineration, pulp and paper industry, municipal wastes incineration, iron and steel, non-ferrous metal, and crematoria), promote establish industrial reduction strategies, start demonstration projects.
- By region: choose typical and good conditional regions, instruct 3 to 5 outstanding demonstration providences, promote local governments start Convention implementation step by step.



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## Task 2008

- **Building capacities, promoting policies:** related institutional capacity shall be strengthened, and long run mechanism for convention fulfillment shall be established, the POPs related management policies home and broad shall be intensively studied, gradually carry out the revision of 90 items of policies, standard and technical guidelines.
- **Continuing awareness rising:** revision of propaganda website, program a TV show, organizing a series of activities to raise public awareness, and international conferences shall be held in date of May,23 and Nov. 11 this year
- **Executing a serious demonstration project:** Carry out the 4 full-size projects as PCB, Chlordane and Mirex , medical waste and anti-fouling paints, try to obtain the approval of 2 full-size projects (GlofoI and obsolete POPs); carry out bilateral cooperation projects such as Sino-Norwegian project for local capacity building in Chongqing



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# Thanks!



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# 全国危险废物和医疗废物处置设施建设 规划(Hazardous Waste and Medical Waste Treatment Facility Construction Program)

房志, 环保总局规划司  
Fang Zhi, Department of  
Planning and Finance, SEPA  
2008年3月19日

SEPA

## 背景 (Background)

《国家环境保护“十五”计划》明确要求;  
《医疗废物管理条例》明确要求;  
危险废物处置和管理落后现状的要求;  
医疗废物处置和管理落后现状的要求;  
放射性废物处置和管理落后现状的要求;  
03年SARS疫情爆发的应急要求。

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## 主要规划原则1 (Principle 1)

- 集中处置, 合理布局(Centralized disposal and rational distribution or layout)

由于医疗废物收集、管理等现状和医院分布等原因,  
**不提倡各医院单独分散处理**

Don't encourage hospitals to treat their MW separately!

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主要规划原则2: 采用先进实用、成熟可靠技术, 切实实现安全处置(Principle 2: Sound, advanced and mature technology required)

- 处置设施建设要采用先进实用、成熟可靠技术, 技术起点要高, 收集、处理、处置、综合利用全过程必须符合相关要求 (Require advanced and mature technology and facility)。
- 严禁采用小型单燃烧室焚烧炉、没有自控系统和尾气处理系统的焚烧装置 (Prohibit certain kinds of facilities)。
- 坚决淘汰各种简易焚烧炉和其他各类排放不达标的处置设施 (Phase out unqualified facilities)。

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### 主要规划原则3 (Principle 3)

- 危险废物和医疗废物处置设施统筹规划和建设  
(Hazardous Waste and Medical Waste disposal facility construction is encouraged to be planned as a whole)

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### 主要规划原则4(Principle 4)

- 功能齐全，综合配套  
鼓励危险废物集中处置设施同时配备综合利用、焚烧和安全填埋等工艺装置  
(Hazardous waste treatment center is encouraged to have full capacity to treat different waste, like being equipped with the facilities and functions , like comprehensive reuse, incineration and secure landfill as a whole)

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### 主要规划原则5(Principle 5)

- 加强监管能力建设 ( To establish and enhance the capacity building on hazardous waste management)  
主要是监测、信息、技术研发、监督管理等方面的能力建设 (mainly focusing on dioxin monitoring stations,CEMs, information exchange system, R&D, supervision and management, and so on)

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### 主要规划原则6(Principle 6)

- 提高装备制造水平，积极推进产业化 ( to encourage and facilitate the domestic manufacture capacity development through importing advanced technology, or doing cooperation with the foreign companies)

## 主要规划原则7(Principle 7)

- 先行试点、稳步推开 (At first, to get experience through demonstration project implementation. Then, to speed up the national program enforcement and facility construction based on the experience.)

## 技术要求(Technical requirements)

- 转运车 (vehicles for transportation)
- 技术路线 (technology and process required)
- 焚烧炉 (incinerators)
- 尾气处理 (tail gas, or flue gas treatment)
- 安全填埋 (secure landfill)
- 系统配置 (full system should be matched to the treatment process)

## 集中处置技术路线(recommended technology for centralized facility)

- 鼓励采用回转窑、热解炉等焚烧技术 (Rotary Kiln and pyrolysis are highly recommended, especially for over 10 tons/day facilities);
- 小于10吨/日的处置设施, 也可采用其他处理技术, 但必须做到杀菌、灭活、毁形和无害化, 防止二次污染 (Less than 10 tons/day facilities can be allowed to use other technology, but there is a basic safe requirement, especially for MW);
- 积极发展等离子体等高新技术, 鼓励其他新技术的开发和示范 (Encourage new technology development and demonstration, like plasma technology).

## 具体建设任务(Concrete tasks)

- 31个省级危废综合处置中心 (31 comprehensive treatment centers in each province for HW)
- 300个设区城市医疗废物集中处置中心 (300 MW treatment centers in big cities)
- 7个区域性二恶英监测中心 (7 dioxin Monitoring Centers)
- 3个工程技术研发中心 (3 R&D Centers)
- 国家和省级危险废物登记交换管理中心 (HW and MW management and supervision centers)
- 31个放射性废物储存库 (31 radioactive waste storage)

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### 投资估算 (Estimated Investment)

149.2 亿元 (US\$1.85 billions)

- 危险废物处置、医疗废物集中处置设施投资138.7亿元 (Construction cost for HW & MW disposal facility: US\$1.72 billions)。
- 能力建设需5亿元, 其中包括二恶英监测中心、工程技术研发中心、国家和省级管理中心等(Capacity building: US\$62 millions, including dioxin monitoring centers, Administration Centers for Solid Waste in both national and provincial level)。
- 31个省放射性废物库填平补齐、扩容改造等, 需投资5.5亿元(31 radioactive waste storages: US\$68 millions)。

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### 资金筹措(Investment arrangement)

- 能力建设项目, 主要由国家投资建设, 地方要提供必要的配套条件 (Management capacity building project: main investment from central government and small part from local government)。
- 承担行政代执行任务的集中处置设施, 按东、中、西部有所差别的原则, 国家安排国债资金支持 (Disposal facility projects: central government will give 30%, 60% and over 75% financial support according to project location, based on the total investment of each project)。

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### 政策措施(Policy guarantee)

- 落实各级政府职责 (local governments responsible for the facility construction)
- 制定收费政策, 保证设施正常运营 (service fee collecting to insure facility operation)
- 建立专业化处置队伍, 实行企业化管理 (require market mechanism and professional operation)
- 加强全过程监管 (whole process supervision and management for HW & MW classifying, collecting, transportation, treatment and recycling)

SEPA

### SEPA实施进展(Implementation works we have done until now)

- 修订、修改和颁布十几项技术标准和要求 (formulating, revising and publishing over 10 technical standards and requirements)
- 研究和考察国内外近百个相关企业 and 设施, 颁布了规划项目技术复核大纲 (Issuing a guideline on technical review for programed projects based on comprehensive research and study tour)
- 研究和出台非焚烧处理技术规范 (doing research, formulating and issuing technical requirements for non-incineration technology, like autoclave, microwave and chemical treatment methods)

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## 实施进展 (续) (continued)

- 对约220个危废和医废项目和6个能力建设项目进行审查, 其中退回17个医废项目修改 (total 220 projects reviewed, including 17 returned for re-study)
- 完成近200个危废和医废项目以及6个能力建设项目的技术复核或行业评审 (finishing the technical review or sector review for over 200 projects)
- 对180个项目下达国债资金约33亿人民币, 约占规划总补助资金的50% (RMB3.3billions given by central gov. as subsidy to about 180 projects, around 50% of the total subsidy from central government)
- 地方自建约40个规划内项目 (Around 40 projects done by local gov. without central gov. aid)

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## 技术复核中的要点和问题

(Key points and problems in technical review)

- 项目内容和规模 (Construction contents and facility capacity)
- 技术和工艺路线 (technology and process choosing)
- 辅助公用工程配置 (assisted equipment, labs and building, as well as land reserved)
- 配套建设条件, 含管理体制、收费制度、业主资质与能力、选址与征地、配套资金等 (matched conditions required, like management and charging system, ability of the operator, site selecting and purchase, matched fund, and so on)

SEPA

## EIA 评审中的要点和问题

(Key points and problems in EIA process)

- 接纳废物种类、形态、数量不清
- 收运及贮存全过程的环境敏感点和环保措施不明确
- 地质勘察等基础工作不细致
- 项目卫生防护距离和对周边影响论证不足
- 服务期满后的封场措施及生态恢复措施等论证不足

SEPA

## 项目实施中的困难和问题

(Dilemma and problems in project implementation)

- 国外先进技术、设备和管理经验的进入和参与
- 示范项目的建设 and 先进技术经验的推广
- 设备和系统的国产化
- 项目实施全过程监管 (建设和技术审查一致性)
- 合格投标商的选择和培养
- 交钥匙工程或系统集成 (商) 的出现和培养
- 工程监理和施工过程环保监管
- 正常运行和运行监管 (二恶英监测、发证等)

SEPA

### 现有设施普查 (survey on existed facilities)

- 危险废物处置企业669个,其中集中式处理处置企业505个, 其中83%是综合利用, 15%是焚烧, 多数技术水平落后, 多有二次污染(669 facilities for hazardous industrial waste treatment, 505 centralized service facilities among)
- 医疗废物处置设施242个,非典焚烧炉175个.技术水平落后, 很难达到排放标准(242 facilities for medical waste treatment, plus 175 built during SARS for emergency-response in poor technical level. Most of them should be phased out after new facilities being built)

SEPA

### 处置设施规模 (capacity of the facilities)

- 04年统计数据:危险废物集中处置规模4006吨/日, 其中焚烧2261吨/日,填埋995吨/日.
- 04年普查数据:危险废物17280吨/日其中综合利用15245吨/日,1580吨/日,455吨/日;医疗废物1327吨/日.

SEPA

### 危险废物处理处置现状(current situation on hazardous waste disposal)

- 04年产生量995万吨(9.95million tons produced)
- 04年处置量275万吨(2.75million tons finally treated)
- 04年综合利用量403万吨(4.03million tons recycled)
- 04年储存量343万吨(3.43million tons in storage)
- 04年排放量11470吨(11470 tons discharged)
- 但普查数据远高于上述统计数据(But the data from survey is much higher than statistical data)

SEPA

### 医疗废物处理处置现状(current situation on medical waste disposal)

- 500个城市中集中处置率60%(60% medical waste are treated by centralized facilities in 500 cities)
- 113个重点城市中处置率75% (75% medical waste are treated by centralized facilities in 113 key cities)



## 项目管理(Project Management)

- 下发4个管理通知，针对不同进展的项目分别提出要求
- 制定竣工验收管理办法，加强与危险废物许可证管理的衔接
- 全部规划项目的衔接沟通，把握进度
- 明确规划销号项目清单
- 开展二噁英监督性监测
- 现有保留设施的监督管理、技术改造和完善
- 对总体实施情况以及典型问题和典型项目进行媒体公布，鼓励先进，鞭策落后

## 医废设施建设与管理中还应特别注意(what we should pay special attention?)

- 非焚烧技术路线的引导和应用
- 国家基础性研发力量和国产化的建立和发展
- 运营经验和水平的积累、改善和提高
- 地方自筹资金和其他配套条件的到位，包括收费政策的落实
- 鼓励产业发展的有关减免税政策
- 边远地区医疗废物的安全处置方法（经济 > 方法）

## 急需的国际帮助 (What international helps needed )

- That is why we are here together today
- Technique+Operation?
  - Management+Supervision?
  - Fund needed to improve BAT and BET?
  - Other experience?
  - Discussion

谢谢!  
Thanks for your attention!  
Question Welcomed?!

## Current Situation and Requirement of Medical Waste Management in China

Department of Pollution Control,  
SEPA



### Context

- Current situation of medical waste management in China
- Existing problem in medical waste management in China
- Present work being carried out by SEPA
- Next work arrangement by SEPA
- Some suggestions for GEF project



### The current status of medical waste management

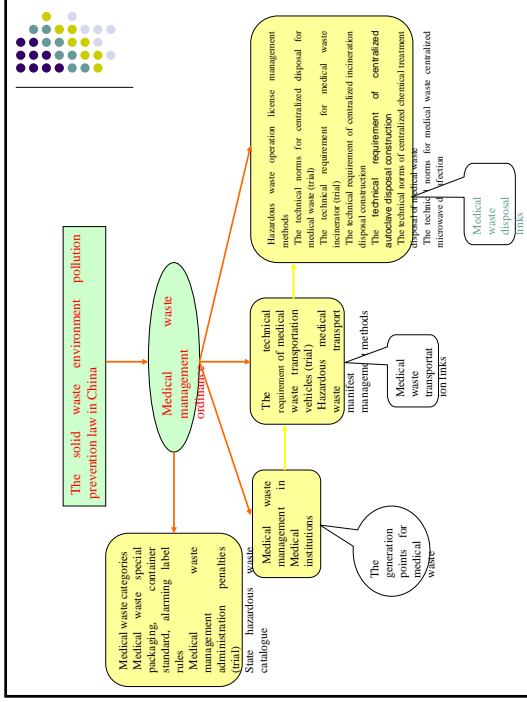
- Medical waste is one kind of special hazardous waste, if not properly managed, will pose serious harm and health risk for environment and human being
- SEPA attached great importance on medical waste environment management work, in recent year push forward the medical waste management with relevant department and achieved positive progress



### The current status of medical waste management in China-Regulations

- (一) Formal establishment of medical waste management regulation system
- Since 2003, under the concerted effort by SEPA and MOH, medical waste management regulations had been improved constantly, relevant regulations such as “Medical waste management Ordinance” had been issued, whole process management system of medical waste in China is being established





### The current status of medical waste management in China- Regulations

- In order to ensure the substantial enforcement of relevant regulations in medical waste management, in collaboration with MOH, SEPA carried out medical waste inspection work, the inspection to the medical waste centralized disposal facilities and medical institution were carried out in all provinces, autonomous regions and municipalities all over China.
- The sampled inspection was carried out by SEPA for medical waste management situation in some provinces and cities in 2006
- Through the abovementioned inspection work, the implementation and fulfillment of relevant regulation in medical waste management were effectively supervised and promoted, meanwhile some of the issues are found

### The current status of medical waste management in China- Facilities

(二) The progress made in the construction of medical waste disposal facilities

The positive progress had been achieved in the medical waste disposal facility construction in China in recent years, certain medical waste disposal capacities had been formed nationwide

- According to the investigation by SEPA in 2005, the medical waste disposal facilities are concentrated in eastern part of China( accounting for 60% of total facilities in China), it is relatively less in middle and western part of China
- For the facility type, the current medical waste disposal facilities mainly adopt incineration method (including all kinds of incinerators) (accounting for 95.49% of total)

### Some existing issues in the medical waste management in China

Although substantial progress had been achieved in medical waste management in China in recent years, there existed some problems as follows:

(一) The working basis for medical waste management is weak, the baseline information is not clear about the generation and disposal of medical waste

Medical waste as a special kind of hazardous waste, the report and registration work had not been carried out according to hazardous waste management planning and reporting stated in "solid waste law", so the baseline information for medical waste in not clear, it is hard to implement effective supervision and management



### Some existing issues in the medical waste management in China

- (二) There is room for improvement and revision for relevant law and regulation in medical waste management
- some of the clauses in “Medical Waste Management Ordinance” need to be improved
  - Some of the stipulation in “Medical Waste Management Ordinance” need to formulate more specific and operable detailed implementation methods, in order to in deed implement the regulation



### Some existing issues in the medical waste management in China

- (三) The forces to fulfill the medical waste regulations and standard should be strengthened further
- there existed illegal trading and orderless flow of medical waste in some places
  - The same regulation is not followed in medical waste segregation, collection, storage, transportation and disposal in some local medical institutions and centralized disposal facilities
  - There lack of necessary pollution monitoring, treatment facilities and measures in some medical waste disposal facilities, lack of daily routing supervision monitoring data or incomplete monitoring data
  - These are the results of ineffective implementation of current regulations



### Some existing issues in the medical waste management in China

- (四) Incomplete medical waste collection and transportation system
- Currently, the construction of medical waste collection and transportation system in China is not well set up in major part of China, much of the medical waste generated in the small scale medical institutions and remote areas are not included in the centralized collection and transportation system, there existed potential pollution sources



### The present work being carried out by SEPA

- (一) Pilot reporting and registration work for medical waste is carried out in order to probe the medical waste generation situation and actual flow direction, our dept. is organizing and implementing medical waste pilot reporting and registration work, we hope to perfect the medical waste reporting and registration schemes through pilot work, to accumulate experience to fully promote the medical waste reporting and registration work.



### The present work being carried out by SEPA

- (一) To formulate “Medical waste collection and disposal situation on site supervision and inspection guidelines”
- In order to guide local EPB to strengthen the medical waste supervision and management, currently out dept. is conducting research in formulating “Medical waste collection and disposal situation on site supervision and inspection guidelines”, in order to clarify the on site supervision and inspection methods and key points while environmental protection department visit medical institutions and medical waste disposal facilities, so the basis could be provided for EPB at different level to conduct on site supervision



### The present work being carried out by SEPA

- (二) To formulate “The guideline for pollution prevention effect evaluation of centralized medical waste disposal facilities”
- According to the 13th clause of “Medical Waste management ordinance”, the centralized medical waste disposal facilities should periodically carry out detection and evaluation on environment pollution prevention and hygienic effect for the medical waste disposal facility according to the rules set in the environmental protection administrative dept and health administrative dept. Currently out dept. is formulating relevant technical guidelines and promote the actual fulfillment of this regulation.



### Next step work plan of SEPA

- (一) Continuously promote the reporting and registration work and strengthen the flow direction management of medical waste
- According to the rules in “Solid Waste Law”, we should continuously promote the reporting and registration work, through the reporting and registration work, to further probe the baseline information and flow direction of medical waste in China and to provide basic safeguard for the whole process management of medical waste
  - In connection with MOH strengthen the monitoring and inspection forces for the medical institution and medical waste disposal facilities, seriously ban and penalize the illegal medical waste trade and dumping actions, especially strengthen the monitoring management work in the remote areas which are not included in the centralized collection and transportation system, to prevent medical waste orderless flow and loss.



### Next step work plan of SEPA

- (二) To promote the revision, perfection of medical waste management regulations and enforcement
- To promote the formulation and revision and supplementary work for medical waste management laws and regulations, so as to provide better service for the management of medical waste in China.
  - Further enhance the publicizing, enforcement and training activities for laws and regulations, so as to unify thoughts at different levels of EPB, deepen the understanding of the importance of medical waste management, upgrade the policy level and enforcement capacities, enhance the work responsibilities and to actually implement the monitoring responsibility set in the law and promote the constant upgrading of medical waste management levels in China.



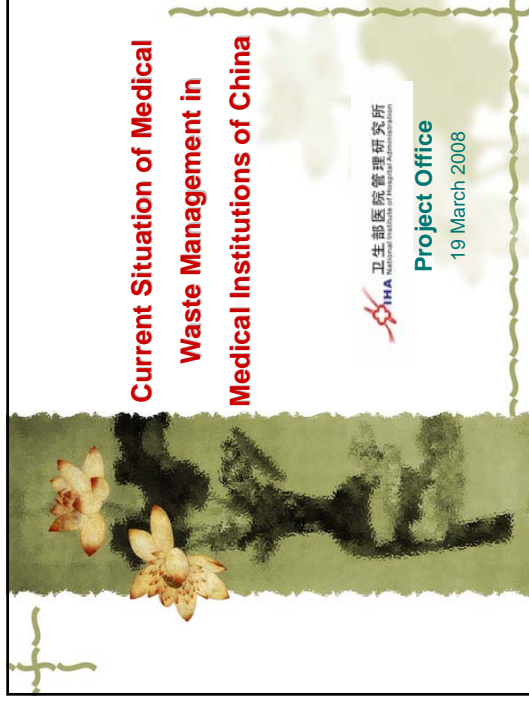
### Some suggestions for GEF project

It is suggested that in close connection with current management status and requirement to design project contents, the key points should be focused as follows:


- The supervision and management system of Medical waste flow direction
- The monitoring management training of medical waste collection and disposal



● Thank you very much for your  
attention!



**Current Situation of Medical  
Waste Management in  
Medical Institutions of China**


 卫生部医院管理研究所  
 IHMA  
 INSTITUTE OF HOSPITAL MANAGEMENT RESEARCH

**Project Office**  
19 March 2008

**Content**

- ❖ Background of MW Management
- ❖ Regulations on MW Management
- ❖ Problems on MW Management in Medical Institutions
- ❖ Requirements


 卫生部医院管理研究所

**A. Background of MW Management**


- ❖ *Regulation on Management of Medical Waste* was enacted in 2003.
- 1. Generation, application and popularization of disposable medical materials (DMM) led to projects of MW Management


 卫生部医院管理研究所

**Background**

**MOH started to promote the utilization of disposal injectors and infusion sets in 1987**

- ❖ The problem of MW treatment started arising. It was not exclusive because of relatively small amount of disposal material constrained by the economic policy.
- ❖ After 1990, the amount of used DMM increased rapidly year after year. The problem of MW management & treatment gradually became more serious.


 卫生部医院管理研究所

**Background**

**2. No Laws or regulations specifically enacted on MW management before 2003**

Laws and regulations related to MW Management

**For environmental protection:**

- ❖ *Law on Environmental Protection of PRC*
- ❖ *Law on Prevention and Control of Environmental Pollution by Solid Wastes*
- ❖ *Sanitary Standard of Medical Waste Incineration*
- ❖ *List of Hazardous Waste of China*
- ❖ .....



**Background**

**For Health and Drug supervision:**

- ❖ *Law on Prevention and Control of Infectious Diseases of the PRC*
- ❖ *Specification of the Management of Hospital Infection*
- ❖ *Sanitary Standard of Hospital Disinfection*
- ❖ *Technical Standard For Disinfection*
- ❖ *Regulation on Supervision and Management of Medical Devices*
- ❖ .....




**Background**

**3. Problems**

Investigation of 96 hospitals in 20 provinces by MOH in 2001 indicated problems such as:


- ❖ Unbalanced management on MW between different locations
- ❖ Unclear definition of MW
- ❖ Some MW were put into residential waste
- ❖ Inadequate treatment of infectious waste



**Background**

**3. Problems**

- ❖ A mass of plastic or high-molecular wastes were treated by medical institutions without appropriate technique and facility.
- ❖ Some MWs were thrown away or sold
- ❖ Some MWs were purchased by illegal businesses
- ❖ Environmental pollution due to incineration of MW by hospitals





#### Background

### 3. Problems(cont.)

The last straw: --Scrap/used plastic markets along Beijing-Shijiazhuang highway

The problems of MW management and treatment were paid attention gradually.



### B. Regulations on MW Management

The *Regulation on Management of Medical Waste* was drafted in 2002 by MOH and SEPA as authorized by State Council and enacted in 2003, then five supplementary documents were issued one by one.

- ❖ *Regulation on Medical Waste Management in Medical Institutions*
- ❖ *Classification Catalogue of Medical Waste*
- ❖ *Provisions on Medical Waste Package materials, Container Standards and Warning Signs*
- ❖ *Administrative Penalty Measures on Management of Medical Waste*
- ❖ *Technical Standards of Treatment of Medical Waste*



#### Regulations

### 1. Purpose of MW Management

#### ❖ Safety Management in Whole Lifecycle of MW

- To prevent disease spread
- To protect environment
- To assure human health



#### Regulations

### 2. Classification of MW

#### WHO recommendation in 1998:


- infectious waste
- pathological waste
- sharp waste
- medicinal waste
- genetic toxic waste
- chemical waste
- mercury-containing waste
- high-pressure vessels
- radioactive waste



Regulations

**Five catalogues in Classification List of Medical Waste**


- infectious waste
- pathological waste
- injurious waste
- medicinal waste
- chemical waste



Regulations


**3. Treatment of MW**

- ◆ **Dedicated treatment:** Emphasizing the responsibility of government and promoting dedicated harmless treatment of medical waste
- ❖ Government is responsible to make plan and construct the dedicated MW disposal facilities in populous cities.



Regulations

- ◆ **Dispersed treatment:** in countryside without condition of dedicated treatment, the MW treatment can be decided by owner themselves, but should satisfy following guidelines:
  - ❖ Used disposable medical instruments and other injurious MW should be disinfected and destructed;
  - ❖ The MW that can be incinerated should be incinerated timely;
  - ❖ The MW that can not be incinerated should be disinfected and buried collectively.




Regulations

**4. MW Management in Medical Institutions**

**Organization Management:** to constitute management organization, to define management duty, to establish management mechanism, to train relevant persons, to carry out and improve MW management consistently by supervision, inspection and feedback.


**Process Management:** classification at the headstream, management in the whole process, generation → collection → temporary storage → transportation → treatment.



**Regulations**

**Wrap and Sign:**

- ❖ Vessel requirement:
  - Yellow disposal MW bag
  - sharp-goods box: resistant to leakage and puncture
  - turnover box
- ❖ Sign: color,symbol,description



香港醫學專科學院  
Hong Kong College of Health Sciences

**Problems**

## C. Problems

### 1. On Classification of MW

- ❖ Focusing mainly on the infective issues of MW but ignoring the link between classification of MW and technique of MW final treatment, so not completely conform to the BAT/BEP requirements.
- ❖ The implementers expect to have further specific descriptions of classification rules and detailed requirements (or else some MW are hard to be classified, for example, gypsum waste).

香港醫學專科學院  
Hong Kong College of Health Sciences

**Problems**

- ❖ To a few kinds of MW there are no unambiguous collection measures or treatment places, for example, Hg-containing material thrown away by dentists.
- ❖ Infectious disease hospitals disagree with the rule that all residential garbage generated by isolated or suspicious infectious patients have to be treated as infectious waste because of the higher cost. For example, the treatment cost for watermelon skin is higher than that of buying watermelon.

香港醫學專科學院  
Hong Kong College of Health Sciences

**Problems**

## 2. On Treatment

- ❖ Unbalanced development in the whole country. In most places, dedicated treatment facilities have not been constructed and there is no exit for MW. That leads to the classification management of MW can not be put into effect in medical institutions.
- ❖ Most of dedicated treatment facilities adopt single treatment measures of incineration that decreases the effect of MW classification and positivity of medical institutions of the area. Secondary pollution may happen if the facility or technique of treatment meet the requirements.

香港醫學專科學院  
Hong Kong College of Health Sciences

Problems

- ❖ In regions and institutions where medical wastes are treated dispersedly by themselves, government has not provided appropriate facilities;
- ❖ more support is necessary for self-driven research on non-incineration technology.



Problems

### 3. On Cost Offset Mechanism

It is stipulated in *Regulation on Management of MW* that: "The expenditure that medical institutions pay for the treatment of medical waste can be included in medical cost".

But the provision has been implemented only in a few cities and provinces, or only the cost of final treatment was taken into account (the cost should cover all activities including classification-collection-temporary storage-transportation and treatment), which is one of the reasons why the provision was not fully implemented in internal management.



Problems

### 4. On Management

- ❖ Lack of unitive training materials
- ❖ Lack of effective management on classification, collection, storage and transportation of MW in medical institutions, that is unfavorable for Health Department to make supervision and management of MIs, and for environmental protection department to make management of treatment facilities.



### D. Requirements

**Objective:** According to the BAT/BEP requirements of the Stockholm Convention, Aiming at above problems and considering of the situation of our country. To explore best MW management mode For Medical and healthcare institutions.



## Works to be done

- ❖ To revise the classification list of Medical list.
- ❖ To explore best MW management mode For Medical and healthcare institutions that is fitted with final treatment technique.
- ❖ To establish and perfect training system (training rule, training bases and textbooks)
- ❖ To Elect pilot point, make demonstration and replication of the outputs of the project.
- ❖ To establish MW sorting management system and perfect supervision measures.

# Thank You!

## **MEDICAL WASTE MANAGEMENT AND TREATMENT INTERNATIONAL EXPERIENCE**

*MEDICAL WASTE PROJECT-INCEPTION WORKSHOP  
BEIJING, MARCH 2008*

## **HEALTH-CARE WASTES**

THE INTRODUCTION OF IMPROVED SOLUTIONS PRIOR TO THE FINAL DISPOSAL OF WASTE ARE NOT DIRECTLY LINKED TO THE PRODUCTION OF POPs,

BUT THEY CAN RESULT IN REDUCED AMOUNTS OF WASTE REQUIRING SPECIAL TREATMENT AND THEREFORE IN REDUCED EMISSIONS AND WASTE TREATMENT COSTS

NEW TECHNOLOGIES HAVE BECOME AVAILABLE TO TREAT BIOMEDICAL AND HEALTH-CARE WASTES SO THAT THEY CAN BE FINALLY DISPOSED OF WITH LOW RISK BY LANDFILLING.

*MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008*

## **WASTE MANAGEMENT**

### **BEST ENVIRONMENTAL PRACTISES**

GENERATION AND MINIMIZATION

SEPARATION AND SEGREGATION OF WASTE

IDENTIFICATION AND CLASSIFICATION

HANDLING AND STORAGE

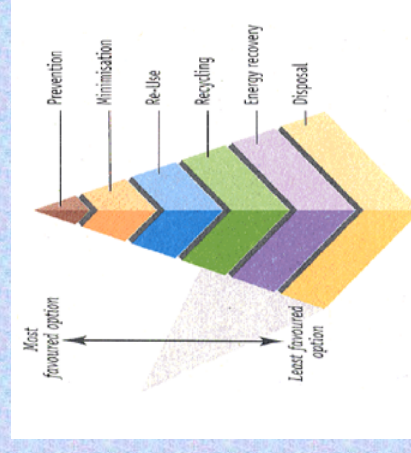
PACKAGING AND LABELLING

TRANSPORTATION INSIDE AND OUTSIDE HEALTH-CARE ESTABLISHMENTS

TREATMENT AND DISPOSAL OF RESIDUES

*MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008*

## **WASTE MANAGEMENT HIERARCHY**



*MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008*

## BACKGROUND AND DRIVING FORCES

IN "HEALTH-CARE WASTE MANAGEMENT" (MARCH 2004)  
WORLD HEALTH ORGANISATION STATES THAT AN EFFECTIVE  
PURPOSE IN THE FUTURE WILL BE:

"AN EFFECTIVE SCALED UP PROMOTION OF NON-INCINERATION  
TECHNOLOGIES FOR THE FINAL DISPOSAL OF HEALTH-CARE  
WASTES TO PREVENT THE DISEASE BURDEN FROM  
UNSAFE HEALTH-CARE WASTE MANAGEMENT AND  
EXPOSURE TO DIOXINS AND FURANS"

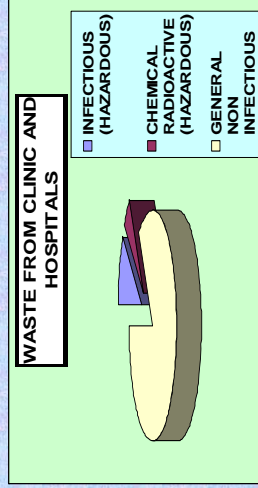
MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008

## SELECTING A DISPOSAL TECHNOLOGY

### BASIC CONSIDERATIONS

- TYPE AND NATURE OF THE WASTE MATERIAL
- HAZARD AND VIABILITY OF THE ORGANISMS  
IN THE WASTE
- EFFICIENCY OF THE TREATMENT METHOD (MICROBIAL INACTIVATION)
- OPERATING CONDITIONS OF THE TREATMENT METHOD  
(CAPACITY AND SPACE REQUIREMENTS)
- ENVIRONMENTAL RELEASES AND WASTE RESIDUES
- OCCUPATIONAL SAFETY AND HEALTH
- LEVEL OF COMMERCIALISATION AND COSTS
- BACKGROUND OF THE TECHNOLOGY MANUFACTURER OR VENDOR
- COMMUNITY AND STAFF ACCEPTANCE

## WASTE ANALYSIS IS AN IMPORTANT STEP IN SELECTING A DISPOSAL TECHNOLOGY



HOSPITAL WASTE STREAM CONTAINS LESS THAN 15% OF  
MATERIALS THAT COULD BE CONSIDERED "POTENTIALLY INFECTIOUS"  
IF PROPERLY SEGREGATED, THE CONTENT OF INFECTIOUS WASTE  
CAN BE REDUCED TO 1-5%.

MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008

## TYPES OF WASTES

- INFECTIOUS HEALTH-CARE WASTE (HAZARDOUS)
- CHEMICAL WASTE
- TOXIC OR PHARMACEUTICAL WASTE, INCLUDING  
CYTOTOXIC DRUGS (ANTINEOPLASTICS) (MOSTLY HAZARDOUS)
- ANATOMICAL AND PATHOLOGICAL WASTE (BODY PARTS ETC.)
- SHARPS (PARTLY HAZARDOUS)
- RADIOACTIVE WASTE
- OTHER WASTE (GLASS, PAPER, PACKAGING MATERIALS ETC.)  
SIMILAR TO MUNICIPAL WASTES

MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008

## NON COMBUSTION METHODS

TREATMENT METHODS	ADVANTAGES	DRAWBACKS
MICROWAVE IRRADIATION	EFFICIENT DISINFECTION UNDER GOOD OPERATING CONDITIONS ENVIRONMENTALLY SOUND	-HIGH INVESTMENT AND OPERATION COSTS -POTENTIAL OPERATION AND MAINTENANCE PROBLEMS -ONLY FOR WET INFECTIOUS WASTE OR FOR INFECTIOUS WASTE WITH A HIGH WATER CONTENT
AUTOCLAVE WET-THERMAL TREATMENT	ENVIRONMENTALLY SOUND LOW INVESTMENT AND OPERATION COSTS GOOD FOR INFECTIOUS AND MICROBIOLOGICAL WASTES	-SHREDDERS SUBJECTED TO BAD FUNCTIONING AND BREAKDOWNS -QUALIFIED TECHNICIANS REQUIRED -INADEQUATE FOR CHEMICAL AND PHARMACEUTICAL WASTE NOT EASILY PENETRABLE BY STEAM

## AUTOCLAVING

THE WASTE IS EXPOSED TO HIGH TEMPERATURE STEAM (135 TO 150 ° C) IN A CLOSED, EVACUATED CHAMBER AFTER THE REQUIRED TREATMENT PERIOD, THE STEAM IS ROUTED THROUGH A CONDENSATE TANK TO REMOVE ODOURS

THE WASTE IS THEN SHREDDED AND COMPACTED FOR DISPOSAL, NORMALLY IN A MUNICIPAL SOLID WASTE LANDFILL



TWO TRADITIONAL TYPES OF EQUIPMENT USED :  
AUTOCLAVES AND RETORTS.

OTHER SYSTEMS, CALLED ADVANCED AUTOCLAVES, HAVE BEEN DEVELOPED IN RECENT YEARS:

ECODAS, HYDROCLAVE,  
STERIVAL,  
STICHEMCLAV, SIS,  
SYSTEM DRAUSCHKE.

## OPERATING CONDITIONS

TYPICAL EXPOSURE TIMES ARE BASED ON TWICE THE MINIMUM TIME REQUIRED TO ACHIEVE AN ALMOST TOTAL KILL OF BACTERIAL SPORES UNDER IDEAL CONDITIONS

A COMMON EXPOSURE TEMPERATURE - TIME IS 121° C FOR 30 MINUTES.

USE OF :

BIOLOGICAL MONITORS

(E.G., B. STEAROTHERMOPHILUS OR B. SUBTILIS SPORE STRIPS)

COLOUR-CHANGING CHEMICAL INDICATORS

PLACED AT THE CENTRE OF TEST LOADS SHOULD BE USED TO VERIFY THAT SUFFICIENT STEAM PENETRATION AND EXPOSURE TIME HAVE OCCURRED.

MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008

## MICROWAVE

IN THE MICROWAVING PROCESS, INFECTIOUS WASTE IS EXPOSED TO HIGH-TEMPERATURE STEAM, SHREDDED, AND THEN HEATED BY A SERIES OF MICROWAVE GENERATORS (MAGNETRON)

TYPICALLY, 2 TO 6 MAGNETRONS ARE USED WITH AN OUTPUT OF ABOUT 1.2 KW EACH.

MICRO-ORGANISMS ARE KILLED IN THE PROCESS AND THE WASTE IS CHANGED INTO A SLIGHTLY MOIST RESIDUE

SOME SYSTEMS ARE DESIGNED AS BATCH PROCESSES AND OTHERS ARE SEMICONTINUOUS

THE MICROWAVE TREATMENT SYSTEMS  
COMMERCIALY AVAILABLE IN EUROPE ARE:

MEDISTER, SANITEC, SINIION, STERIFANT

MEDICAL WASTE PROJECT- INCEPTION WORKSHOP - BEIJING, MARCH 2008



## PRETREATMENT OR ALTERNATIVE METHODS

TREATMENT METHODS	ADVANTAGES	DRAWBACKS
CHEMICAL DISINFECTION	-EFFICIENT DISINFECTION UNDER GOOD OPERATING CONDITIONS -COSTLY IF THE CHEMICALS USED ARE EXPENSIVE	-HIGHLY QUALIFIED TECHNICIANS REQUIRED -REQUIRE SAFETY MEASURES -INADEQUATE FOR CHEMICAL PHARMACEUTICAL AND MOST TYPES OF MIXED SOLID INFECTIOUS WASTES
DRY HEAT DISINFECTION	-INTERNAL SHREDDER AND POST-TREATMENT COMPACTOR REDUCE WASTE VOLUME BY ABOUT 80% -THE TREATED WASTE IS DRY AND UNRECOGNISABLE	-HIGH NOISE LEVELS -LARGE, HARD METAL OBJECT IN THE WASTE CAN DAMAGE THE SHREDDERS
ELECTRON BEAM TECHNOLOGY	-IT IS A ROOM-TEMPERATURE PROCESS, WELL AUTOMATED AND REQUIRES LITTLE TIME -STEAM, WATER, CHEMICALS, HEATED AIR ADDED TO THE WASTE -LOW OPERATING COST	-EMISSION OF LOW-LEVELS OF RADIOACTIVITY -LOW WASTE VOLUME REDUCTION -SHREDDER ARE NEEDED -ANY LARGE, HARD METAL OBJECT IN THE WASTE CAN DAMAGE SHREDDERS OR GRINDERS

## CHEMICAL DISINFECTION

IN THE PAST, THE MOST COMMON CHEMICAL DISINFECTANTS FOR TREATING MEDICAL WASTE WERE CHLORINE-BASED  
ABILITY OF CHLORINE AND HYPOCHLORITE (BLEACH) TO INACTIVATE A BROAD RANGE OF MICRO-ORGANISMS.

HOWEVER, THE REACTIONS BETWEEN CHLORINE/HYPOCHLORITE AND ORGANIC MATTER PRODUCE TOXIC COMPOUNDS  
TRIHALOMETHANES, HALOACETIC ACIDS, CHLORINATED AROMATIC COMPOUNDS

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## NEW PRODUCTS

**NON-CHLORINE CHEMICAL DISINFECTANTS HAVE BEEN INTRODUCED INTO THE MARKET**

PEROXYACETIC ACID (ALSO KNOWN AS PERACETIC ACID) (STERIS ECOCYCLE 10)

CALCIUM OXIDE, ALSO CALLED LIME OR QUICKLIME  
OZONE (LYNNTECH)

ALKALI OR CAUSTIC, SUCH AS SODIUM OR POTASSIUM HYDROXIDE, (WR2) DESIGNED FOR TISSUE AND ANIMAL WASTES AS WELL AS FIXATIVES, CYTOTOXIC AGENTS AND OTHER SPECIFIC CHEMICALS

METAL CATALYSTS (CEROX)

ENCAPSULATING COMPOUNDS THAT CAN SOLIDIFY SHARPS, BLOOD, OR OTHER BODY FLUIDS WITHIN A SOLID MATRIX PRIOR TO DISPOSAL

## CASE STUDIES

### HOSPITAL WASTE MANAGEMENT IN PORTUGAL

SINCE 1998 30 LOW TECHNOLOGY INCINERATORS WERE PHASED OUT THE AMOUNT OF HAZARDOUS HOSPITAL WASTE HAS BEEN DECREASING FROM 25000 T IN 1995 TO 15000 T IN 2002 DUE TO A BETTER SEGREGATION

BETWEEN 1996 – 1998 TWO BIG AUTOCLAVES WERE BUILT, NOW ADAYS TREAT MORE THAN 80% OF THE TOTAL HOSPITAL HAZARDOUS WASTE PRODUCED IN PORTUGAL

### HOSPITAL WASTE MANAGEMENT IN IRELAND

IRELAND DECIDED TO TREAT ALL HOSPITAL WASTE BY NON-INCINERATION INCINERATORS WERE SHUT DOWN AND A CONTRACT WAS MADE WITH STI - STERILE TECHNOLOGIES IRELAND

95% OF ALL HEALTHCARE WASTE TREATED UNDERGOES SEGREGATION STI MODEL 2000 PROCESS IN SHREDDING WASTE PRIOR TO INJECTION OF STEAM IS USED

CYTOTOXIC, SHARP AND NON-SHARP WASTE, RECOGNISABLE ANATOMICAL WASTE IS EXPORTED TO AN INCINERATOR IN BELGIUM

## CASE STUDIES

### THE CENTRE HOSPITALIER IN ROUBAIX, FRANCE

HOSPITAL CAPACITY 2000 BEDS,  
1 TON OF WASTE PER BED ANNUALLY  
15% HAZARDOUS HOSPITAL WASTE – 85% NON-INFECTION WASTE  
(2% SPECIAL INDUSTRIAL, 3% ORDINARY INDUSTRIAL, 80% HOUSEHOLD WASTE)

BEFORE 1993, ON SITE INCINERATOR WAS USED  
AFTER, COLLECTION AND SORTING WASTE AT SOURCE AND HOT STEAM SYSTEM  
(ECODAS T1000) WERE ADOPTED

REDUCED RISKS FOR STAFF AND TRANSPORT COSTS

THE ANNUAL COST OF WASTE MANAGEMENT AT THE HOSPITAL  
HAS BEEN REDUCED BY 30%

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## THERMAL PROCESS

MAINLY FOR ECONOMIC REASONS, IN RECENT YEARS THERE HAS  
BEEN A MOVE TOWARDS LARGER, MODERN PLANTS IN  
DEVELOPED COUNTRIES

### MAIN BURNING PROCESS FOR MEDICAL AND HAZARDOUS WASTE

ROTARY KILNS

PYROLYSIS WITH DIFFERENT CONFIGURATIONS

GASIFICATION WITH DIFFERENT CONFIGURATIONS

COMBINATED MODULAR SYSTEMS  
("STARVED AIR" OR "TWO STAGES")

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## BAT THERMAL TECHNIQUES

TECNOLOGY	CONSIDERATION	OTHER COMMENTS
PYROLYTIC INCINERATOR	SUITABLE FOR SMALLER PLANTS (200 KG/DAY TO 5 TONS/DAY) > 3500 KCAL/KG	-HIGH INVESTMENT; (4 MILLION US\$) -OPERATING-MAINTENANCE COSTS (380 US\$) PER TONNE OF WASTE -WELL TRAINED PERSONNEL REQUIRED
ROTARY KILN	SUITABLE FOR MEDIUM SIZED PLANTS (1 – 10 TONNES/HOUR)	-USE OF WATER COOLING FOR KILNS -HIGH INVESTMENT AND MAINTENANCE COSTS -WELL TRAINED PERSONNEL REQUIRED
INCINERATOR WITH GRATE (MUNICIPAL WASTE)	MUNICIPAL WASTE INCINERATORS REQUIRE SPECIAL ADAPTATIONS NO PREVIOUS MIXING OR DIRECT HANDLING OF INFECTIOUS WASTE	-USE OF WATER COOLING FOR GRATES -COMBUSTION INCOMPLETE FOR MEDICAL WASTE -HIGH COSTS -DIFFICULT FOR HIGH MOISTURE AND VISCIOUS WASTES

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## BAT THERMAL TECHNIQUES

TECNOLOGY	CONSIDERATION	OTHER COMMENTS
FLUIDIZED BED INCINERATOR	STABLE COMBUSTION NO ODORS, WITHOUT COMBUSTIBLE SMALL (ABOUT 1/3 OF THE GRATE FURNACE) QUICK START AND STOP	NOT WIDELY APPLIED FOR INCINERATION OF HEALTHCARE WASTE LOW COST
GASIFICATION	STABLE COMBUSTION	COMPLEX CONFIGURATION HIGH COSTS
HIGH TEMPERATURE PLASMA	STABLE COMBUSTION QUICK START AND STOP	COMPLEX CONFIGURATION DEVELOPING TECHNIQUE HIGH COST

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### NON BAT COMBUSTION TECHNIQUES

TECHNOLOGY	CONSIDERATION	OTHER COMMENTS
SINGLE CHAMBER INCINERATION WITH DUST REDUCTION	GOOD DISINFECTION DRASTIC REDUCTION OF WEIGHT AND VOLUME RESIDUES DISPOSED OF IN A LANDFILL LOW INVESTMENT AND OPERATION COSTS	SIGNIFICANT EMISSIONS OF ATMOSPHERIC POLLUTANTS, SLAGS AND SOOT REMOVAL; WITH TEMPERATURE BELOW 800° C, INEFFICIENT IN DESTRUCTION OF THERMALLY RESISTANT CHEMICALS
DRUM OR BRICK INCINERATOR	REDUCTION OF THE WEIGHT AND VOLUME OF WASTE RESIDUES MAY BE DISPOSED OF IN A LANDFILL NO NEED FOR HIGHLY QUALIFIED OPERATORS VERY LOW INVESTMENT AND OPERATING COSTS.	ONLY 99 % DESTRUCTION OF MICRO-ORGANISMS NO COMPLETE DESTRUCTION OF MANY CHEMICALS EMISSION OF BLACK SMOKE, FLY ASH AND TOXIC FLUE GAS EXCEPTION ONLY FOR DISPOSAL OF INFECTIOUS WASTE OUTSIDE URBAN AREAS AND DURING EMERGENCY

### PRIMARY MEASURES TO REDUCE PCDD/F EMISSIONS

MANAGEMENT OPTIONS	RELEASE	OTHER CONSIDERATIONS
INTRODUCTION OF THE WASTE AT TEMPERATURES OF COMBUSTION CHAMBER ≥ 850 IN GENERAL, AVOIDANCE OF START AND STOPS OF THE INCINERATION PROCESS INSTALLATION OF AUXILIARY BURNERS (FOR START-UP AND CLOSE-DOWN OPERATIONS)	200 ng TEQ/m3	
SUFFICIENT OXYGEN CONTENT		OXYGEN: 6%
SUFFICIENT RESIDENCE TIME (MINIMUM 2SEC) ABOVE 850°C (1100°C FOR HIGHLY CHLORINATED WASTES)		SUFFICIENT RESIDENCE TIME BECAUSE OF PLASTICS AND WATER CONTENT OF WASTES
HIGH TURBULENCE OF EXHAUST GASES AND REDUCTION OF AIR EXCESS BY INJECTION OF SECONDARY AIR OR RECIRCULATED FLUE GAS, PRE-HEATING OF THE AIR-STREAMS		OPTIMIZED AIR FLOW CONTRIBUTES TO HIGHER TEMPERATURES
ON-LINE MONITORING FOR COMBUSTION CONTROL (TEMPERATURE, OXYGEN CONTENT, CO, DUST)		

### SECONDARY MEASURES TO REDUCE PCDD/F EMISSIONS

MANAGEMENT OPTIONS	RELEASE	APPLICABILITY	OTHER CONSIDERATION
FABRIC FILTERS	1-61 % REMAINING EMISSION	MEDIUM-HIGH	USE AT TEMPERATURES < 260° C (DEPENDING ON MATERIAL)
CERAMIC FILTERS	LOW EFFICIENCY	MEDIUM	USE AT TEMPERATURES 800-1000° C, NOT COMMON FOR WASTE INCINERATORS
CYCLONES	LOW EFFICIENCY	MEDIUM	ONLY EFFICIENT FOR LARGER PARTICLES
ELECTROSTATIC PRECIPITATORS	MEDIUM EFFICIENCY	MEDIUM	USE AT A TEMPERATURE OF 450° C; PROMOTION OF THE DE NOVO SYNTHESIS OF PCDD/F LOW EFFICIENCY FOR FINE PARTICLES,
ELECTRODYNAMIC VENTURI WITH ACTIVATED CHARCOAL		HIGH	FOR THE BEST REMOVE

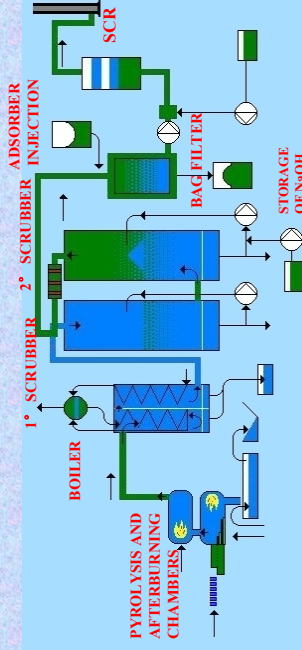
MANAGEMENT OPTIONS	RELEASE	APPLICABILITY	OTHER CONSIDERATION
CATALYTIC OXIDATION	HIGH EFFICIENCY < 0.1 ng TEQ/m3	HIGH INVESTMENT AND LOW OPERATING COSTS	ONLY FOR GASEOUS STREAMS AFTER DUST REMOVAL NO SOLID RESIDUES HIGH SPACE DEMAND ADDITIONAL NH3 ADDITION
FABRIC FILTERS COATED WITH CATALYST	HIGH EFFICIENCY < 0.1 ng TEQ/m3	HIGH INVESTMENT	MADE FROM PTFE LOWER FILTER CONTAMINATION
WET AND DRY SCRUBBERS WITH ACTIVATED CHARCOAL	HIGH EFFICIENCY	MEDIUM INVESTMENT AND OPERATING COSTS	POSSIBLE CONTAMINATION OF ADSORBING MATERIALS AND RELATIVE MEMORY EFFECTS
FIXED BED REACTOR WITH ACTIVATED CHARCOAL	HIGH EFFICIENCY < 0.1 ng TEQ/m3	HIGH INVESTMENT AND MEDIUM OPERATING COSTS	HIGH DEMAND OF SPACE DISPOSAL OF SOLID RESIDUES PERMANENT CO MONITORING INCREASE OF DUST FIRE/EXPLOSION
CIRCULATING BED FLUIDISED BED WITH ACTIVATED COKE OR LIME-FABRIC FILTER	HIGH EFFICIENCY < 0.1 ng TEQ/m3	LOW INVESTMENT MEDIUM OPERATING COSTS	NOT COMMON FOR HEALTH CARE WASTES SOLID RESIDUES TO BE DISPOSED OF EXPLOSION RISK

## THE NETHERLANDS ZAVIN PLANT

8000 TON/YEAR MEDICAL WASTE PRODUCED IN THE NETHERLANDS

NON SPECIFIC WASTE FROM HOSPITALS ARE TREATED AS MUNICIPAL WASTE

ZAVIN IS THE CENTRALISED TREATMENT PLANT



## ZAVIN PLANT

### THERMAL TECHNIQUE

PYROLYSIS INCINERATOR WITH POST-INCINERATION IN SEPARATE ROOMS IN THE FIRST CHAMBER PYROLYSIS AND PARTIAL GASIFICATION TAKES PLACE THE SECOND AND THE THIRD FURNACE CONTAIN AIR INLETS FOR PRIMARY COMBUSTION AIR

THE BALANCE BETWEEN PYROLYSIS AND GASIFICATION IS MAINTAINED BY REGULATING THE AMOUNT OF AIR IN THE TWO FURNACES

### BOILER

THE INTERNAL TUBES AND WALLS ARE CLEANED ACOUSTICALLY BY FOUR AIR HORNS

WASTE GAS TEMPERATURE IS COOLED DOWN RAPIDLY FROM 1000 °C TO APPROX 225 °C

THIS PREVENTS PARTICULATE ACCUMULATION AND PCDD/F- DENOVO- SYNTHESIS

## ZAVIN PLANT

### WASTE GAS TREATMENT

TWO SCRUBBERS FOR DUST, HEAVY METALS, SULPHUR OXIDES, HALOGENS AND AND PCDD/F SEPARATION

INJECTION OF ADSORBENT (85% CARBON-CALCIUM MIXTURE) FOR HEAVY METALS AND PCDD/F REMOVAL

BAG HOUSE FILTER REMOVES FINE DUST AND ADSORBENT THE FILTERS ARE CLEANED AT FIXED INTERVALS TO PREVENT THE FORMATION OF A LAYER OF ADSORBENT THAT CAN ADSORB PCDD/F AND HEAVY METALS

SCR DENOVO SYSTEM SUITABLE FOR CATALYTIC CONVERSION OF PCDD/F

**PCDD/F ACHIEVABLE EMISSIONS < 0.01 ng TEQ/Nm<sup>3</sup>**

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## DENMARK

THE DOMINANT PART OF HEALTHCARE RISK WASTE GENERATED IN DENMARK IS INCINERATED TOGETHER WITH MUNICIPAL SOLID WASTE IN 7 OF THE ORDINARY MUNICIPAL WASTE INCINERATION PLANTS

ALL SMALL INCINERATION PLANTS PREVIOUSLY OPERATING AT HOSPITALS HAVE BEEN CLOSED

ONLY 7 PLANTS HAS ESTABLISHED SPECIAL DIOXINS FILTERS WITH CHARCOAL/COAL DUST FOR TREATMENT OF THE FLUE GAS BESIDES THE NORMAL FLUE GAS CLEANING EQUIPMENT

THE FILTER MATERIAL WITH ITS CONTENT OF DIOXIN IS DISPOSED OF INTO THE FURNACE.

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## REDUCTION IN DENMARK

Flue gas cleaning process <sup>1)</sup>	Dioxin concentration ng I-TEQ/Nm <sup>3</sup> <sup>2)</sup>			Waste incinerated 1000 tonnes	Dioxin emission g I-TEQ/year <sup>3)</sup>	
	Mean	Min.	Max. Samples			Best estimate
No dioxin filter	1.49	0.1	5.6	7	17.3	9 - 35
Semidry filter	1.40	1.3	1.5	2	2.9	1.5 - 6
Dry filter	0.26	0.04	0.75	5	0.3	0.15 - 0.6
Dioxin filter (coal dust)	0.068	0.005	0.254	5	0.5	0.25 - 1
Sum					2,679	11 - 42

DANISH INVESTIGATIONS HAVE CONCLUDED THAT INCINERATION OF MEDICAL WASTE TOGETHER WITH ORDINARY SOLID WASTE DOES NOT INFLUENCE THE DIOXIN EMISSION TO AIR FROM ORDINARY WASTE INCINERATION

**DRY PROCESSES ARE PREFERRED TO WET AND SEMIDRY PROCESSES**

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## JAPAN AND EUROPE ACTIVATED COKE FIXED BED SYSTEM

POLLUTANT	REMOVAL RATE	ACHIEVABLE AIR EMISSION
PCDD/PCDF	> 98%	0.01-0.1 ng TEQ/nm <sup>3</sup>
HCL		1ppm or less
SOx		1ppm or less
MERCURY	90-97%	0.05mg/m <sup>3</sup> n or less

DIOXINS AND OTHER ORGANIC POLLUTANTS AS WELL AS HEAVY METALS SUCH AS MERCURY ARE ABSORBED IN THE PROCESS

LARGE AMOUNT OF ACTIVATED COKE MUST BE USED ACFB IS LOCATED USUALLY DOWNSTREAM OF FILTERS AND SCRUBBERS ATTENTION MUST BE PAID FOR FIRE RISKS

## REDUCTION IN USA

Year	National dioxin emissions from medical waste incinerators (twt. eq), grams/yr	
	TEQ basis	Total mass basis
1990	600	29,000
1995	150	7,200
2002	14 to 23 <sup>a</sup>	660 to 1,100 <sup>a</sup>

Type of emission control	TEQ factors, lb TEQ dioxin/lb waste	Dioxin factors, lb total dioxin/lb waste
1/4-sec combustion control	3.96 x 10 <sup>-9</sup>	1.94 x 10 <sup>-7</sup>
1-sec combustion control	9.09 x 10 <sup>-10</sup>	4.45 x 10 <sup>-8</sup>
2-sec combustion control	7.44 x 10 <sup>-11</sup>	3.65 x 10 <sup>-9</sup>
Wet scrubbers	1.01 x 10 <sup>-11</sup>	4.26 x 10 <sup>-10</sup>
Dry scrubbers no carbon	7.44 x 10 <sup>-11</sup>	3.65 x 10 <sup>-10</sup>
Dry scrubbers with carbon	1.68 x 10 <sup>-12</sup>	7.04 x 10 <sup>-11</sup>
Fabric filter/packed bed	6.81 x 10 <sup>-10</sup>	3.34 x 10 <sup>-8</sup>

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## LOW COST INCINERATORS

HIGH-TEMPERATURE INCINERATORS OF SIMPLE DESIGN ARE CURRENTLY BEING DEVELOPED, AND A SYSTEM DESIGNED SPECIFICALLY FOR HEALTH-CARE AND PHARMACEUTICAL WASTE IN LOW-INCOME COUNTRIES IS CURRENTLY UNDER TEST IN ENGLAND, AT DE MONTFORT UNIVERSITY

(Professor D.J. Picken Innovative Technology Group Monfort University UK)

MOBILE INCINERATORS FOR HEALTH-CARE WASTE HAVE BEEN TESTED IN BRAZIL

THESE UNITS PERMIT ON-SITE TREATMENT IN HOSPITALS AND CLINICS, THUS AVOIDING THE NEED TO TRANSPORT INFECTIOUS WASTE. TEST RESULTS FOR UNITS WITH A CAPACITY OF 30KG/HOUR WERE SATISFACTORY IN TERMS OF FUNCTION, PERFORMANCE, AND AIR POLLUTION

(Bartone C (1998), Municipal solid waste management, Washington, DC, World Bank (Report No. 16635)

## PLASMA TECHNOLOGY

THIS TECHNIQUE IS UNDER DEVELOPMENT AND IT USED FOR INDUSTRIAL WASTE DISPOSAL (OZONE DEPLETION CFC DESTRUCTION) BUT SOME APPLICATION ARE UNDER STUDY FOR HOSPITAL WASTES

CREATION OF HIGH-TEMPERATURE (UP TO 10,000°C) PLASMA ARC DECOMPOSES CHEMICALS TO ATOMIC FORM

### COMPARED TO INCINERATION:

- HIGHER DESTRUCTION EFFICIENCY
  - LOWER GAS EMISSION
- LOWER CAPITAL AND MAINTENANCE COSTS
- SMALLER SIZE (COULD BE BUILT MOBILE)

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## CASE STUDIES

KAISER PERMANENTE MEDICAL CENTER, IN CALIFORNIA, USA  
328 BED MEDICAL FACILITY  
THE 500 KW PLASMA PROCESSES WASTE AT 500 Kg/hour

ITALY, CSM - CENTRE FOR MATERIAL DEVELOPMENT  
500 KW TRANSFERRED ARC TORCHES, CAPACITY OF 250 Kg/hour  
(OIL CONTAINING PCBs, ASHES WITH HIGH CONCENTRATION OF HEAVY METALS, CHLORINATED PLASTICS, ASBESTOS, SLUDGES, RDFS)

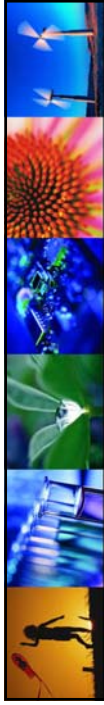
TYPE OF TECHNIQUE	PCDD/F EMISSIONS ng/Nm <sup>3</sup>	PCDD/F (MASS EMISSIONS) ng/h
ARGON PLASMA (Australia)	0.006	0.2
INDUCTIVELY COUPLED RADIO FREQUENCY PLASMA	0.012	0.3
CO <sub>2</sub> PLASMA ARC	0.013	0.4
MICROWAVE PLASMA (Japan)	0.0011 (TEQ)	0.03 (TEQ)
NITROGEN PLASMA ARC (Australia)	0.044 (TEQ)	95 (TEQ)

(UNEP 2002 REPORT ON DESTRUCTION TECHNOLOGIES)

**THANK YOU FOR YOUR  
ATTENTION !**

谢谢

MEDICAL WASTE PROJECT- INCEPTION WORKSHOP -  
BEIJING, MARCH 2008




UNIDO/GEF/China Project  
Environmentally Sustainable Management of Medical  
Wastes in China

## Project Design

Mr. Zhengyou Peng

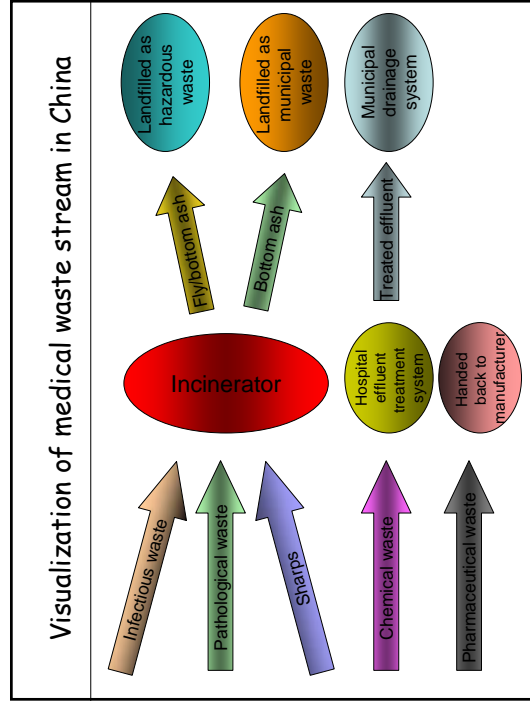
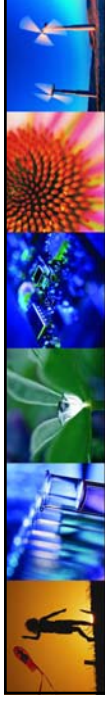
March 19, 2008



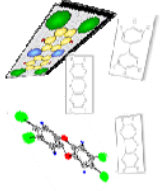

## medical waste





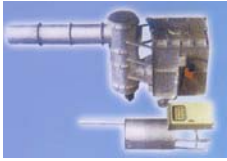


- China produces approximately 670,000 tons medical waste per annum or 1,780 tons pre day

The estimation result shows that the total amount of PCDD/PCDF releases into air from medical waste incinerators in China in 2004 reached about 450g TEQ, accounting for above 8% of the total releases to air from all sources.



- In China, there are 149 dedicated medical waste disposal facilities
  - 147 incinerators
  - 1 autoclave
  - 1 microwave

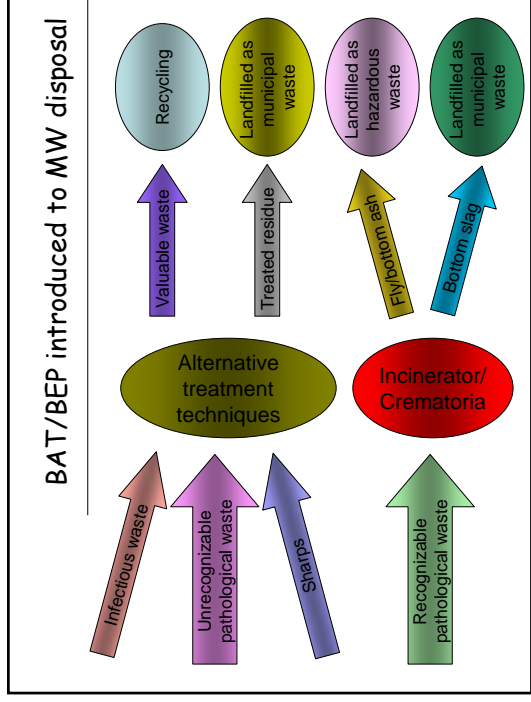
- National Programme for Construction of Facilities for Disposal of Hazardous Waste and Medical Waste proposed to construct 332 dedicated medical waste disposal facilities



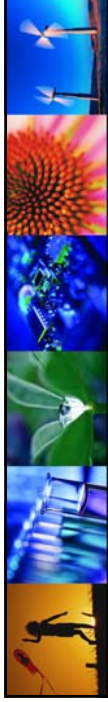

**Project Objective**

To reduce and ultimately eliminate the releases of unintentionally produced PCDD/PCDF and other pollutants of global harms from medical waste incineration into environment.

- Creation of a regulatory and policy enabling environment and strengthening of institutions, together with or based on a cluster of demonstrations to apply and verify the BAT/BEP in the lifecycle management of medical waste;
- Application of the successfully verified BAT/BEP in 3 selected demonstration provinces within the project implementation period;
- Formulate a replication program to disseminate the BAT/BEP to the whole nation by the end of the project implementation.

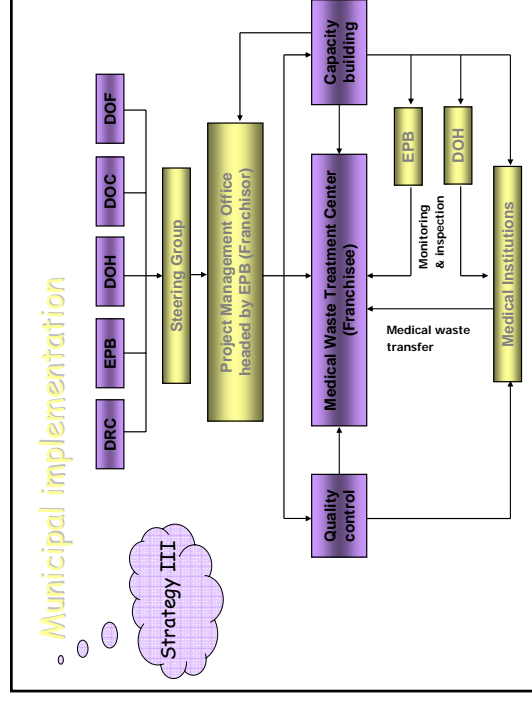
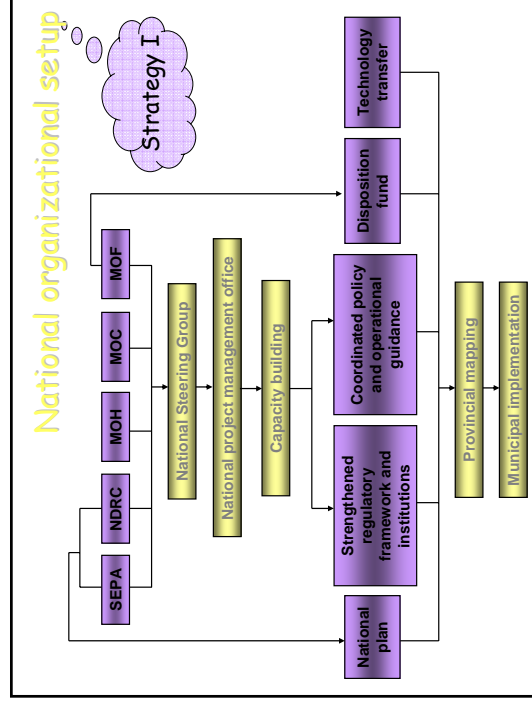
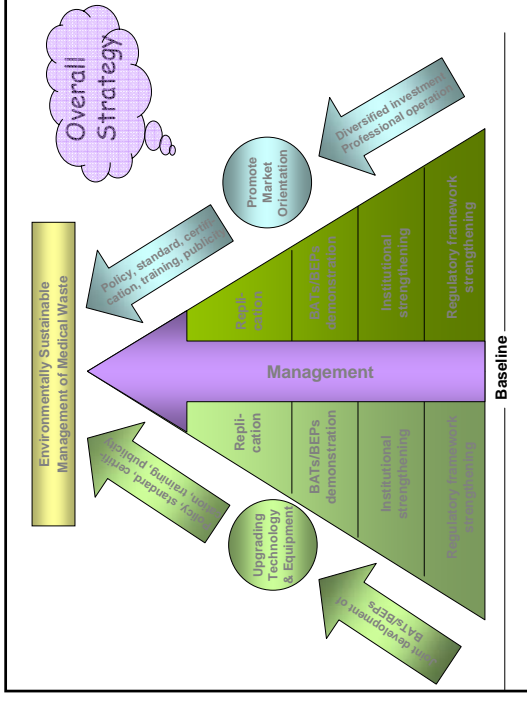



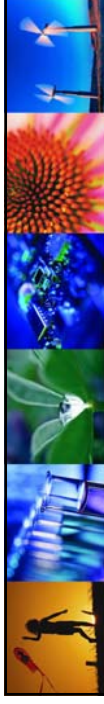




## Methodological approaches


- Upgrade the incineration equipment to the BAT performance level
- Replace outdated or over-capacity incineration facilities with alternative non-incineration techniques that avoid the formation and emission of dioxins
- Promote BEP in medical institutions
- Comprehensively apply regulatory, administrative, planning, technical, economic, market, information and training instruments to
  - Promote the locally affordable or commercially available supply of technologies and equipment of needs, and
  - Promote the commercialization of MW disposal






### Component 1. Strengthen the regulatory framework

- Revise related laws and regulations
  - Operating License Management, Transfer Note Management, and Classification System
- Upgrade or establish emission limits from medical waste disposal
  - Dioxin emission limit from incineration
  - VOCs and other pollutants emission limits from non-incineration





### Component 2. Strengthen the institutional capacity

- Establish a long-term national steering and coordination mechanism
- Strengthen supervision and inspection on medical care institutions
- Strengthen monitoring and supervision on medical waste treatment and disposal
- Strengthen environmental impact assessment on disposal facilities
- Strengthen performance audit of disposal facilities




### Component 3. Demonstrate BEP based management of medical waste in MTIs

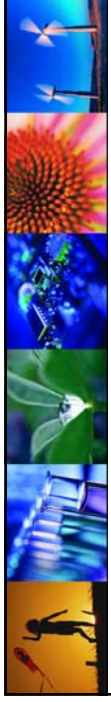
- Select 20 representative medical care institutions
  - Establish waste management systems and carry out staff trainings on BEP application
  - Implement best purchasing practices, reduction, reuse, waste segregation, reduction, intermediate storage, transportation and traceability
- Monitor, record and evaluate the implementation process and results
- Develop Specifications on Medical Waste Management in Medical Institutions
- Issue and disseminate the Specifications

### Component 4. Demonstrate BAT/BEP for medical waste disposal using thermal combustion

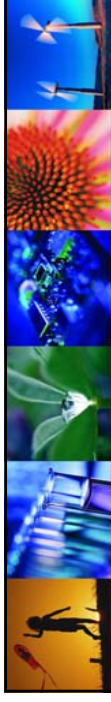
- Select 1 facility using incineration process and 2 facilities using pyrolytic process
- Procure, retrofit, and operate the modified facility, including on-line PCDD/PCDF sampling system
- Train the relevant managerial and operation staff
- Monitor, record and evaluate the implementation process and results
- Develop Booklets of BAT/BEP Application for Thermal Combustion Processes of Medical Waste
- Develop Code for Construction and Operation of Medical waste Disposal Facility Using Thermal Combustion Processes





### Component 5. Demonstrate BAT/BEP for medical waste disposal using non-combustion

- Select 1 facility using steam treatment, 1 facility using microwaving treatment, and 1 facility using chemical treatment
- Procure, retrofit, and operate the modified facility
- Train the relevant managerial and operation staff
- Monitor, record and evaluate the implementation process and results
- Develop Booklets of BAT/BEP Application for Non-Combustion Treatment of Medical Waste
- Develop Code for Construction and Operation of Medical Waste Disposal Facility Using Non-Combustion Processes



### Component 6. Demonstrate integrated and coordinated medical waste management and disposal

- Demonstrate the application of integrated medical waste management among various institutions at municipal level
  - Select 3 demonstration municipalities
- Demonstrate coordinated medical waste treatment among the dedicated medical waste facilities at provincial level
  - Select 3 demonstration provinces



### Component 7. Develop and implement a strategy for the adoption of BAT/BEP

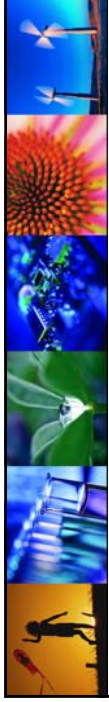
- Formulate techno-economic policies promoting the adoption of BAT/BEP
- Develop and implement a medical waste treatment equipment certification and labeling program
- Demonstrate and promote commercially available options for medical waste treatment and disposal
- Establish personnel training systems
- Enhance stakeholder awareness raising and education
- Establish effective mechanisms to promote transfer of technologies in great demand in China
- Adopt successfully demonstrated BAT/BEP in the 3 demonstration provinces



### Component 8. Develop a national replication program to widely disseminate the experience

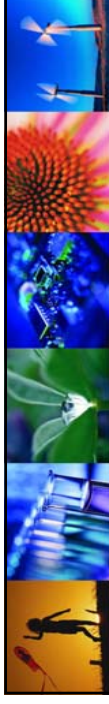
- Organize a workshop to evaluate the outcomes of the project
- Summarize the experience and results
- Draft a replication program for BAT/BEP application in medical waste management
- Hold a national consultation workshop for the finalization of the draft replication program
- Hold an international workshop to share the national experience with representatives from other countries





### Component 9. Project management, monitoring and evaluation

- Establish the project management structure
  - Steering group, National Project Management Office, National Project Management Team, National Expert Team, 3 local project management offices
  - Carry out a series of management training classes to the national and local project management staff
- Design and implement an M&E mechanism according to GEF M&E procedures



### Financial plan

Source	Amount (million USD)
GEF	12
Chinese Government	3.8
Other multilateral, bilateral sources and private sector	29.2





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GEF/UNEP/WHO/WHOCC/WHOCC/WHOCC  
 for a pop-free environment!

## Activity Arrangement of Environmentally Sustainable Management of Medical Waste in China

Stockholm Convention Implementation Office,  
 State Environmental Protection Administration of China  
 19<sup>th</sup> March, 2008



## Table of Contents


1. Project History
2. Project Objective and General Content
3. Project Final Output
4. Project Principle
5. Project Component Design
6. Project Organization Management
7. Selection of Demonstration Activities
8. Action Plan in 2008



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## 1. Project history


- Workshop on Control and reduction technology of Dioxin generated from incineration source was held in Hangzhou , Oct. 2004
- Preparing project of PDE-B was approved in Oct. 2005
- The first meeting of Project Steering Team (PST) was held at 14th, Feb. 2006, at meantime, the project steering team was formally found, and the inception workshop for pre-stage preparing work was held at that time.
- The second meeting of PST was held at 2<sup>nd</sup> June, 2006.
- Consultation contract in pre-stage phase of the project was invited for bidding within June to July ,2006, and project document was also drafted during meantime.
- Field investigation of abroad medical waste management was carried out in India, Ireland and etc. in Oct.,2006



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## 1. Project history

- Workshop on non-combustion Treatment technologies of medical waste was held in Beijing, Jan. 2007
- The third meeting of PST was held to render the Project Document (PD) at Feb. 2007.
- The full-sized PD was formally reported to GEF in March,2007
- The PD was approved in the 31<sup>st</sup> board of GEF in June,2007
- Approval of GEF-CEO was obtained in Nov. 2007.



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## 1. Project history

- Collaborative agreement was signed with international executive institution at 13th, Feb,2008
- Inception workshop shall be held in 19th, March,2008.
- Annual action plan and implementation manual of the project are being drafted.
- Project team and expert team are being prepared to found.
- Annual work plan for project activity and contracts are being prepared.
- Further domestic investigation shall be carried out.



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## 2. Project Objective and General Content

### 2.1 Main objective:

Protection of global environment and human health from the harm of POPs.

Combined with the implementation of *National hazardous waste and medical waste disposal facility construction plan*, in accordance with the request of *Stockholm Convention (SC)* and *National Implementation Plan of China*, avoidance and reduction for dioxin-like POPs and other toxic substance generation and emission within medical waste management and disposal shall be carried out.

The concept of life-cycle and whole-process management shall be applied in medical waste management and disposal in China, which shall widely promote the application of Best Available Technique and Best Environmental Practice (BAT/BEP) required by SC, and upgrade the management and disposal capacity of medical waste as well as the target of reduction and detoxification for medical waste.



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## 2. Project Objective and General Content

### 2.2 General content

- Revision and draft of law and regulation for medical waste management
- Strengthen the institutional capacity building in both state government level and local government level in respect of whole process management, which shall promote the implementation of the *Plan*.
- BEP demonstration shall be established within the medical institution.
- Demonstration facilities of Medical waste disposal consist of 1 rotary kiln, 2 pyrolysis facilities.
- BAT demonstration shall consist of 1 autoclave facility and other 2 non-combustion disposal facility including micro-wave and chemical-disinfection and 1 facility for remote rural area.
- Select 3 demonstration province, among which select 6 demonstration city to centralized disposal for the medical waste of Health-care institution.



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## 2. Project Objective and General Content

### 2.2 General content

- Demonstrate the comprehensive management and collaborative disposal of medical waste
- Draft technical-economic policies to promote the application of BAT/BEP
- Carry out Disposal Technology Verification
- Financing the project by multiple-way and specialized operation
- Establish the transference and application mechanism of method, technology and equipment.
- Establish the training system for the staff of participated enterprise, of which whole-process management and BAT/BEP shall be carried out.
- Promote the education and awareness rising of stakeholder



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## 3. Project Output

- 3.1 Demonstration outcome
  - Draft total of 20 items of regulatory, law and standards, and 20 directive documents
  - 3 demonstration incineration facilities reach  $0.1\text{ngTEQ}/\text{Nm}^3$  of Dioxin emission
  - 3 non-combustion facilities reach the request of BAT/BEP
  - 3 environmental protection training centers
  - 7 training centers for health-care institution
  - 20 health-care institution for BEP demonstration
- 3.2 Outcome in dissemination stage
  - 15 incineration facilities reach the Dioxin emission of  $0.1\text{ngTEQ}/\text{Nm}^3$
  - 120 non-combustion facilities
  - 1500 healthcare institutions applied with BEP

**Reduction and Avoidance of PCDD/Fs generation of 22.66 g-TEQ**



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## 4. Project Principle

- 4.1 The best techniques, implementary entities, staff and local government with executive basis and capability shall be selected to focus on the application of BAT/BEP in the project.
- 4.2 Facilitate the interconnection between the essential parts during the implementation to magnify the outcome of available resources.
  - Smooth the interconnection between management mechanism with the applied technique, the generation of MW with the mechanism of MW final treatment, interrelationship of current administrative mechanism between medical and environmental sector in the local government and the management and disposal capacity at present and future, so as by all means to promote the implementation of the project.
- 4.3 Establish the project management model, which focus on the enterprise assisting, with environmental management sector at city level, which includes technical demonstration, application of BAT/BET, technical and management training program, facility operational and monitoring management and promotion of successful experience as well.



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## 4. Project Principle

- 4.4 Establish the implementation mechanism, of which demonstration plays as fundamental basis and associates with inducing promotion mechanism, which should promote the three aspects based on the requirement of the best joint between project management and technology, application capability and whole-process control, also name as actual requirement of life-cycle for MW treatment.
- 4.5 Well-found BAT/BEP related policy system plays as premise and basis, which includes policy, regulation, standard, BAT/BEP guideline, technical-economic policy as well as related capability building, such as technology assessment, facility operation, monitoring and management, environmental monitoring, technical training, technology promotion and etc.
- 4.6 Closely concerning with present status of China and resorting to regional management and technical promotional mechanism, the principle of concentrate on the main point shall fulfilled within the whole project, two focal point namely as technology and whole-process control of MW treatment.

**Project Design Concept**



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## 5. Project Component

### 5.1 Regulation and standard

It amounts to 40 standards or regulations shall be formulated in the project, and 20 in them shall be promulgated as national standards. **Table of Policies Output**

### 5.2 Demonstration sub-item

- General consideration for project design
- Selection standard of demonstration technology
- Selection standard of demonstration city
- Selection standard of demonstration province



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## 5. Project Component

- 5.3 Capacity building
  - 3 environmental protection training centers
  - 7 training centers for health-care institution
- 5.4 Propaganda and training
  - Objective people and institutions consist of who carry out decision-making, administrator, health-care institution, disposal facilities plant and public
- 5.5 R&D
  - Key technology of Incineration and non-combustion disposal technology, monitoring technology, etc.
- 5.6 Promotion
  - Promotion mechanism, Environmental economic policy, Environmental protection authentication and etc.



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## 5. Project Component

- Activities to strengthen the supervisory management of medical waste
- 1. Draft Duideline of Supervisory Management within healthcare institution of medical waste based on the view of sanitary respect, of which the environmental sector to manage the medical waste within hospital shall also be considered.
- 2. Testing specification for incineration facility of medical waste shall be drafted in accordance with the implementation of license permitting system for medical waste management.
- 3. Promote the registration management system for medical waste discharge based on manifest management on transfer of medical waste and assimilation of latest international experience and digital management for pollutant discharging declaration.



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## 5. Project Component

- Activities to strengthen the supervisory management of medical waste
  - 4. *Catalogue of Classified Medical Waste*, the classification standard and method based on different disposal technology shall be drafted accordingly
  - 5. Strengthen the source management of medical waste; promote the application of health-care product contained no Hg and PVC via the demonstration project, to efficiently control the generation and emission of dioxin and other toxic, poisonous substance
- Furthermore, establish the related training management system to promote the related management concepts to be fully understood and widely applied.



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## 6. Principal of Project Management

- 6.1 Stick to the principle of micro-management, which require to maximally disassemble the implementation components of the project, and stipulate the action plan as way of design and implementation
- 6.2 Stick to the expert's decision making system lead by CIO, and concretely maximize the role of experts in project management
- 6.3 Stick to the principle of project management, including following as aspects: objective, human resources, quality, progress, finance, communication and comprehension.



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## 7. Primary requirement of demonstration Activities

### Selection standard for demonstration city

- The related functional sectors of selected city shall actively positively desire to promote the MW sustainable management and treatment, especially the consistent coordination between the environmental sector and healthcare sector of local government.
- Well-developed MW management system should be the concern of selected city which own the good foundation in MW management in both environmental and healthcare sector of local government and disposal capacity. The MW sustainable management system shall be realized by the project implementation.
- The MW treatment facility of the selected city has already been listed in construction plan. Good conditions for project implementation have been already established, including fee charge policy, specialized operation licence, technical audit, project design and etc.



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## 7. Primary requirement of demonstration Activities

### Selection standard for demonstration city

- The alternative technologies of selected city shall be reliable BAT, and match with the overall plan and concept of the MW project design, which shall facilitate the target realization.
- The technical and management staff worked in environmental and healthcare sectors of local government as well as disposal facility shall be well qualified to carry out the responsibilities during the project implementation as well as capacity building in native management system.
- The selected city shall promise to supply required counterpart fund during the project implementation as well as guarantee the fund is available in accordance with the promise by necessary measures.



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## 7. Primary requirement of demonstration Activities

### Selection standard for demonstration province

- Well-developed foundation of MW management and treatment, specially, notable progress in the MW management and facility construction and operational management has been achieved by the joint effort of healthcare and environmental sector of local government.
- In respect to the MW facility construction, the implemented project shall take up 70% of the total MW treatment facilities in the selected province.
- In respect to the medical institutional capacity, a relatively standardized MW management system has been already established, where the management sectors at level shall fulfill the planned target and responsibility with good executive capability.
- The selected province shall own good relationship including interior-side as well as exterior side, including environmental sector and healthcare sector of provincial level, MOF and SEPA.



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## 8. Timeline

Timeline 2008:

- March, 19-20: Inception Workshop
- April: Establishment of Project Coordination Group  
Complete subscription of subcontract with MOH  
Establishment of Experts group
- Before May: Finish TORs and subcontracts for part of project activities.



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## 8. Timeline

- June: Determination the selection standard of demonstration sites and demonstration technologies and site visiting
- September: Determination of demonstration sites and demonstration technologies and prepare demonstration projects work plan
- November: Complete preliminary BAT/BEP demonstration plan
- December: Project annual monitoring and evaluation



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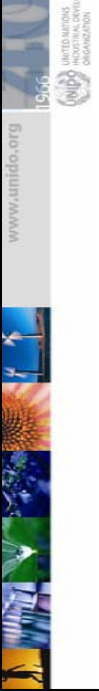
Special thanks to GEF, UNIDO, USEPA,  
IMET!

Special thanks to SEPA and MOH !

Special thanks to local EPBs, Enterprises,  
Academic institutions!




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# MEDICAL WASTE MANAGEMENT IN CHINA

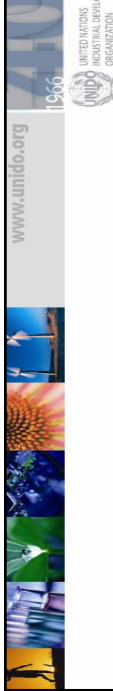
## Inception Workshop – Beijing, 19 March 2008



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## About UNIDO

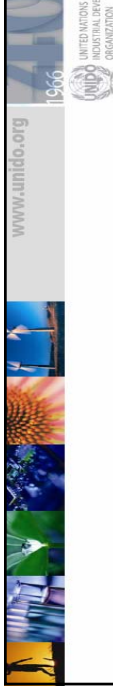
- Background
- Mission
- Technical Cooperation – Facts and Figures



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## UNIDO background

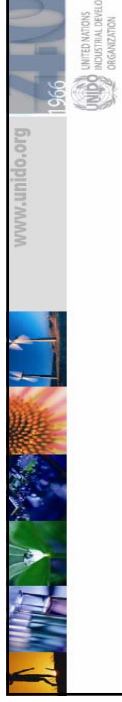
- Established in 1966 - UN Specialized Agency since 1985
- As part of the UN common system UNIDO has the responsibility for promoting industrialization throughout the developing world
- 172 Member states
- Headquarters in Vienna
- Represented in 35 developing countries



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## Mission

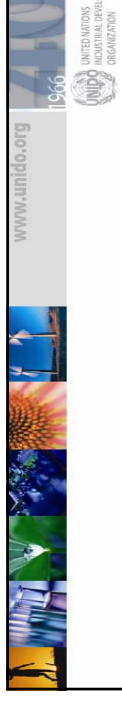
- “Poverty reduction through sustainable development”
- Assist developing countries and countries with economies in transition in their fight against marginalization in today’s globalized world
- Mobilize knowledge, skills, information and technology to promote productive employment, a competitive economy and a sound environment



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## UNIDO Procurement

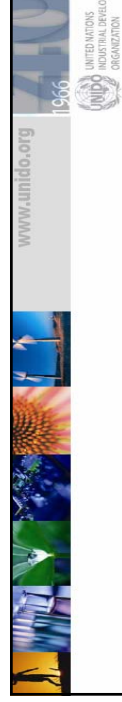
- UNIDO procures goods and services on a **broad international basis by using various procurement methods**, depending on the **value and complexity** of the requirement
- Procurement for **Technical Cooperation projects** covers a **variety of technically complex products and services**



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## UNIDO procures goods and services for:

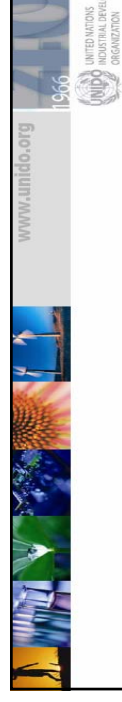
- Implementation of its **Technical Cooperation Programme**  
 2007: USD 60 million
- Maintenance of functioning of the Vienna International Center including UNIDO Headquarters  
 2007: USD 24 million



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## Most frequently procured EQUIPMENT

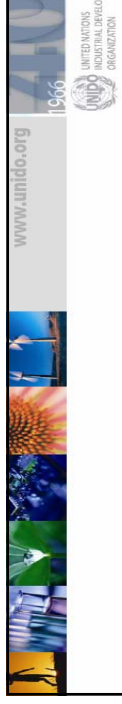
- To replace & substitute CFCs in refrigeration, solvents, aerosols and foam sector
- To replace carbon tetrachloride in pesticides production, degreasers etc.
- Dairy equipment
- Air pollution abatement equipment and materials
- Measuring, checking and testing instruments
- Mining, quarrying and construction equipment
- Laboratory equipment
- Cleaning equipment
- Equipment for textile and leather production
- Machine and hand tools



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## Most frequently procured SERVICES

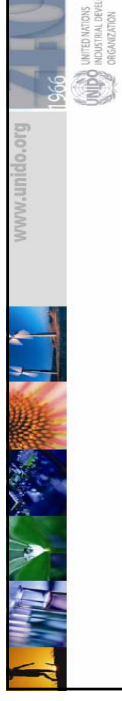
- Phase-out Ozone Depletion in refrigeration, foam, aerosols and solvents sector
- Implementation of Stockholm Convention 's requirements
- Energy conservation: environmental protection specialist and advisory services
- Electricity, generation and distribution sector
- Phase-out of Methyl Bromide
- Training
- Engineering design and construction
- Fisheries



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**UNIDO project GF/CPR/07/008**

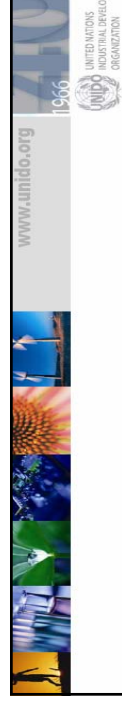
- **ENVIRONMENTALLY SUSTAINABLE MANAGEMENT OF MEDICAL WASTE IN CHINA**
- **Beijing - March 2008**



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**Objective of the Project**

to reduce and ultimately eliminate the releases of unintentionally produced POPs and other globally harmful pollutants into the environmental and assist China in implementation its relevant obligations under the Stockholm Convention.

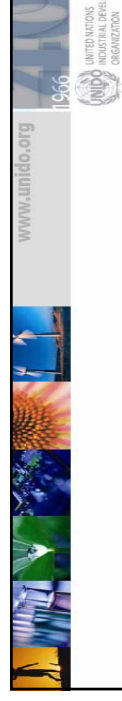


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**Scope of supply**  
 Supply of different disposal and air monitoring technologies to address combustion and non-combustion of Medical Waste.

In addition to technical criteria: commercial availability for technology transfer

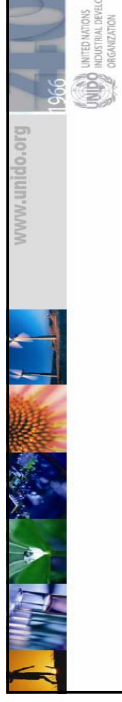
Selected through  
 UNIDO and China international competitive bidding process



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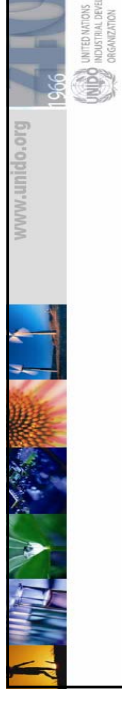
**Procurement Methods**

- Solicitation of tenders through invitation to short-listed qualified companies
- Advertisements on IAPSO and UNIDO Websites
- Expression of Interest (EOI)  
 After review and pre-qualification of EOI, solicitation documents are sent to qualified vendors or contractors



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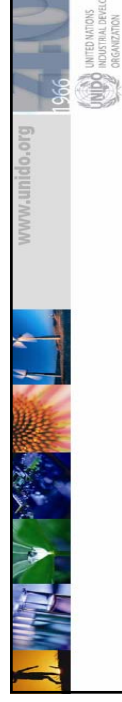
- **Requesting competitive quotations (RFQ)**  
 Less formal solicitation, lower-value, standard specifications, readily available on the market (for requirements up to €20,000)
- **Request for Proposal (RFP) or Invitation to Bid (ITB)**  
 Formal solicitation, on wide international basis, value more than €20,000 and below €300,000:  
 one sealed envelope (commercial & technical offer)  
 Value above €300,000 – **two sealed envelope system:**
  - one sealed envelope with technical offer
  - one sealed envelope with commercial offer



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### Identification of companies

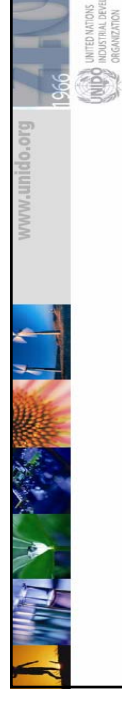
- Companies registered by UNIDO via the United Nations Global Market Place (UNGM)
- Search on Internet
- Trade Missions, Chambers of Commerce
- Exchange with other UN Agencies
- Through calls for Expression of Interest



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### Bidding documentation content of the solicitation letter:

- Deadline for submission of bid
- General guidelines for preparation of proposals/bids including the procurement method, presentation and submission, required statements, companies background and relevant references etc.
- Offers should be clearly marked  
**WRONGLY SUBMITTED PROPOSALS ARE DISQUALIFIED!**

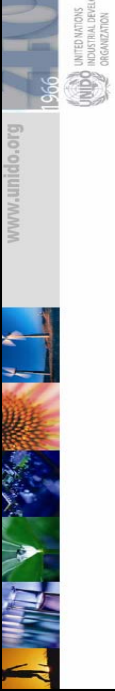


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### Requirements from bidders

Including but not limited to:

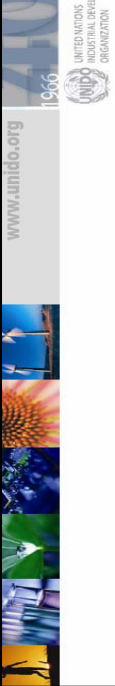
- Statements: legal status of company, authorized officials, financial statement and company profile
- Understanding of scope of work as per terms of reference, provision of CVs, realistic time table for execution of services, detailed cost-breakdown, etc.
- Acceptance of the Model Contract & UNIDO General Conditions



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### Terms of references/technical specifications

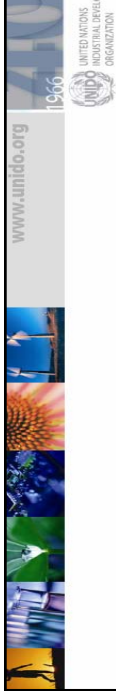
- General project background
- Scope of supply (services & equipment)
- Outputs/equipment specifications
- Guarantee requirements
- Representative in the country (equipment supply)
- Delivery period
- Installation, commissioning and acceptance
- Reporting
- Evaluation criteria



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### Evaluation criteria

- Understanding of the scope of services and supply
- Conformity with the technical requirements
- Delivery time/warranty conditions
- Appropriate after-sales service
- Supporting documentation
- Proven production capacity & financial situation
- Acceptance of UNIDO contractual terms
- References
- Recognized International/National Standard (if applicable)
- Price/payment terms

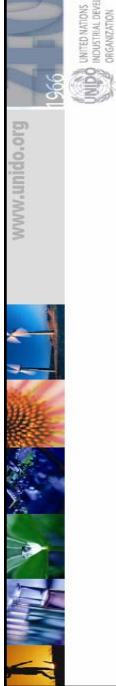


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### Opening and Evaluation of Proposals

Proposals submitted in two sealed envelopes:

- Envelope with technical proposals opened first by UNIDO team;
- Peer review for technical evaluation and identification of technically acceptable proposals;
- Commercial envelopes corresponding to technically acceptable offers are opened;
- Procurement services complete commercial evaluation;
- Final evaluation based on „best value for money“ principle submitted to Procurement Committee by Procurement Services




www.unido.org 1966  
 UNITED NATIONS  
 INDUSTRIAL DEVELOPMENT  
 ORGANIZATION

### Award of contract

**in accordance with UNIDO financial regulations and rules**

**on the basis of the best value for money principles and the interests of UNIDO to the qualified bidder whose bid conforms to requirements set forth in the solicitation documentation and offers the lowest cost to UNIDO**






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 INDUSTRIAL DEVELOPMENT  
 ORGANIZATION

## Contract terms

- Risks/liabilities
- Licensing agreement
- Bank performance guarantee
- Title rights

**TURNKEY CONTRACT**

- Performance tests
- Contract termination due to default or breach
- Liquidated damages due to late delivery, installation etc.




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 UNITED NATIONS  
 INDUSTRIAL DEVELOPMENT  
 ORGANIZATION

## Contract execution

**Contracts are administered and performance of the contractor is monitored by the Procurement Officer in close cooperation with the Substantive Office**


**Appropriate corrective actions are taken when necessary**



www.unido.org 1966  
 UNITED NATIONS  
 INDUSTRIAL DEVELOPMENT  
 ORGANIZATION

## UNIDO supplier registration

- Products and services suitable to UNIDO
- Registration procedure through United Nations Global Market place - [www.ungm.org](http://www.ungm.org)
- Obtain information about procurement activities and practices – UNIDO Procurement website: [www.unido.org](http://www.unido.org)
- Bid according to solicitation documents/rules
- Observe norms and international/national standards
- Seek clarification in case of questions
- References



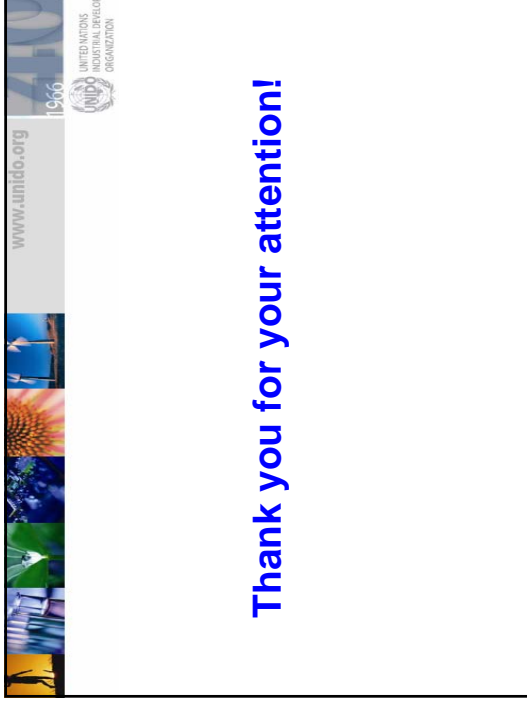
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 ORGANIZATION

## United Nations Global Market Place

[www.ungm.org](http://www.ungm.org)

= UN wide platform used by most UN agencies for **company registration**

- System guides companies through all steps required to complete application
- Application is reviewed by individual organization and confirmed (e-mail response)
- Pre-qualification is made using criteria such as: experience and references, capacity, financial and organizational strength and stability etc.
- UNIDO reserves the right to accept or reject any application without thereby incurring any liability or any obligation to inform the affected companies of the ground for UNIDO's action



**Thank you for your attention!**

# Procurement Management of FECO , SEPA

Division of Contract  
Management  
March 2008

## Contents

- Part I Functions of the Contract Management Division
- Part II Contract Committee Mechanism
- Part III How to Carry Out Procurement

## Part I Functions of the Contract Management Division

1. Contract management
2. Procurement management
3. Secretariat of the Contract Committee

## Part I Functions of the Contract Management Division

1. Contract management
  - Formulating contract management rules of FECO and monitoring their implementation;
  - Providing advice on contract formation and examining contracts of FECO;
  - Providing advice on general legal issues in project management
  - Applying for tax exemption or reduction for imported goods and locally procured goods in projects using international grants.

## Part I Functions of the Contract Management Division

2. Procurement management
  - Formulating procurement management rules of FECO and monitoring their implementation;
  - Keeping track with procurement management rules of international organizations and foreign governments in cooperation with FECO, providing advice on procurement in foreign funded projects implemented by FECO, compiling procurement documents when necessary;
  - Examining procurement related components in project proposals and project executing plans ;
  - Assisting in procurement, examining bidding and bid evaluation documents, monitoring procurement procedures and processes;
  - Executing procurement of goods when necessary.

## Part I Functions of the Contract Management Division

3. Secretariat of the Contract Committee
  - Acting as the Secretariat of the Contract Committee, organizing meetings of the Contract Committee, preparing documents for meeting and compiling meeting minutes , etc.;

## Part II Contract Committee Mechanism

### ★ Contract Committee (CC)

- Established inside FECO, the highest evaluation and decision-making organ for important project management, procurement and contract issues
- 2.1 Composition of CC
  - 2.2 Functions of CC
  - 2.3 Convening of CC meetings
  - 2.4 Decision making procedure of CC

## Part II Contract Committee Mechanism

### 2.1 Composition of CC

1. CC is comprised of Director General, Deputy Directors General and division directors of FECO
2. Director General works as the chairperson and Deputy Directors General as vice chairs. Directors are members of CC and deputy directors are alternate members. When a director is not available for the CC meeting, the deputy director of the same division shall attend the meeting .

## Part II Contract Committee Mechanism

### 2.2 Functions of CC

- 1 Examination and approval of project application examining issues related to agreements in which FECO transfers grants to another parties with the amount equaling to or exceeding 100,000 USD
- 2 Examination and approval of procurement modalities
  - 1) examining issues related to entrusting a procurement agent
  - 2) examining issues related to changing procurement modality except for changing to a stricter modality

## Part II Contract Committee Mechanism

### 2.3 Functions of CC

- (三) examining issues related to bidding invitation and contracting examining bid invitation documents for goods or work with a budget equaling to or exceeding 1 million USD;
- 2) Examining bid invitation documents for service with a budget equaling to or exceeding 0.5 million USD;
- 3) Examining contracts with an amount equaling to or exceeding 0.1 million USD;
- 4) Examining bid evaluation reports of procurements executed by procurement agents with a budget equaling to or exceeding 0.2 million USD;
- 5) Examining direct contracts with an amount equaling to or exceeding 30,000 USD;
- 6) Examining issues related to competitive bidding in which there is only one bidder;
- 7) Examining such contracts, no matter their amounts, which will lead to signing of a series of contracts with total amounts equaling to or exceeding 0.1 million USD

## Part II Contract Committee Mechanism

### 2.2 Functions of CC

- (四) Examination and approval of other issues
  - 1) Examining all complaints;
  - 2) Examining topics related to the work of CC;
  - 3) Other issues which the chair and vice chairs think need to be examined by CC

## Part II Contract Committee Mechanism

### 2.3 Convening of CC meetings

- In principle, CC meetings are held every three weeks (Thursday afternoon of the third week)
- In case of emergency and other special reasons, the chair or vice chairs can convene provisional meeting

## Part II Contract Committee Mechanism

### 2.4 Decision making procedure of CC

- The topic to be discussed on the CC meeting should be put forward at least five working days before the meeting. After reviewed by the CC Secretariat, the topic will be reported to the chair or vice chairs to decide whether it is listed in the agenda.
- For topics on the agenda, the Secretariat is responsible for sending the related materials to the Finance Division and Contract Management Division. The two divisions review the topics and should send their opinions to the Secretariat at least three working days before the meeting. Based on the opinions of the two divisions, the Secretariat will convene related divisions for discussion and consultation when necessary.

## Part II Contract Committee Mechanism

### 2.4 Decision making procedure of CC

- For topics on the agenda, the proposers should provide related materials at least four working days before the meeting.
- Materials prepared by the proposers are in electronic form, which should include backgrounds, contents and suggestions of the topics. The introduction should be precise and brief.

## Part II Contract Committee Mechanism

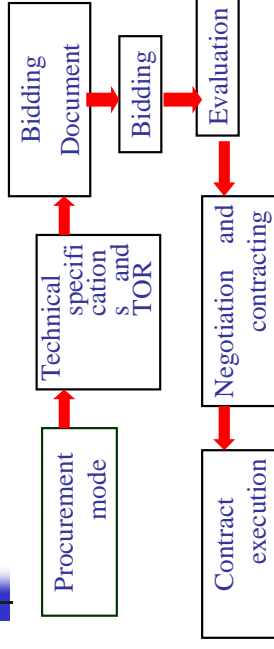
### 2.4 Decision making procedure of CC

- After collecting the opinions of the Finance Division and the Contract Management Division and related introduction materials, the Secretariat informs the CC members of the meeting time, place and topics no later than two working days before the meeting and send their related materials. The member should acquaint themselves with the topics and their contents.
- Three steps for review:
  - 1 Director or authorized vice director of the division that proposes the topic introduce the topic and the Finance Division and the Contract Management Division raise their opinions respectively.
  - 2 CC members review the topic;
  - 3 Chairman of the meeting summarizes the topic and put forward suggested resolution for the members to vote on.

## Part III How to carry out procurement

- Definition: Procurement refers to acquiring of goods, works and services as well as the process and mode for acquiring them. It includes not only purchase of goods, but also hire of contractors and consulting agencies or professionals.
- Rules: project agreement, domestic regulations, procurement rules of international organizations and foreign governments

## Part III How to carry out procurement



## Part III How to carry out procurement

### Different procurement modes

- Request for quotation (goods or services)
  - > Less than \$30,000: at least three quotations, choose the lowest quotation meeting the requirement
  - > Less than \$100,000: public bidding, at least five suppliers are invited and three bidding documents are received. Evaluated by bid evaluation committee and the lowest quotation meeting the requirement is chosen.

## Part III How to carry out procurement

- Invitation to Bid (goods or works)
  - > Normally used when entity is not required to propose technical approaches to a project activity.
  - > More than \$100,000, ICB, evaluated by bid evaluation committee and approved by the Contract Committee
- Request for Proposal (services)
  - > More than \$100,000, ICB
  - > Separate technical and financial proposals
  - > Evaluated by bid evaluation committee and approved by the Contract Committee

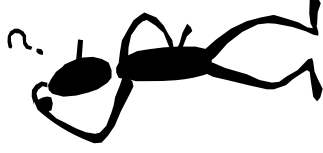
## Part III How to carry out procurement

- Individual consultants at least three resumes, compare qualification and choose the best

## Part III How to carry out procurement

Factors to be paid attention to

- Technical specification/TOR is the basis for all bidding
- Documents inviting bidding
- Shortlist
- Bid evaluation
- Contract execution



## Part III How to carry out procurement

TOR: mainly services provided by individual or an institution

- Background
- Objective
- Scope of work
- Purposes: is any hardware requirements connected with the assignment
- Deliverables: how and when will the report be presented
- Qualifications of individual or company
- Contributions: what is the client going to provide in the way of facilities and professional support

## Part III How to carry out procurement

Preparation of bidding documents

- Importance of bidding documents: bidding document is the basis for bidders prepare documents for bidding, and the basis for bid evaluation and contracting
- Composition of bidding document: notification for bidding, instruction to bidders, contract conditions, list of goods, technical specification/TOR, contract form, guarantee form, etc.
- Technical specification is a critical part of bidding document. International standards should be adopted and specific brand of certain manufacturer should be avoided.

## Part III How to carry out procurement

- Bidding document should be complete, precise, definitive and with good compatibility
- Bidding document is critical for success of the bidding. It is normally composed of financial and technical parts. Attention should be paid to the following:
- Bidding document should provide all necessary situations for bidders and should be helpful to encourage competition;
- When compiling the technical part, important technical factors and indicators should be concrete and precise;
- Clear evaluation method should be included.



## Part III How to carry out procurement

### Short list

- Prequalification review

## Part III How to carry out procurement

### Bid evaluation

- Purpose of bid evaluation: evaluate and compare the documents of bidders based on standards and methods prescribed in the bidding document so as to select the bidder providing the lowest price and meeting the requirement
- Basis, standard and method for bid evaluation: bidding document is the basis for bid evaluation; all factors need to be considered should be included in the bidding document
- In case there is no prequalification review, qualification review should be conducted in bid evaluation stage.


## Part III How to carry out procurement

- Bid evaluation is a critical link in procurement and attention should be paid to the following:
  - 1 Leadership: normally a bid evaluation team should be formed, and a bid evaluation committee can be formed for a large project ;
  - 2 Confidentiality: all that participate in bid evaluation should keep the evaluation process secret before the bid is formally granted;
  - 3 Equity: comparison and evaluation must be strictly follow the procedure and method prescribed in the bidding document.


## Part III How to carry out procurement

### Several factor for consultancy services

- **Qualification**
- **Similar experience**
- **Personnel arrangement**
- **Work plan**
- **Handling of critical matters**



Thanks



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Questions?

# Environmentally Sustainable Management of Medical

Waste in China

Financial Management Training

Division of Finance  
FECO/SEPA

## Contents

- Basic Principles for financial management of project
- Primary tasks for financial management of project
- Render an account and drawing
- Signing contract and capital disbursement
- Audit requirements

## I. Basic Principles

- **Use of funds as ear-marked:** use of funds according to budget;
- **Manage by designated person:** united leadership, hierarchical management.
- **Special project: account and treatment:** Each project implementation agency shall set up special account, and nominate designated person to be responsible for accounting treatment and financial management.

## II. Primary tasks

- Establish sound financial management system
- Manage funds strictly
- Organize accounting treatment of project
- Manage the assets of project strictly
- Process financial supervision and review

## 1. Establish sound financial management system

Establish sound internal control and financial management system, work out financial management method of project, and clarify approval procedures and approval authorities for using of funds.

## 2. Manage funds strictly

To manage and use the funds of project efficiently and effectively is key to ensure the smooth implementation of project. Funds management should be strengthened, fund usage should be according to budget, and encroach and divert funds for other purposes are strictly forbidden, in order to ensure that funds be used especially for project construction, and bring the economic benefit of grant into play.

## 3. Organize accounting treatment of project

Organizing accounting treatment is one of the primary functions of project finance. Every project institution is the main body of project accounting and must establish a complete set of accounting system. Project accounting shall reflect overall, objective financial activities of project, and record economic transactions continuously, systematically and truly. It shall compile fund usage statement by the end of a year and make financial analysis of project.

## 4. Assets Management

- **Current assets:** including cash, bank deposit, receivables, prepayment and stock etc.
- **Fixed assets:** Pricing and manage according to relevant current regulations complied to by every institution.
- **Property right:** The State owns the property right of assets before the project has been completed. After the project has been completed and accepted, it shall transfer the property right to the management institution according to relevant agreement.

### III. Accounting treatment

The performance of financial activities of project is subject to review and supervision of The State Environmental Protection Administration , and fund usage shall be for pre-designated purpose. Project institution shall maintain complete financial materials of project.

#### 1. Accounting treatment of project

The accounting treatment of project institution shall be based on the economic transactions that actually occur and shall be treated according to stipulated accounting method. It shall apply the method of debit-credit bookkeeping on accrue basis. In principle, it uses RMB as recorded currency for bookkeeping, however uses USD as recorded currency for USD account. By the end of a year, it shall convert USD into RMB to compile financial report.

#### IV. Render an account and drawing in the project

- Render an account and drawing
- Procedures for rendering an account

#### 1. Render an account and drawing

- It refers to the method of applying fund disbursement according to the actual payment from funds that have been received during the previous period and proposed activities of next period based on the fund using plan. (it is different from performance-based disbursement method)。

## 2. Rendering procedure

- The FECO of SEPA shall be responsible for the review of rendering and drawing and process reimbursement of project.
- The project institution shall fill in drawing application letter according to the progress of contract or project and documentation for relevant actual expenses, and FECO will process disbursement after the review and approval.

## V. Contract review procedures and essentials

Review essentials of every procedure

- Contract committee: approval for key project and arbitration for difficult issues, such as the authenticity and qualification of enterprise; openness and fairness in project company selection; rationality for determining the sum of a project; effectiveness of project design; assurance for implementation obligations.
- Contract department: compliance of bidding process, rationality of bidding results and legality of contract document.

## V. Contract review procedures and essentials

- Financial Division:
  1. Whether it will implement project activities according to the proposed project implementation method within the framework of overall funds allocation plan submitted to the Financial Division when project being confirmed.
  2. Economic rationality of project budget.
  3. Commercial terms for contract document.

## VI. Review for contract payment

Review the payment terms

- Review by project officials: The payment is included in the plan, the submitted technical index of material is eligible and the applied amount is correct.
- Review by financial officials: The payment terms of contract conform to financial system and payment procedures, and amount does not exceed budget amount. Supporting documents and receipts for payment are complete and approved by the project department.

## VI. Review for contract payment

Primary supporting documents for various payments

1. It shall compare different quotations in solicitation for procurement: provide relevant receipts when making the payment, including price inquiring sheet, quotation, price comparison report, signed approval for signing contract and original contract, acceptance sheet, settlement sheet etc.
2. Procure by inviting a public bid: it shall implement bid invitation and selection activities after the short list has been approved, and sign the contract with the awarded institution being approved. It shall provide signed approval for signing contract and original contract, relevant basis satisfying payment terms, invoice and other receipts when making the payment.

## VI. Review for contract payment

3. Attach meeting notice, budget, minutes, sign-up sheet, materials, final accounting for expenses, invoices and other receipts when paying for meeting, training and investigation.

## VII. Audit requirements

- Audit institution
- Audit time
- Audit object
- Audit requirements
- Problems in audit

## Audit institution

- Project Office of Central Government shall entrust National Audit Office (or independent third party) to make the audit according to the requirement of UNDIO.

## Audit time

- The National Audit Office will make audit for project around March every year.

## Audit object

- All institutions that involve with grant according to the flow of funds, including the FECO /SEPA and project institutions.

## Audit requirements

Mainly divided into financial audit and performance audit.

- Financial audit: conducting audit for the management of project funds mainly, including the accounting statements, accounting book, accounting voucher; and for the authenticity, rationality of project's financial activities and scientificness of management. —— with the aim to discover mistakes and prevent fraud.

## Audit requirements

➤ Performance audit

1. Conducting audit is mainly to check the achieving of project objectives, which does not only answer the authenticity, legality of the use of grant, but also can provide information about project management and the benefit and effectiveness of using the funds.
2. It includes two aspects, project performance and the use of funds.



## Audit requirements

Main concerns of performance audit:

1. Project performance, including whether the project is appropriate, management is effective, assurance measures are helpful, and the fairness and rationality of audit before confirming project, and whether the project progress conforms to the contract.
2. The use of funds, including whether the use of grant is reasonable, the account is clear and authentic, and whether there is any violation against financial regulations.
3. Project progress, contract performance, grant receiving and using conditions of technical assistance projects by the end of a year.

## Problems found in audit

1. Material and evidence collection, management and maintenance is not so scientifically that material is not complete. It shall keep complete accounting record for the use of grant and co-finance materials. Otherwise, the audit institution have not audit basis and evidence, and cannot express its audit opinion.

## Problems found in audit

2. It does not follow full procedures during project activities.

## Problems found in audit

3. Co-finance is not in place.
  - Divert project funds and materials for other purposes;
  - Incomplete financing material evidence
  - False application for grant
  - Detain project funds
  - Sell of project materials
  - Weak financial management

Thanks for your attention!

Contact: Wu Xian, Financial Division of FECO  
Tel: 010-88575455



Inception workshop for GEF- Environmentally Sustainable  
Management of Medical Waste in China

## *Current Situation of Medical Waste Management and Disposal Policy and Related Output of the Project*

Chen Yang  
Mar.20, 2008

## Contents

1. History of Medical Waste Management and Policies Development
2. Current Situation of Policy and Standard of Medical Waste
3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal
4. Policies Development Tendency of Medical Waste Management
5. Concept of Policy Development and Design of Project
6. Design Idea and Policy output of Project



## 1. History of Medical Waste Management and Policies Development

- (1) *Medical Garbage Incineration Environment Health Standard* issued by the Ministry of Constructions in 1995 to raise the environment health requirement for medical waste incineration.
- (2) *Hospital Sterilization Health Standard* jointly promulgated by State Administration of Technical and Quality Supervision and the Ministry of Health in 1996, providing that the pollutants, regardless of recycled or scraped, must undergo harmless treatment and the treated substances are not permitted to contain any infectious microbes.
- (3) *National Catalogue of Hazardous Waste* jointly issued by State Administration of Environmental Protection, State Economic and Trade Committee, Ministry of Foreign Trade and Economic Cooperation and Ministry of Public Security, where medical waste is listed as number one hazardous waste.



## 1. History of Medical Waste Management and Policies Development

- (4) *Hospital Infection Management Regulation (tentative)* issued by the Ministry of Health in 2000, providing hospital waste treatment and classification, collecting and treatment requirements, used sharp device to be placed in leaking-proof and anti-piercing containers for harmless treatment and infectious waste to be sealed in yellow plastic bag for transportation to harmless treatment facilities.
- (5) *Hazardous Waste Incineration Pollution Control Standard*, *Hazardous Waste Storage Pollution Control Standard* and *Hazardous Waste Landfill Pollution Control Standard* issued by the State Administration of Environmental Protection, providing hazardous waste plant site selection, incinerator technical criteria, hazardous waste storage, etc. In 2002 the Ministry of Health enacted *Sterilization Management Method*, providing that all spent one-shot medical devices used in medical facility shall be timely treated to harmless specifications.



## 1. History of Medical Waste Management and Policies Development

- (6) *Medical waste Management Regulation* issued by the State Council in 2003, the first legislation associated with medical waste management. Its promulgation indicated Chinese medical waste management process from generation, temporary storage, transportation to concentration disposal entering into a regulated and legal management orbit.
- (7) *National Hazardous Waste and Medical waste Disposal Facility Construction Plan* issued by the State Council in 2004. For implementation of the Plan, the State Administration of Environmental Protection and the Ministry of Health enacted a series of regulation and standard. The Plan and relevant regulation and standard together symbolized Chinese medical waste management and disposal entering a brand new development stage.

## 2. Current Situation of Policy and Standard of Medical Waste

- Law
- Regulation
- Standard and specification

[Existing law, regulation and standard system framework](#)



## 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

- The uppermost hazardous property of medical waste is infectious, in order to eliminate the infectious property so that to protect human body and environment, incineration methods have been prominent role to dispose medical waste in the world for many years.
- But the process of incineration facilitate to produce pollutants such as PCDD/PCDF and heavy metal, etc. thereinto, PCDD/PCDF has been linked to cancer, immune system disorders, diabetes, birth defects, and other health effects. In the last 10 years, the enforcement of stricter emission standards for dioxins and furans by many countries significantly reduced the release of these substances into the environment. (WHO,2005).
- Many pressure from the collecting, package, transportation, storage, etc. in the medical waste management.

## 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

- The agreement was eventually concluded in 2001 and the *Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)* was signed in Stockholm, Sweden, which became effective in 2004.
- *Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Their Disposal (Basel Convention)* was signed in Basel in 1989 and become effective on 1992.
- WHO-requirements on medical waste management and treatment-the book *named Safe Management of Waste from Health-care Activities* was published in 1998.



### 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

#### Requirement of POPs Convention:

- Among 5 main objectives, there are 2 related to medical waste management and treatment.
- Among 12 POPs, there are 4 related to medical waste management and treatment ( PCDD, PCDF, PCB and HCB ).
- Guidelines on Best Available Techniques and Guidance on Best Environmental Practices Relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants, specific requirement on medical waste management and disposal was put forward.



### 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

#### Requirement of Basel Convention:

- In Basel Convention, medical waste embody infectious characteristic and one of the main components of hazardous waste, and list medical waste into Annex 1.
- Main contents of Basel Convention aim to protection of human health, prevention of environment safety from detriment resulted from production, movement, treatment and disposal of hazardous waste and other waste.
- Released *Technical guidance for the environmentally sound management of Biomedical and Health care Waste*, mentioning of plastic and other chloride content have more infectious or toxic substances than ordinary rubbish and prone to generate PCDD/PCDF, HCB, PCB and other trace volume of pollutants.



### 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

#### Requirement of WHO-Safe management of wastes from health-care activities :

- Divide medical waste into 9 classification.
- Specific guidance to medical waste management, for example legislation, management procedure, management method, supporting activities and strategic objective, etc..
- Emphasize on the conjunction between POPs Convention and Basel Convention.



### 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

#### Requirement of WHO-Safe management of wastes from health-care activities :

- Divide medical waste into 9 classification.
- Specific guidance to medical waste management, for example legislation, management procedure, management method, supporting activities and strategic objective, etc..
- Emphasize on the conjunction between POPs Convention and Basel Convention.

### 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

- On Jan, 2004, *National Hazardous Waste and Medical waste Disposal Facility Construction Plan* issued by the State Council in 2004, 332 centralized medical waste disposal facilities will be built in municipal level all over the country. So far, over 50 facilities in the Plan have been enter operation, 150 have been approved by SEPA, which result over 200 facilities in operation.
- For implementation of the Plan, the State Administration of Environmental Protection and the Ministry of Health enacted a series of regulation and standard. The Plan and relevant regulation and standard together symbolized Chinese medical waste management and disposal entering a brand new development stage.

### 3. Pressure from Implementation of Conventions in Medical Waste Management and Disposal

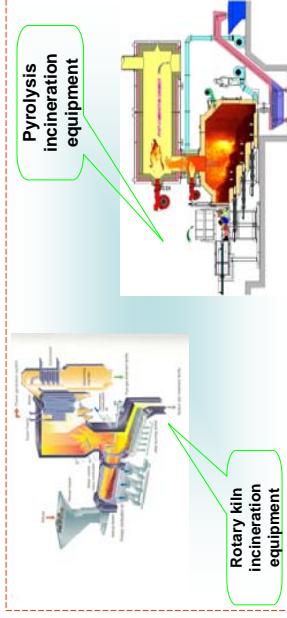
- Currently implementation processes of Chinese medical waste management and standard still exist some urgent problems to resolve compared with Convention.
- It is still imperative to how to achieve sound environmentally management to incineration technologies, for example rotary kiln and pyrolysis etc. as well as non-incineration technologies, for example autoclave, microwave and chemical treatment, etc. in China.

### 4. Policies Development Tendency of Medical Waste Management

#### Technologies for medical waste disposal

- Incineration technologies**
    - Rotary kiln
    - Pyrolysis
    - Flowing bed
    - Fixed bed
  - Non-incineration technologies**
    - Autoclave
    - Microwave
    - Chemical
    - Dry heat treatment
- Type of Technologies

### 4. Policies Development Tendency of Medical Waste Management



4. Policies Development Tendency of Medical Waste Management

Autoclave equipment

Autoclave equipment

4. Policies Development Tendency of Medical Waste Management

Microwave equipment

Microwave equipment

4. Policies Development Tendency of Medical Waste Management

Microwave+ autoclave

Microwave+ autoclave

4. Policies Development Tendency of Medical Waste Management

**Tendency of Policy**

- Wholesome medical waste management system is effective **approach to resolve the problem of medical waste all over the countries.**
- Strengthening the all-round medical waste management and improving the enforcement ability is the common choice in the world.
- The tendency of treatment technology embodies in the transition from incineration to non-incineration.
- Push to adopt BAT/BEP in all-life medical waste is the necessity to achieve sustainable management in the future.

## 5. Concept of Policy Development and Design of Project



- **As the multi-factors of complex composition of MW, The disposal technology available including incineration and non-combustion technology associating with their characteristic to treat respective scope of MW, so the requirement for the flue gas emission and control is different for such concern.**
- **The core target of MW management and dispose is promotion of the BAT/BEP application in new and existing MW source, and actively brings the concept of cleaner production and circulation economy into the practice in MW management.**

## 5. Concept of Policy Development and Design of Project



- **Concerning of comprehensive management and technical training system and economic operational mechanism, the concept of Life-cycle and whole-process control shall be introduced into the management practice to push forward the MW sustainable management.**
- **Life-cycle management is referred the management concern the whole process of MW treatment, including collection, classification, packing, storage, transportation, treatment and disposal.**
- **The term of Whole-process control emphasized in the process of environmental management, i.e. the technical authentication after completeness of R&D stage of a technology, project construction of technology application and operational management after project established, supervisory management of governmental environmental sector and the process monitoring for facility operation and management.**

[Concept of Project design](#)

## 6. Design Idea and Policy output of Project



### Design Idea of Project

- (1) **Facilitate the interconnection between the essential parts. Under well concern of the life-cycle, the optimal BEP shall be concretely applied in all the interior parts within the medical institution, to smooth the interconnection between management mechanism with the applied techniques, the generation of MW with the mechanism of MW final treatment, interrelationship of current administrative mechanism between medical and environmental sector in the local government and the management and disposal capacity at present and future, so as by all means to promote the implementation of the project.**
- (2) **Focus on the enterprise assisting with environmental management at city level, which includes technical demonstration, application of BAT/BET, technical and management training program, facility operational and monitoring management and promotion of successful experience as well, especially for the interior management experience of medical institution.**

## 6. Design Idea and Policy output of Project



### Design Idea of Project

- (3) **Demonstrational function plays core role as fundamental basis and associates with inducing promotion mechanism, which should promote the three aspects based on the requirement: the best fit and between project management and the policy application capability and whole-process control, also name as actual requirement of life-cycle for MW treatment.**
- (4) **Well-found BAT/BEP related policy system plays as premise and basis, which can order policy priority and under BAT/BEP guiding, technical-economic policy as well as related capability building, technology assessment, facility operation, monitoring and management, environmental monitoring, technical training, technology promotion and etc.**
- (5) **Closely concerning with present status of China and resorting to regional management and technical promotional mechanism, the principle of concentrate on the main point shall fulfilled within the whole project, two focal point namely as technology and whole-process control of MW treatment.**





## 6. Design Idea and Policy output of Project

### Output of Policy

**It amounts to 40 standards or Project files shall be formulated in the project.**

[Inventory of Policy Output](#)

# Thanks



Introduction on the application and development of the technologies for medical waste treatment and disposal in China

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## Context

- ❑ *Technologies application*
- ❑ *Developing trend*

## Technology application before the implementation of “National Plan”

■ *Number of disposal facilities*  
Emergency Incineration Facilities During SARS :  
Total : 175  
Dispersed facilities: 132  
Collective facilities: 43

Other self-building facilities:  
Total: 242  
Dispersed facilities : 130  
Collective facilities : 112

■ *Technologies:*  
Among these dedicated disposal facilities, one facility is using autoclaving technique, 5 facilities recycling medical waste illegally and all the others applies incineration or pyrolysis. Most of them have not installed even the basic air pollution control devices or have limited devices to control the PCDD/PCDF emissions. Among the 149 incineration facilities, there are 10 rotary kiln incineration facilities ;the rest deploy pyrolysis furnaces.

## Technology application before the implementation of “National Plan”

- *Scale and capacity:*  
within 149 dedicated incineration facilities:  
The treatment capacities of 52 dedicated incineration facilities are more than 10 tons/day accounting for 34.9% of national capacity (total number is 149);  
The treatment capacities of 38 dedicated incineration facilities are between 5 tons/day and 10 tons/day accounting for 25.5% of national capacity.  
The treatment capacities of 59 dedicated incineration facilities are less than 5 tons/day accounting for 39.6% of national capacity.  
  
Total treatment capacities is 1,327.48 tons/day, 438,000 tons/year (300 days). Among these facilities, the treatment capacities are more than 10 tons/day are 52 facilities, that of 43 concentrated facilities are 213.2 tons/day, averagely 5 tons/day for one facility, and that of 132 dispersed facilities are 226.2 tons/day, averagely 1.7 tons/day for one facility.  
In 2004, the actual disposal amount of waste of China was 107,600 tons, the designed capability in these same cities are 336,000 tons, with the facility utilization ratio of 32%.  
  
■ *Investment :*  
The total investment for concentrated facilities is 68,344,000 Yuan with disposal capability 190 tons/day (equal to 360,000 Yuan/ton)  
The total investment for dispersed facilities is32,270,000 Yuan with disposal capability 110 tons/day (equal to 293,000 Yuan/ton).  
The average investment for unit treatment capacity is 293,000 Yuan/ton.

## Technology application before the implementation of “National Plan”

### Existing Problem

- Inappropriate construction site for serious residents interference
- Imperfect system configuration, less reliable equipment quality (without air pollution treatment, such as acid removal, quenching, online-monitoring, feeding system, etc.)
- Weak control of secondary pollution which has become a new pollution source
- Low technical level, a chaos of pyrolysis incineration facilities market
- Small unit construction scale, low capacity ratio
- Many projects are lack of environmental supervision and management

## Technology application in technical check

Projects completed technical check Until March 2008

- 24 disposal facilities, which disposal hazardous waste and medical waste together, used rotary kiln incineration process;
  - 125 medical waste disposal facilities
  - 69 adopted pyrolysis incineration technology
  - 54 adopted autoclave technology
  - 2 adopted autoclave+microwave technology
- The major autoclave equipments in some projects were imported equipments
- Technical route adjust from incineration to non-incineration

## Technology applications in current built projects

- Built projects: 79  
use self-funding: 56  
use national debt: 23
- Built projects before July, 2008: 28  
use self-funding: 3  
use national debt: 25
- Built projects before December, 2008: 63  
use self-funding: 9  
use national debt: 54

具备一定的环境安全保障能力

## Technology applications in current built projects

### Existing problem

- Location choosing (Liangcheng, Yueyang)
- Design scale of some of projects is bigger than what they need
- Difficult to collect medical waste, hardly reach full capacity, hardly continue operating
- Disordered dioxin monitoring
- No guarantee of level of technologies
- Fee policy cannot be fulfilled and effected implemented
- Supervision and monitoring are not sufficient, environmental protection built acceptance are not strict

## Technology applications in current built projects

### Existing problem

- ❑ Less control on bidding price, low bidding price won the bid.
- ❑ The difference between different bidding price is huge, cannot guaranty the level of technology
- ❑ No on-line monitoring equipments
- ❑ Depress major equipment price, adding more adjunctive facilities establishments
- ❑ Operation cost is high, the execution of fee collection is low
- ❑ Conflict between BOT building model and national debt building model

## Considerations for choosing technologies

- The adaptation of the object
- The appropriated scale
- The matching management
- The reliability of technology

## Choosing technologies

- Use collective disposal based on cities. Suggest to use collective and Dispersed disposal model together only at special situation, for example, the transportation distance is too long or any emergency happens (SARS)
- Consider waste characters, disposal scale, disposal purpose, disposal cost, adjunctive facilities, and etc. to choose technology. According to china's situation, suggest: 1. incineration technologies (rotary kiln and pyrolysis process) are matured with engineering experience, suit to medical waste disposal, still first choosing technology; 2. non-combustion technologies, such as autoclave, could be the first choosing technology for small scale disposal facilities
- The precondition of choosing technologies is sterilization, disinfection, destroy the appearance, harmless and preventing secondary pollution. Also considering the disposal scale, social-economy development, environment awareness and national plan in different service region. Prior adopt practical, matured and reliable technologies.
- The plan is: 1. the facilities treatment scale above 10 tons/day and medical waste and hazardous waste mix facilities, prior adopt incineration technologies, such as rotary kiln; 2. the facilities treatment scale between 8 tons/day to 10 tons/day, could adopt pyrolysis process that can be controlled better and realize stable combustion; 3. 5 tons/day, could consider autoclave and microwave disinfection technologies; 4. other technologies, such as chemical disinfection technologies, could be considered for dispersed disposal plan for long term consideration and emergency in remote area or medical institutions.

## Developing trend 1: phase out and improve

- The implementation of Plan companied with a large number of facilities phase out, upgrade and replacement
- No national requirement of facility construction, research and development of facilities are weak
- No systematic, no policy, no market drivenness, very less engineering practice, weak industrialization
- The need of retrofit of current facilities and strengthen the technology (incineration and flu gas) is obvious
- Medical waste in remote area need simple safe disposal, emergency facilities need to be considered

### Developing trend 2: small scale facilities adopt non-combustion technology

- Non-combustion technology is new technology, it was lack in the plan
- Incineration and non-combustion technologies have their own advantages and disadvantages
- The selection of incineration and non-combustion technologies should be related with facility scale, especially for incineration technologies.
- non-combustion technology should also use collective disposal
- non-combustion technology should fully consider waste water, waste gas, VOC and other issues.
- Some less amount medical waste need coordination disposal

### Developing trend 3: from craft theory to quality guarantee of equipment; from products to engineering; from single hardware to system integration

- Lack of knowledge on how to ensure safe design specification and requirement of technique; lack of knowledge on the key points of facilities and design, such as equipment, craft, structure and materials; lack of process control, the disposal process is not transparent.
- Previously emphasis on research and development only on technique and craft, no experiences on engineering, the level of technology industrialization is low.
- Consider incinerator as single products not engineering construction, it is hard to permit to the market and verify after construction
- Need specifications on some aspects
- Systematic, integrated and operation experience

### Developing trend 4: from end pollution control to whole-process technique management

- Emphasis end pollution control for a long time, lack of engineering construction standard, design specification and whole-process technique management, lack of related experience
- There are differences between domestic and international requirements; the parameter of process and construction control standard are necessary; whole-process technique management, guide and improvement need for China
- Development of medical waste BAT/BEP fits Chinese context
- Lack of specification of engineering design, construction standard, design manual, bidding technique requirement, technique requirement on complete construction examination, and etc.

### Developing trend 5: insist on life-cycle systematic management

- Lack of basic characteristic research on medical waste, not applicable design
- Lack of connection between medical waste segregation and collection in medical institutions and later treatment and disposal
- Lack of research on the applicability of disposal technology, most of technologies of flu gas pollution control are from municipal waste incineration, need develop technology for medical waste
- Attach most importance to R&D and industrialization of technology, realize systematic of craft, technique, equipment, engineering and operation
- Enhance summarize engineering construction, extract technique requirement from the experiences of engineering and operation

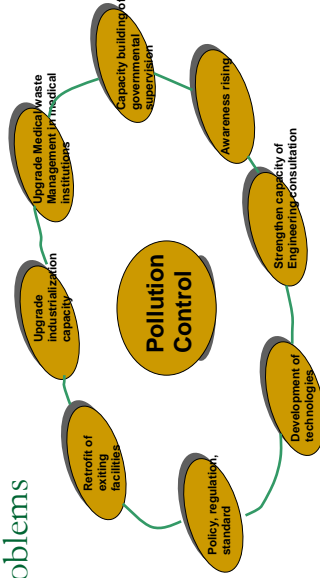
Developing trend 6: consider dioxin issue step by step on the base of consideration on normal pollution factors

- Strict execution the requirement of technique specification
- Supervising monitoring and client monitoring
- Normal factors and specific factors, NOx和HCl
- Daily supervision and consignment management
- The pressure on POPs Convention Implementation
- Lack of impact, possible pass, technical and economic analysis and evaluation on enhance dioxin emission standard

Developing trend 7: operation management technology

- Equipment should consider Chinese context, such as collection insufficiency, operation efficiency
- The emphases of next stage is operation
- Fully consider operation technique according to the utilize life and efficiency of equipments
- Fee system has not truly established
- The solution of management issue cannot rely on the solution of hardware

Bottle neck of technologies and major problems



Improve the level of medical waste management and disposal  
Fulfill the Convention Requirement

Thanks!

## Implementation Plan of MOH Sub-project

Global Environment Facility(GEF)

Environmentally Sustainable Management of Medical

Wastes in China (PDF-B)



卫生部医院管理研究所  
National Institute of Hospital Administration

Project office

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## Content

- Objectives and Significances
- Expected Outcomes
- Activities and Implementation Plan
- Supporting Requirements



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## Objectives and Significances

To improve and promote the MW management and treatment in medical institutions of China, in order to achieve the goal of reducing and ultimate eliminating the release of unintentionally produced POPs and other globally harmful pollutants into the environment, as well as to implement the provision of the Stockholm Convention.



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The researches and activities under the sub-project will cover the most processes in the MW lifecycle including purchasing, waste generation, waste segregation, intermediate storage and transportation. Therefore, it is very crucial for the accomplishment of the whole project because the result of this sub-project will be the base and precondition.



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Benefits from the implementation of the sub-project:

- Strengthening the regulatory framework for MW management and treatment in macroscopical aspect and enhancing the maneuverability in microcosmic aspect.
- Promoting establishment of better management systems and performance mechanisms within medical institutions for MW management and treatment.



Benefits from the implementation of the sub-project:

- Raising effectively the awareness of environmental protection for administrators, managers, healthcare workers and residences through adopting and replicating the BAT/BEP management and treatment of MW.
- Reducing the cost of MW treatment by reducing the amount of MW and rising cost-benefit rate.



### **Expected Outcomes**

1. Updating *Classification List of Medical Waste* based on document studies and field investigations;
2. Analyzing problems of current MW treatment system in MIs and establish supervision mechanism of MW management so as to meet the requirement of BAT/BEP;



3. Establishing demonstration BEP hospitals based on outcome 1 and 2;
4. Compiling and publishing training materials on MW management in medical institutions, establishing training systems.





## Activities and Implementation Plan

### 1. *Update Classification List of Medical Waste*

- This is the most crucial and difficult part in the whole project. Supervision, training and demonstration activities must rely on the scientific outcomes of this research.



**1.1 Document Studies:** focusing on relevant laws, regulations and study reports on MW management from domestic and foreign sources to analyze the differences between the regulatory framework in our country and the requirement of international treaties, for the purpose of laying foundation of revising or promulgating relevant regulations and supplementary documents.



1.2 Field Investigations: by distributing investigation forms or investigating on site.

- Choose representative medical institutes: taking account into the elements such as different areas, different types, and different MW treatment measures, etc.



- Investigation in different MIs: to gain reality, be familiar with the process, so as to ensure a new operational catalogue of MW.



**1.3 Workshops and seminars:** to discuss the revised drafts.

**1.4 Collecting comments and advices:** to circulate the drafts widely among hospitals, healthcare centers, academic community, MW treatment facilities, governmental agencies and relevant experts for comments and advices.



## **2. Strengthen supervision and management capabilities of health administration on MW management**

- Develop guidance for Health Agencies to supervise MIs in adoption of BEP on MW Management;
- Have relevant trainings according to the actual necessary of supervision and management;
- Establish a MW data reporting system between medical institutions and authorities;
- Establish a regular inspection mechanism for the local environment and health departments .



**2.1 On-site investigation:** investigations in MIs both in dedicated disposal treatment areas and dispersed treatment areas separately, and make quantifying and qualitative analysis.



- a. General information of supervisors of MW management
- b. Supervision mechanism of MW management
- c. Utilization of supervising tools of MW management
- d. Problems in supervising process
- e. Advices on improving supervision



2.2 Seminars: discuss and determine the criteria, means and other issues on supervision

- a. Classification ( who'll be in charge )
- b. Collective means for different types of MW (tools)
- c. Requirements for persons in charge of transportation within hospitals
- d. Criteria of temporary storage places



2.3 Information management system

- a. Governmental information management system
- b. Information exchange
- c. Medical information management system
- d. Data of MW information management



### 3. Demonstrate BEP in medical institutions

- Plan demonstration program
- Develop booklet for BEP Application in MIs
- Develop Specifications on MW Management in MIs
- Select 20 representative medical institutions for the demonstration program
- Implement the demonstration BEP program
- Monitor and evaluate the results of demonstration program
- Summarize experience of demonstration BEP and extend the MW BEP Management in MIs



- 3.1 Develop Specifications on MW Management in MIs based on the revised classification of MW
- 3.2 Organize experts to draft demonstration booklets
- 3.3 Select demonstration institutions
- 3.4 Take pilot demonstration
- 3.5 Perfect demonstration booklet
- 3.6 Establish 20 demonstration institutions



#### 4. Establish training and accreditation systems for management of MW

- 4.1 Compile textbooks for trainings
- 4.2 Develop training curriculum systems
- 4.3 Take managerial and technical trainings ( environmental protection 、 health )



4.4 Develop administrative measures and qualification standards for training institutions

4.5 Establish training system that include 7 training bases on BAT/BEP management of MW at the national 、 provincial 、 municipal and county levels



#### Expected Outputs (sum-up)

- The revised *classification catalogue of medical waste* that is Scientific and workable;
- Specifications to supervise different Mis in adoption of BEP on MW management
- 20 demonstration BEP bases established
- various training textbooks published
- 7 training bases established



#### Supporting Requirements

- ❖ GEF will provide financial support for the project;
- ❖ UNIDO has committed to provide financial support;
- ❖ Central and local governments of China will provide necessary co-financing and support for the implementation of the project;
- ❖ Support on management and organization of activities from China administrations at all level;



## **Supporting Requirements**

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- ❖ Inter-departmental consultation and coordination between governmental agencies at all levels relevant to environmental protection and health in China;
- ❖ Participation and support from relevant enterprises;
- ❖ Participation and support from relevant medical institutions;



## Demonstration sites total design concept

- At demonstration stage, provincial EPB, provincial HB will establish provincial coordination point, the selection of demonstration province should consider how to ensure the outputs of dissemination stage
- The core of Demonstration sites will be the cities located medical waste disposal facilities, establish municipal level project implementation unit, the implementation of BAT/BEP demonstration of disposal facilities and BEP demonstration in medical institutions should combine together.



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## Demonstration sites total design concept

- Life-cycle management concept should be reflected in the establishment of operation management Demonstration sites
- Management model demonstration and disposal technology demonstration shall be simultaneously implemented to practise the concept of BAT/BEP guideline.
- Fulfill the related management model implementation combined with training system
- Ensure the project output dissemination



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## The basic requirement of demonstration enterprise

- Actively participate the demonstration cite construction, and consent to carry out the demonstration in management and technical respect.
- Consent to fulfill the technical retrofit to reach the requirement of the BAT/BEP technical Guideline by own expense.
- Intend to adapt international management system and carry out the necessary modification.
- Possess sufficient fund and other resources to guarantee the successful implementation.



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## Drawback of rotary kiln

- Un-reasonable material selection in Engineering Design, low-automation, poor-monitoring system, poor operation and management
- Current design of rotary kiln under the basis of PCDD/Fs emission below 0.5TEQng/m<sup>3</sup> which is fairly margin comparing with the international standard of the start of art technology as 0.1TEQng/m<sup>3</sup>, so the existing facility faces with the in-borned defects as system imperfectness, low design basis, which cause the retrofit project will soon be carry out.
- As lack of understanding the nature and characteristics of medical waste, the adaptability of rotary kiln is not so good, which is reflected as serious sintering leading to shortening the life of fire-resistant material, unstable performance of acid control, for flue gas, corrosion and humidity accumulation occurring in fan, all such defects harm the stable operation of the system as well as the disposal performance.
- As the collection of medical waste is insufficient, the facility operates in continuity manner, which will generate the high yield of PCDD/Fs as well as the other pollutants in the stage of start-up and stop, which is tremendously above the emission standard, and form serious environmental pollution.



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## Preliminary selection standard of rotary kiln demonstration

- The established facility shall be basically accordance with technical guideline of BAT/BEP
- Engineering basis and continue operational experience has been already achieved, which means the facility should continually operate at least one month after the facility was established.
- The requirement of pollution control standard for hazardous waste incineration (GB18484-2001) shall be satisfied through the facility BEP demonstration, Dioxin emission reach the  $0.5\text{TEQng/m}^3$
- The space for project retrofit is available, on-line monitoring system is established or is going to construct, the waste utilization facility is possibly added
- Dioxin emission reach  $0.1\text{TEQng/m}^3$  via technical retrofit and management perfection.
- Demonstration experience shall be practically applied for other projects



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## Existing drawbacks in pyrolysis technology

- The market of technical supplier is extremely disorder in competition, which is due to the low market entrance threshold, as there are many types of pyrolysis equipment with different technical level competing with each other, and the price of different equipment with the same capacity can be over 10 times. The few of successful cases is established.
- Stable pyrolytical condition is hard to achieve since the fluctuating of the operational condition, the flue gas control facility is hard to suit the serious changes of volume and composition of flue gas and the inefficient adjustment of automation system lead to the bad performance for flue gas control system. Burning, backfiring and other abnormal phenomena may occur within chamber will increase the fuel consumption, hence the advantage of pyrolysis shall not be took place. The system operation is easily affected by some above mentioned factors.
- Low automation system or absence of them, on-line monitoring systems are not equipped.



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## Preliminary selection standard for non-combustion disposal demonstration

- The established facility shall be basically accordance with technical guideline of BAT/BEP.
- The demonstration projects consist of established and operating facilities and the facilities under the stage of inviting bidding for main equipment in implementation phase, which should be listed as ongoing medical waste projects of plan.
- The requirement of pollution control standard for hazardous waste incineration (GB18484-2001) shall be satisfied through the facility BEP demonstration, Dioxin emission reach the  $0.5\text{TEQng/m}^3$
- The space for project retrofit is available, on-line monitoring system is established or is going to construct, the waste utilization facility is possibly added
- Dioxin emission reach  $0.1\text{TEQng/m}^3$  via technical retrofit and management perfection.
- Demonstration experience shall be practically transferred to other projects



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## Existing drawbacks of non-combustion disposal technology

- Lack of successful experience of non-combustion disposal facility in China as well as quite limited understanding on such types of disposal technology, the demonstration project are urgently required to carry out for reference.
- Extremely insufficiency in engineering design and operational experience by centralized non-combustion disposal.
- Lack of the technical regulation and standards for operation and emission of centralized non-combustion disposal.
- Coordination capacity among non-combustion disposal technologies of Medical waste is not well developed.
- Pollutants released from disposal process commonly hard to reach the emission standard, and the current standards are insufficient to match with the international system.
- Lack of experience in whole-process control and monitoring, also as the poor operation practice.
- Strict requirement of medical waste classification with health institutions under the non-combustion disposal base, good coordination of both factors shall be required to carry out.



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## Preliminary selection standard for non-combustion disposal demonstration

- The demonstration sites shall possess relatively engineering basis, and the established or ongoing construction facility shall be basically accordance with technical guideline of BAT/BEP.
- The demonstration projects consist of established and operating facilities and the facilities under the stage of inviting bidding for main equipment in implementation phase, which should be listed as ongoing medical waste projects of plan.
- All the pollutants including VOCs, carcinogenic substance, Hg, vapor and other unknown pollutants shall be treated to reach the international emission standard during the steam-base disposal.
- The space for project retrofit is available, or-line monitoring system is established or is going to construct, the waste utilization facility is possibly added
- Realization of reduction, detoxication for medical waste shall be achieved via the technical retrofit and management perfection.
- Demonstration experience shall be practically transferred to other projects



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## Selection standard for demonstration city

- The related functional sectors of selected city shall actively positively desire to promote the MW sustainable management and treatment, especially the consistent coordination between the environmental sector and medical sector of local government, to achieve the project target.
- Well-developed MW management system should be the concern of selected city which own the good foundation in MW management in both environmental and medical sector of local government and disposal capacity. The MW sustainable management system shall be realized by the project implementation.
- The MW treatment facility of the selected city has already been listed in construction plan. Good conditions for project implementation have been already established, including fee charge policy, specialized operation permission, technical audit, project design and operation permit, and etc.



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## Selection standard for demonstration city

- The alternative technologies of selected city shall be reliable BAT, and match with the overall plan and concept of the MW project design, which shall facilitate the target realization.
- The technical and management staff worked in environmental and medical sectors of local government as well as disposal facility shall be well qualified to carry out the responsibilities during the project implementation as well as capacity building in native management system.
- The selected city shall promise to supply required counterpart fund during the project implementation as well as guarantee the fund is available in accordance with the promise by necessary measures.



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## Selection standard for demonstration province

- Well-developed foundation of MW management and treatment, specially notable progress in the MW management and facility construction and operational management has been achieved by the joint effort of medical and environmental sector of local government.
- In respect to the MW facility construction, the implemented project shall take up 70% of the total MW treatment facilities in the selected province.
- In respect to the medical institutional capacity, a relatively standardized MW management system has been already established, where the management sectors at level shall fulfill the planned target and responsibility with good executive capability.
- The selected province shall own good relationship including interior-side as well as exterior-side, including environmental sector and medical sector of provincial government, MOF and SEPA.



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Welcome your valuable comment

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## The investment management model of medical waste treatment

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### Concept

- Investment: One-time input for fundamental construction, belonging to the category of fixed asset investment.
- Input: Including the expenses of one-time construction and maintenance etc.

### Review of evolution

- Before 1990:
  - Basically no effective input
- Before 2003:
  - Medical waste producing industries paid for constructing the treatment facilities and the operation expenses by themselves.
  - Some local governments depended on local financial support or private investment for investing concentrate disposal facilities construction; a part of local finance depended on charging medical waste producing industries to pay for operation expenses.
  - Some BOT projects or special businesses.

### Current Status

- National financial support is divided according to the percentage of 30%, 60%, 75% for east, middle and west of China, for disposal facilities construction.
- Local government get funds through the methods of local financial support, BOT and direct private investment for concentrate disposal facilities construction.
- The establishment of operation charging system resulting in the treatment expenses of medical waste being part of medical cost; and part of western cities depend on financial support to afford the running expenses.
- National input for standard establishment, supervision, disseminating and training etc.
- Private fund, oversea investment and other funds for technology R&D, and equipments transformation etc.

## Demand

### ■ Construction investment demand

**Inclination facility** (Full investment, incl. land and workshop etc.) : approximately 2-4 million RMB/(\*\*day (satisfying the requirement of convention implementation)

**Non-inclination facility**: approximately 1.5-2.5 million RMB/(\*\*day

Total demand is 4-8 billion RMB for whole country, depreciation period is 15years, so average demand is 0.27-0.54 billion RMB per year.

### ■ Demand of running input

**Inclination facility** : approximately 3—5 yuan/Kg

**Non-inclination facility** : approximately 2—4 yuan/Kg

Average running expense is 1.46-3.65 billion RMB per year

Sum of both input demands is approximately 1.73-4.19 billion RMB per year for whole country.

## Existing Problems: Financial system building

- Medical waste treatment is not in the scope of routine financial investment system (financial sector)
- Less sustainability for depending on one-time investment of national debt.
- The imperfectness of convention funding system in POPs; inadequate international regular financing system for compensating national incremental cost; less implementation approach for international burden of incremental cost.
- Inadequate technical supervision for private fund for construction; irregular level of technology; no decrease of full input for BOT in the purpose of benefit.
- Local governments avoid relevant responsibility in term of investment, and transfer responsibilities lean to both sides of hospitals and patients in operation.

## Existing Problems: Region diversity

- Under the capacity limit of technology and equipment producing, investing efficiency is quite low and repeat construction is common.
- Big difference of region strength, low adaptability of investment model.
- Low implementation process of disposal facilities input and operation cost in remote regions.
- Tax incentives policies without target.
- Regional classification difference among capital cities, prefecture-level cities and other regions (autonomous prefectures) etc.
- Regional difference among east, middle and west.

## Existing Problems: Operation input guarantee

- The disposal charging system is still imperfect.
- Difference between Five Ministries' documents and provinces' charging systems
- Difficulty for villages and towns in terms of coverage scope of charging system, charging performance efficiency and availability.
- Time difference between event and policy required by charging system
- The difficulty of charging in underdeveloped areas, resulting from limited local financial capacity, and low guarantee for operation cost.
- Cost constitution of charge to be transferred to patients or not, special orientation of medical institutions (nonprofit? The disposal charge of medical waste is afforded by medical institutions, not patients.)
- The depreciation cost in part of regions and medical institutions internal cost are not counted into costing.

### Policy: Establish shared responsibility mechanism

- Central authorities: basically available
- Effectively solving the position lack problem in local government
- The technical problems for policy cost of increment and international convention implementation responsibility partition
- Establish reasonable charging mechanism in the base of medical institutions reform
- Control enterprises profit level, establish charging publicity system, and reasonably check charging class for nonprofit and special businesses.

### Policy: Moderate support in finance and focus on enterprises' operation

- Counted into general financial input channels (incl. management, supervision, governance, emergency, government budget, newly added finance, special fund and bonds etc.)
- Fund utilizing issues of bonds balance for hazardous waste planning, strengthening existing investment and management model of bonds, and achieving moving development.
- Clear responsibility of local government and promoting local financial input.
- Increase transfer payment among regions; promote united construction, emergency support and other united input methods for cross administrative regions.
- Establish effective mechanisms to encourage technology R&D, BAT/BEP, demonstration project and management improving input.
- Dominant position of enterprise operation, improving efficiency of operation and capital using.

### Policy: Improve tax incentives policy

- Continue to push the disposal charging mechanism.
- According to local situation, establish disposal charging system in dominant position, assisting with other operation input mechanisms of tax incentives and financial allowances etc.
- Increase tax incentives scope, conduct medical disposal facility investment. (6% off for tax incentives etc.)
- Price difference between retail and wholesale for oil used in incineration.

### Policy: Conduct private investment

- Establish reasonably feasible charging methods, decrease owner charging or bargaining operation methods, improve guarantee extent.
- Adopt policies of government allowances or discount and government assurance, to decrease credit risks and conduct financial capital input.
- Improve franchise system, and in the base of supervision strengthening to promote kinds of private investment, like BOT, BOO, TOT.
- Strive for international fund and technical assistance to support part of incremental cost.

**Thank you!**

# Monitoring & Evaluation

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## M&E Objectives

- The GEF Monitoring and Evaluation Policy
  - Promote accountability for the achievement of GEF objectives through the assessment of results, effectiveness, processes, and performance of the partners involved in GEF activities.
  - Promote learning, feedback, and knowledge sharing on results and lessons learned among the GEF and its partners, as a basis for decision-making on policies, strategies, program management, and projects, and to improve knowledge and performance.
- UNIDO Evaluation Policy
  - Evaluation assures accountability, supports management and drives learning and innovation.

## M&E guiding principles

- Independence
- Impartiality
- Transparency
- Disclosure
- Ethical
- Partnership
- Competencies and capacities
- Credibility
- Utility

### Minimum Requirement 1: Project Design of M&E

All projects will include a concrete and fully budgeted monitoring and evaluation plan by the time of work program entry for full-sized projects and CEO approval for medium-sized projects. This monitoring and evaluation plan will contain as a minimum:

- SMART indicators for project implementation, or, if no indicators are identified, an alternative plan for monitoring that will deliver reliable and valid information to management;
- SMART indicators for results (outcomes and, if applicable, impacts), and, where appropriate, indicators identified at the corporate level;
- baseline for the project, with a description of the problem to be addressed, with indicator data, or, if major baseline indicators are not identified, an alternative plan for addressing this within one year of implementation;
- identification of reviews and evaluations that will be undertaken, such as mid-term reviews or evaluations of activities; and
- organizational set-up and budgets for monitoring and evaluation.

### Minimum Requirement 2: Application of Project M&E

Project monitoring and supervision will include implementation of the M&E plan, comprising:

- SMART indicators for implementation are actively used, or if not, a reasonable explanation is provided;
- SMART indicators for results are actively used, or if not, a reasonable explanation is provided;
- the baseline for the project is fully established and data compiled to review progress reviews, and evaluations are undertaken as planned; and
- the organizational set-up for M&E is operational and budgets are spent as planned.

### Minimum Requirement 3: Project Evaluation

Each full-sized project will be evaluated at the end of implementation. This evaluation will have the following minimum requirements:

- The evaluation will be undertaken independent of project management, or if undertaken by project management, will be reviewed by the evaluation office of the Implementing or Executing Agency or by independent quality assurance mechanisms of the agency.
- The evaluation will apply the norms and standards of the Implementing or Executing Agency concerned.
- The evaluation will assess at a minimum:
  - achievement of outputs and outcomes, and provide ratings for targeted objectives and outcomes;
  - likelihood of sustainability of outcomes at project termination, and provide a rating for this; and
  - whether minimum requirements for M&E 1 and 2 were met, and provide a rating for this.
- The report of this evaluation will contain at a minimum:
  - basic data on the evaluation:
    - when the evaluation took place,
    - who was involved,
    - the key questions, and
    - methodology—including application of the five evaluation criteria;
  - basic data of the project, including actual GEF and other expenditures; lessons of broader applicability; and
  - the TOR of the evaluation (in an annex).
- The report of the evaluation will be sent to the GEF Evaluation Office immediately when ready, and, at the latest, within 12 months of completion of project implementation.

## M&E schedule

Outcome/Output/Activity <sup>1</sup>	Y1				Y2				Y3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Activity 2.1.1: Prepare the M&E Strategy, including a list of SMART indicators, and a work plan for management, and implement and monitor the M&E Strategy												
Activity 2.1.2: Develop the M&E Strategy, including a list of SMART indicators, and a work plan for management, and implement and monitor the M&E Strategy												
Activity 2.1.3: Develop the M&E Strategy, including a list of SMART indicators, and a work plan for management, and implement and monitor the M&E Strategy												
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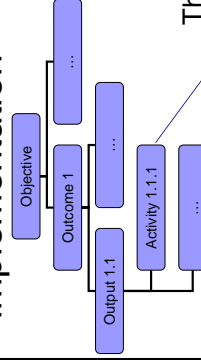
## SMART indicators

- Specific
- Measurable
- Achievable and Attributable
- Relevant and Realistic
- Time-Bound, Timely, Trackable, and Targeted

## SMART indicators for results

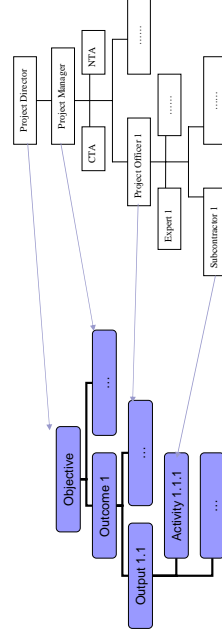
Key Impact	Baseline	Target (at Year 5)	Means of Verification	Sampling Frequency	Location
Number of medical institutions adopting BFP	0	1500	Site visit and questionnaire survey	In the mid and end	3 demonstration provinces
Number of dedicated medical waste incineration facilities meeting 0 mg/NMP release limit	0	15	Site visit, Sampling and lab analysis	Annually	3 demonstration provinces
Number of dedicated medical waste incineration treatment facilities	0	120	Site visit and questionnaire	Annually	3 demonstration provinces and nationwide
Number of occupational injuries and accidents in biohazard facilities caused by handling and treatment of medical waste	To be determined in the first year of project implementation	To be determined in the fifth year of project implementation	Site visit and questionnaire	In the mid and end	3 demonstration provinces and nationwide
Reduction of PCDD/PCDF releases from medical waste incineration disposal	0	9.7%	Sampling and operational conditions monitoring	Annually	3 demonstration provinces
Avoided releases of PCDD/PCDF from medical waste treatment	0	12.5%	Operational conditions monitoring	Annually	3 demonstration provinces and nationwide
Levels of PCDD/PCDF in biological organisms in the vicinity of dedicated medical waste treatment and disposal facilities	To be determined in the first year of project implementation	To be determined in the fifth year of project implementation	Sampling and lab analysis	In the mid and end	Schools of incineration facility demonstration sites

## SMART indicators for project implementation



There are 132 activities in total with at least 1 SMART indicator for each activity in the Logical Framework.

## M&E staff



## Responsibilities and TORs

- Project Director
- Project Manager
- Project Officer
- Subcontractors
- TOR for consultant to set up the M&E system
- TOR for consultant on Information Management
- TOR for mid-term and terminal evaluations

Thank you!