

## 2.4 Action plans for Technology 3: Technology for management of Health Care Waste

### 2.4.1 Description of the technology

The World Health Organization identifies health care waste management as a measure to reduce the burden of disease, including alternatives to incineration<sup>16</sup>. Of the total amount of waste generated by health-care activities, about 80% is general waste comparable to domestic waste. The remaining 20% is considered hazardous material that may be infectious, toxic or radioactive. Waste and by-products cover a diverse range of materials, such as infectious waste, pathological waste, sharps, chemicals, pharmaceuticals, radioactive substances, genotoxins, and heavy metals. The major sources of health-care waste are: hospitals and other health-care establishments, laboratories and research centres, mortuary and autopsy centres, animal research and testing laboratories, blood banks and collection services, and nursing homes for the elderly.

High-income countries generate on average up to 0.5 kg of hazardous waste per bed per day while low-income countries generate on average 0.2 kg. However, health-care waste is often not separated into hazardous or non-hazardous wastes in low-income countries making the real quantity of hazardous waste much higher.

Health-care waste contains potentially harmful micro-organisms which can infect hospital patients, health-care workers and the general public. Other potential infectious risks may include the spread of drug-resistant micro-organisms from health-care establishments into the environment. Waste and by-products can also cause injuries such as radiation burns, sharps-inflicted injuries etc. Poisoning and pollution due to improper disposal of health care waste could occur through the release of pharmaceutical products, in particular, antibiotics and cytotoxic drugs, waste water; and toxic elements or compounds, such as mercury or dioxins that are released during incineration. The Risks associated with waste disposal are indirect health risks that may occur by the release of toxic pollutants into the environment through treatment or disposal.

Incineration of waste has been widely practiced but inadequate incineration or the incineration of unsuitable materials results in the release of pollutants and ash residues into the air. Incinerated materials containing chlorine can generate dioxins and furans, which are human carcinogens and have been associated with a range of adverse health effects. Incineration of heavy metals or materials with high metal content (in particular lead, mercury and cadmium) can lead to the spread of toxic metals in the environment. Dioxins, furans and metals are persistent and bio-accumulate in the environment. Materials containing chlorine or

---

<sup>16</sup> WHO, 2011

metal should therefore not be incinerated. Only modern incinerators operating at 850-1100 °C and fitted with special gas-cleaning equipment are able to comply with the international emission standards for dioxins and furans. Alternatives to incineration are now available, such as autoclaving, microwaving, steam treatment integrated with internal mixing, and chemical treatment.

Improvements in health-care waste management rely on building a comprehensive system, addressing responsibilities, resource allocation, handling and disposal. This is a long-term process, sustained by gradual improvements, raising awareness of the risks related to health-care waste, and of safe and sound practices, and selecting safe and environmentally-friendly management options, to protect people from hazards when collecting, handling, storing, transporting, treating or disposing of waste<sup>17</sup>. Government commitment and support is needed for universal, long-term improvement, although immediate action can be taken locally.

#### **2.4.2 Target for technology transfer and diffusion**

The preliminary target for technology transfer and diffusion is 25 selected major health institutions in the island. In implementing the planned projects, the main emphasis will be for targeting institutions in underserved areas. The number of health workers to be will be 300-350 (5 or 6 persons from each institution). It will take approximately twelve to fifteen years for transfer and diffusion of the technology island wide.

#### **2.4.3 Barriers to the technology's diffusion**

Two economic and financial barriers and four non-financial barriers have been identified and the economic and financial barriers included '*Treatment technologies of health care waste are expensive*' and '*Lack of sustainability of ongoing implemented activities due to financial constraints*'. Non-financial barriers included one each from Information and awareness, Institutional and organizational capacity, Social, cultural and behavioral and Network failure categories.

The list of key barriers and hierarchy classification for technology 3 is given in table 2.10.

---

<sup>17</sup> WHO, 2011

**Table 2.10: List of key barriers and hierarchy classification for the technology 3**

<b>Technology Name: Technology for management of Health Care Waste</b>			
<b>No.</b>	<b>Key Barriers Identified</b>	<b>Priority Rank (1 – 5)</b>	<b>Category of Barriers</b>
1.	Treatment technologies of health care waste are expensive	1	Economic and financial
2.	Lack of sustainability of ongoing activities due to financial constraints	3	Economic and financial
3.	Poor awareness among health personnel including administrators	2	Information and awareness
4.	Shortage of technical staff to manage regular healthcare waste activities	4	Institutional and organizational capacity
5.	Uncommitted attitude of policy planners and administrators	5	Social, cultural and behavioral
6.	Inadequate inter-sectoral coordination	6	Network failures

#### **2.4.4 Proposed Action Plans for Technology 3: Technology for management of Health Care Waste**

The Proposed Action Plan for Technology for Management of Health Care Waste is provided in table 2.11.

## HEALTH SECTOR

### Action Plan for Technology 3

Table 2.11: Proposed Action Plan for the technology 3: Technology for management of Health Care Waste

<b>Measure/Action 1: Exploration for additional funding sources, Public-private partnerships and Identification of appropriate and low-cost technologies for implementation</b>					
<b>Justification for the action:</b> To secure additional funding, explore partnerships and identify low-cost technologies to address issues related to high costs of implementation .					
Action /Sub Action	Priority Rank	Responsibility of Implementation	Time frame	Cost & Funding Source (US \$)	Indicators
I. Identification of financial sources, low-cost technologies, and establishment of a national information centre to facilitate public-private and other partnerships	V. High	Ministry of Health/ Ministry of Environment	0-2 years	25,000 \$ US IF	<ul style="list-style-type: none"> <li>- Number of parties providing resources by the end of two years</li> <li>- Availability of partnership information reports by the end of two years</li> <li>- Number of technologies implemented by the end of two years</li> </ul>
<b>Measure/Action 2: A combination of conducting feasibility studies on different technologies and implementation of sustainable technologies</b>					

<b>Justification for the action:</b> To identify appropriate technologies for ensuring sustainability of the programs					
<b>Action /Sub Action</b>	<b>Priority Rank</b>	<b>Responsibility of Implementation</b>	<b>Time frame</b>	<b>Cost &amp; Funding Source (US \$)</b>	<b>Indicators</b>
I. Study to identify appropriate, sustainable, and affordable technologies and implement the identified technologies.	V. High	Academic/Research institutions Ministry of Health	0-3 year	30,000 \$ US IF	- Number of technologies identified and implemented by end of three year - Availability of study reports by the end of the three year
<b>Measure/Action 3: Awareness creation among health personnel</b>					
<b>Justification for the action:</b> To create awareness in order to generate interest for healthcare waste management and to prevent ill effects on the environment soil and water.					
<b>Action /Sub Action</b>	<b>Priority Rank</b>	<b>Responsibility of Implementation</b>	<b>Time frame</b>	<b>Cost &amp; Funding Source (US \$)</b>	<b>Indicators</b>
I. Preparation of educational material, leaflets, booklets, posters	V. High	Ministry of Health / Ministry of Environment	0-1 year	10,000 \$ US DF	- Number of different educational materials prepared by the end of one year
II. Awareness creation among health personnel at national and sub-national levels	V. High	Ministry of Health/Ministry of Environment/ Ministry of Education	0-1 year	7500 \$ US IF	- Number of awareness programmes conducted by the end of one year

<b>Measure/Action 4: Train interested and qualified persons already in service, open avenues for carrier development and take measures to retain personnel for a stipulated period</b>					
<b>Justification for the action:</b> To overcome the barrier related to shortage of technical staff by providing required skills and Opportunities for carrier development					
Action /Sub Action	Priority Rank	Responsibility of Implementation	Time frame	Cost & Funding Source (US \$)	Indicators
I Selection and provision of training and skills to health personnel across the sector	High	Ministry of Health/ Provincial Ministries of Health	0-3 years	15,000 \$ US IF	- Number of established institutes with proper waste management skills at the end of three years
<b>Measure/Action 5: Advocacy creation, illustrate evidence of ignorance and solicit technical assistance from UN and other agencies</b>					
<b>Justification for the action:</b> To overcome the obstacles due to lack of commitment by the policy planners and administrators					
Action /Sub Action	Priority Rank	Responsibility of Implementation	Time frame	Cost & Funding Source (US \$)	Indicators
I Advocacy to administrators at national and sub-national levels	High	Ministry of Health/ Ministry of Environment	0-1 years	3,000 \$ US DF	- Number of Provinces covered by the end of one year
<b>Measure/Action 6: To improve the coordination between sectors</b>					
<b>Justification for the action:</b> To address inter-sectoral coordination weaknesses					

Action /Sub Action	Priority Rank	Responsibility of Implementation	Time frame	Cost & Funding Source (US \$)	Indicators
I. Strengthen the existing network to include the healthcare waste management	High	Ministry of Health	0-2 years	20,000 \$ US IF	<ul style="list-style-type: none"> <li>- Over 70 % of institutions connected with the network by the end of two years</li> <li>- Number of sectors connected by the end of two years</li> </ul>
<b>Total Cost of Technology 3</b>				<b>Approx: US \$ 111,000</b>	

DF – Domestic Funds, IF – International Funds; V. High = Very High