

United Nations

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## Summary

Waste management and waste minimization represent challenges for all countries, but developing countries face mounting challenges with growing economies, rising incomes and rapid urbanization, all leading to rising waste volumes. For dynamic, urbanizing economies, defining a long-term waste management strategy for the coming decades is critical to fostering sustainable waste management. An effective long-term strategy should include the operationalization of integrated sustainable waste management systems.

Understanding the scale of generation of various categories of waste is fundamental to formulating appropriate policies. A number of new waste streams have emerged or assumed greater importance, especially e-waste and hazardous waste. In many cases, conventional waste management systems were not designed for either of these trends and need to be modified and upgraded.

Implementation of waste management strategies requires coordinated efforts by international agencies, local governments (within their jurisdictions), national governments, civil society, informal waste sector and the private sector. Reducing waste production, recycling waste and reusing materials form the basis of sustainable waste management. Municipal solid waste (MSW) in many developing countries requires strengthening, and in this regard the availability of financial resources for building waste management infrastructure and of technical and managerial skills for system management need to be enhanced. Public-private partnerships could be further explored to increase availability of and access to financial resources.

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**Box 1**

**Incentives for Waste Reduction**

**Volume Based Collection Fees System: Korea**

Prior to 1995, all municipalities in Korea levied waste fees on households





## **2. Strengthening capacities to manage growing and increasingly diversified waste streams**

12. Industrialization, urbanization, growing population and consumptive lifestyles have led to an exceptional increase in the quantum and type of waste generated around the globe. Per capita waste generation rates in many developing countries have now crossed the one-kilogram per day mark. Industrial waste generation rates are also very high, as many industries are primary industries producing raw materials for further processing. Understanding the scale of generation of various categories of waste is fundamental to establish the appropriate policies. A number of new waste streams have emerged, especially e-waste and hazardous waste.
13. Complexity, costs and coordination of waste management require multi-stakeholder involvement at every stage of the waste stream and intensive capacity building of all stakeholders including, but not limited to, technical personnel in local governments, municipalities, and other related institutions who are usually responsible for development and implementation of Waste Management Plans.
14. Comprehensive efforts need to be put in place to strengthen capacity including development and dissemination of training packages, manuals and guidelines on various aspects of waste management, technology compendiums, awareness raising materials, case-studies and best practice. A comprehensive on-line information clearing-house could be developed for easy accessibility by different users. Series of workshops and training programmes need to be conducted in all regions. Efforts should also be made to provide hands-on experience through demonstration projects. A network of capacity building institutions could help to institutionalize the effort.

## **3. Improving access to appropriate technologies and infrastructure**

15. In achieving national waste management goals, Governments need to identify the best infrastructure as well as technology that are appropriate and possible to be applied. Such identification and choice would depend on resource requirements and local applicability.
16. While the success of developed countries is, to a certain extent, due to the adoption of modern technologies at every stage of waste management from waste collection through segregation, recovery/recycle, transport, treatment and disposal, infusion of modern technologies in developing countries has been rather limited and needs to be intensified to realise effective waste management. Many cities in developing countries have not been able to set up adequate systems for the collection of municipal and industrial waste due to a poor infrastructure base; in rural areas, waste management infrastructure is largely non-existent. Economic and financial limitations have forced

many developing countries to adopt technologies mostly on the basis of cost rather than sustainability criteria.

17. The organic waste which is still a sizeable portion of waste in many developing nations should be suitable for reduction through composting. In the case of incineration, the high start-up and operational costs are a major barrier to successful adoption of this technology in many developing countries.
18. Developing countries need information exchange and dissemination of waste treatment technology from developed countries, particularly for innovative 3R technology. For western Asia region, a high priority is strengthening waste management capacities of

**4. Increasing research on and development of region- and country-specific technologies**

21. Waste quantities and characteristics are location specific and require technologies to be adapted to suit local conditions. In the area of research and development of region and country specific technologies, countries should:



28. Next to MSW, hazardous waste (including industrial, healthcare, and domestically produced hazardous wastes) constitutes a major component of global waste statistics. The Basel Convention has estimated the amount of global hazardous waste at 338 million metric tonnes a year and trans-border movements at close to 9 million tonnes.
29. Although some countries are taking steps into the right direction, still many developing countries and countries with economies in transition do not have the necessary expertise and infrastructure to handle and manage e-waste and hazardous waste in an environmentally sound manner. Collection, treatment and disposal of hazardous waste are beyond the traditional capacity of local governments that manage municipal waste. Numerous obstacles have been identified by developing countries in regard to their ability to manage these waste streams in an environmentally sound way. These include: lack of easily accessible information (on flows, quantities, available technology, legislative/trade requirements of countries importing new products, which increasingly require strict standards for minimization and re-use, recycling and recovery); lack of trained personnel; inadequate legislation; inadequate infrastructure for collection, recycling and recovery; lack of public awareness; and lack of economic alternatives to activities carried out by the informal sector and small family repair shops.
30. A comprehensive e-waste management should address technical and financial capacity requirements and create an enabling environment focusing on policies and financial incentives to attract the private sector.
31. Projects should also be in place to develop a comprehensive inventory of sources, quantities and composition of e-waste and hazardous waste. To abandon unsound practices, both end-of-the-pipe as well as prevention at source strategies should be devised. Local as well as national Governments should renew their efforts to raise awareness, mobilise all stakeholders, encourage and facilitate ESM of e-wastes in their collection, storage and transportation to repair or refurbishment workshops. Capacity building and training, particularly of small businesses, will contribute to the improvement of the quality control in the repair or refurbishment workshops, i.e. accomplishing both environmental benefits and benefits to worker's health, without compromising the economic returns.
32. Large quantities of e-waste are being exported to developing countries for the purpose of re-use, repair, refurbishment, recycling and recovery of non-ferrous and precious metals at facilities that do not always operate under sound environmental conditions. Some end-of life equipment is exported under the guise of donations and for charitable purposes.
33. Significant quantities of hazardous waste are transported to developing countries in Africa, Asia, and the Caribbean and, increasingly, to East and Central Europe. The United States exports more than 50 per cent of its e-waste to countries such as India and

China. The average cost to recycle a single personal computer in the U.S is \$20, while in India the same activity would cost just \$2 per machine. According to Greenpeace, in the UK alone, at least 23,000 metric tonnes of undeclared or 'grey' market electronic waste was illegally shipped in 2003 to the Far East, India, Africa and China (Wankhade 2004). Import and export statistics provided by Parties to the Basel Convention for the year 2000 illustrate that there were imports of more than 17.5 million tonnes designated as used electrical and electronic assemblies or scrap.

34. In this context, international cooperation is crucial, the market should be regulated and strict control on the import and export of hazardous wastes enforced. There is equally a need to enhance the ability of countries, specially developing nations, to implement and enforce the Basel Convention provisions. This requires the strengthening of national and regional mechanisms to support multilateral agreements, including the promotion of information sharing and sanction of illegal traffic.

**Box 4**

In 2002 the Mobile Phone Partnership Initiative (MPPI) was launched, during the sixth meeting of the Conference of the Parties to the Basel Convention, when 12 manufacturers signed a Declaration entering into a partnership with the Basel Convention and in cooperation with other stakeholders to develop and promote the environmentally sound management of end-of-life mobile phones. Following the success of the MPPI, PACE (Partnership for Action on Computing Equipment) was launched at the ninth meeting of the Conference of the Parties to the Basel Convention, which took place in Bali in June 2008. PACE is a multi-stakeholder partnership that provides a forum for governments, industry, non-governmental organisations and academia to tackle the environmentally sound management, refurbishment, recycling and disposal of used and end-of-life computing equipment.

**E. Management of specific wastes****Radioactive waste**

35. Practically all countries generate radioactive waste, be it from production of nuclear energy, from the use of radioisotopes for medical diagnosis and treatment, from the use of nuclear methods for improving crops and food safety, or from various research and industrial applications. National Governments should ensure that appropriate safety measures are applied to the management of the radioactive waste that their economies generate. National strategies, plans and corresponding actions for managing radioactive waste must be developed. The establishment of a proper legal framework, regulatory infrastructure, policies and strategies is a prerequisite for these purposes.

36. Internationally, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management is the only legal instrument directly addressing these issues on a gl

**Box 5**





are three stages for the policy maker to consider: prevention of litter generation and entry to the sea; observations of the ambient marine litter stock levels at sea; and cleaning up litter once it is in the ocean or on the coasts. A diverse strategy of regulations, market-based instruments and community initiatives is required to address the marine litter problem.

**Plastic waste**

43.



technologies, and developing a business case for converting waste agricultural biomass into an energy source.

**3. Utilizing biomass waste for soil quality enhancement**

53. Biomass produced as a byproduct of cropping systems is often disposed of by burning or landfilling. Using such mate

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in waste management systems requires a shift in the role of government institutions from service provision to regulation, which may require the development of new institutional capacities to ensure conditions necessary for successful private sector involvement (e.g. competitive bidding, technical and organizational capacity, regulatory instruments and monitoring and control systems).

57. A key success factor is the establishment of institutional mechanisms that facilitate co-operation across traditional institutional structures in ways that stimulate increased waste prevention. Multi-level, national/regional/local government partnerships are useful in ensuring that waste prevention activities at various levels are mutually reinforcing. Government and municipal efforts in waste prevention can be promoted by seeking out perspectives from stakeholders (e.g. input during target setting, instrument choice and application, and performance evaluation).
58. Successful technology transfer does not only involve the selection and shipping of equipment, but also the adaptation of that equipment to local circumstances, the training of local technicians, and the long-term upkeep and use of the equipment, and thus requires both capacity building and the promotion of an enabling environment for technology uptake, development and diffusion. The successful transfer of environmentally sound technologies necessitates that recipient countries have the requisite institutional resources and competencies. If these are not in place, projects need to incorporate strategies to address this e.g. through capacity building measures or activities aimed to improve access to resources. Existing market conditions and market forces need to be considered in the design of technology transfer projects and barriers need to be identified and addressed e.g. through the creation of policy instruments, awareness raising or other measures.
59. Technology transfer should help strengthen research and development systems and promote the capacity to develop new technologies and solutions. Accurate, timely, and authoritative information is critical to project success, including explicit information about government policies, cost and performance of new technologies, opportunities for international support, or the long-term nature of the necessary technological change. Effective strategies include developing niche research areas, particularly in institutions with limited funding, as well as creating research centres and strengthening research infrastructure.

### **Transfer of EST for cleaner management of municipal solid waste (MSW) in Havana City**

The main emphasis of the project was to enable ministerial, provincial and municipal staff to design and implement MSW strategies that suit the needs of the country and are in accordance with the requirements of ecologically sound natural resources management. The project aim was to improve the capability of the targeted region in MSWM through capacity building at municipal, provincial and central levels. This was achieved by theoretical training on one side and through the practical experience acquired by the implementation of selected demonstration projects on the other side. The project was based on an integrated approach including awareness raising, local capacity building and training, transfer of Environmentally Sound Technologies and transfer of know-how. A central part of the project was capacity building of all persons involved.

Key project results include the establishment of an integrated system for separate collection of different municipal waste streams and subsequent management (including a laboratory for waste analysis, biogas plant and compost production). Furthermore, the Cuban Ministry of Economy and Planning, has instructed other municipalities to study the introduction and application of separate collection of MSW in their municipalities, adjusting the activities to the local conditions with the locally available resources.

### **B. Financing and investing in sustainable waste management**

60. Waste management costs are increasing. Developing countries spend 60 to 70 percent of their waste budget in collection, with complete MSW related services consuming 1 to 2 percent of a country's GDP. Cost of waste segregation ranges from \$107/ton for mixed collection to \$1320/ton for segregated collection in developed regions. Capital cost of incinerators may range from \$100,000 to \$ 200,000 per daily metric tonne of capacity, compelling the owner to invest at least \$30 to 600 million initially. The annual cost per metric tonne of waste burned comes to \$30 on an average. The additional cost of treatment of residual ash in a special landfill can range from \$ 200 to 500 per metric tonne. In a typical city with population of 50,000, the costs of landfilling and incineration are \$95 and \$147, respectively (Porter 2002).
61. Government investments in waste management services have increased over recent years. Energy recovery projects have been the recent focus of Government investments in developed countries. UK has allocated US\$16.5 million for anaerobic WtE projects. China is planning to allocate 862.9 billion RMB (US\$126 billion) to promote provUcts h(efpro)2 -1



MBT (mechanical biological treatment) process (about 60 per cent) was funded through prudential borrowing.

66. The Clean Development Mechanism (CDM) introduced under Kyoto Protocol helps to improve the financial viability of waste management projects. This market mechanism should be strengthened further. It is important to note that CDM only improves the Internal Rate of Return (IRR) of projects by a margin of approximately 5 per cent and hence identification of other sources of financing is critical to the project.

### **C. Building partnerships**

67. Various national governments and international institutions have launched activities supporting capacity development for policy frameworks, financing mechanisms (including public-private partnerships) and technology for waste management. However, efforts have thus far been scattered, uncoordinated and insufficient to address the needs of developing countries. The complexity, costs and coordination required for effective waste management demands multistakeholder involvement at every stage of the waste stream. There is a clear need to identify and engage all stakeholders in waste management and strengthen cooperation conducive to the creation of strong innovative partnerships at international, regional and local levels. These partnerships are particularly needed to strengthen cooperation in areas of institutional and human capacity, research and information-sharing and technology transfer. They should also be actively engaged in advocacy, education, building awareness.
68. In this context, UNEP proposes to establish a Global Partnership on Waste Management to provide coordination, increase the exchange of best practices across countries and pool resources for the replication and scaling up of successful practices. UN-DESA is also planning to launch an International Partnership to address the needs of public waste utilities and municipalities and support local action plans and strategies for sustainable waste management.

## **IV. The way forward**

69. The magnitude and gravity of the problem of adequate waste management has been amply highlighted in CSD18. The rapid increase in volume and type of both solid and hazardous waste as a result of economic growth, urbanization and industrialization is becoming a major issue for national and local governments, particularly in developing countries, which are constrained both in terms of resources and capacity. The negative impacts on the health of surrounding communities, as well as on local environment, in terms of pollution of land, water and air, are becoming more acute. Ineffective and inefficient waste management results in greenhouse gas and toxic emissions and loss of precious materials and resources.

70. Waste management and resource recovery from waste are still low in the priorities of many countries, particularly developing countries, and national and local policies on waste management are not yet comprehensive enough to cover all types of wastes and all aspects of waste management. In many developed countries, policy frameworks to support resource recovery from waste remain inadequate.
71. The priority objectives in the field of policy options for waste management are to formulate and implement policies that promote waste prevention and minimization and support effective and efficient management of the remaining solid and hazardous wastes, focusing on reuse and recycling and on the recovery of useful materials and energy. Countries need to set time bound targets especially regarding aspects like minimization and segregation, recycling and



75. Special attention needs to be paid to some specific waste streams such as E-Waste, waste plastics, waste agricultural biomass, healthcare wastes, industrial hazardous wastes, radioactive wastes, etc.
76. Effective implementation of waste-related multilateral agreements and guidelines is needed at the national level. Corresponding laws, regulations and standards need to be developed and their enforcement strengthened both at the national and local levels. Economic incentives for waste minimization and recycling need to be more extensively employed.
77. Finally, it is incre7o bg n ls