



## Background Paper: Plenary Session 2

# Addressing New and Emerging Waste Issues through 3Rs Approach – Policy, Institutional and Technological Considerations

**Presented by:**

Matthew GUBB, Director

International Environmental Technology Centre

Division of Technology, Industry and Economics (DTIE)

United Nations Environment Programme (UNEP)

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# To begin

**Waste management challenge of the 20th century was;**

**How do we get rid of waste efficiently with minimum damage to public health and the environment**

**Dr. Paul Connett, Zero Waste**





# Introduction

- Waste is a complex and often neglected issue
- Waste is an underlying issue in many international agenda
- The negative impacts of wastes on the local environment are becoming more acute often resulting in public outcries and demands for action
- The impacts of inadequate waste management are not just limited to the local level but are now felt across national boundaries



# Trends of new emerging waste streams in Asia and their impact on health, ecosystem and resiliency

**We produce as much “economic” waste each year as cereals (2 billion tons) and steel (1 billion tons)**

1. Municipal Solid Waste: Largest waste stream in Asia, continues to grow rapidly due to population growth, urbanization and economic growth

**Table 1:** Typical characteristics of municipal solid waste management in Asian cities by level of development

MSW characteristics	Level of development		
	Less-developed cities (Less than 2,000)	Rapidly developing cities (2,000-15,000)	Developed cities (16,000-30,000)
MSW collection rate	<70%	80-95%	95-100%
Recycling	Informal	Formal and informal	Formal
Expenditure from Municipal budget (%)	15-40	5-25	1-5
MSW generation (kg/capita-day)	0.3-0.7	0.5-1.5	>1.0



# Trends of new emerging waste streams in Asia and their impact on health, ecosystem and resiliency contd.

## 2. E-Waste

- Difficult to estimate volumes due to differences in definitions and complex disposal routes
- Estimated to be in the range of 7 to 13 Kg/capita/year
- Globally, estimated to be 5% of municipal solid waste
- Waste being moved from one country to another is also increasing – as per reports to the Basel Convention between 1993 and 2001 waste criss-crossing the globe increased from 2 to 8 million tons

## 3. Marine litter

- Issue of marine litter is addressed in several international conventions including IMO-MARPOL, London Convention and Protocol on dumping and Global Programme of Action
- Influx of litter into the world's oceans estimated to be 6.4 million tons/year
- Complex, cultural and multi-sectoral problem





# Trends of new emerging waste streams in Asia and their impact on health, ecosystem and resiliency contd.

## 4. Waste Agricultural Biomass

- Globally, 5 billion tons of waste agricultural biomass is generated every year equivalent to 1.2 billion tons of oil - about 25% of current global annual production
- Asia accounts for 77% of global generation
- Currently, specially in developing countries, most of waste agricultural biomass is left to decompose in the fields or burnt in open thus emitting gaseous emissions as well as black carbon

## 5. Healthcare Waste

- Issue of growing concern particularly in urban areas
- Often co-disposed with municipal waste
- Healthcare waste generation is estimated to be 1 to 3 Kg/bed/day; about 25-30% of which is hazardous
- UNEP-IETC has prepared a compendium of technologies for treatment and destruction of healthcare waste. It is available for free download on our website.





# Trends of new emerging waste streams in Asia and their impact on health, ecosystem and resiliency contd.

## 6. Used tires

- A major waste stream in both developed and developing countries
- As a rule of thumb the used tire generation in industrialized countries is 1passenger car tire/capita/year
- 2 to 3 billion tires stockpiled in USA
- 100 million used tires generated in China every year
- Potential of fire in tire stockpiles is a major hazard
- Potential of harnessing used tires as a source of material and energy; crumb rubber, metal from bead wires and latex/carbon black as a source of energy







# Trends of new emerging waste streams in Asia and their impact on health, ecosystem and resiliency contd.

## 7. Waste Oils

- Global lubricating oils consumption estimated to be 42 million tons/year in 2010 – expected to reach 45 million tons by 2015
- 30% of global waste oil generation is in Asia followed by 22% in USA
- Due to improper collection practices, indiscriminate dumping, burning etc. the amount available for recycling is only about 16 million tons/year
- In developing countries, recycling, if at all practiced, is based on obsolete, inefficient technologies such as acid clay method
- More efficient and environmentally sound technologies are not well known. UNEP-IETC has prepared a compendium of technologies for recycling and destruction of waste oils. It is available for free download on our website.





# Trends of new emerging waste streams in Asia and their impact on health, ecosystem and resiliency contd.

## 8. Waste plastics

- World's annual plastics consumption has increased 20 times over last fifty years reaching almost 100 million tons/year
- Waste plastics constitute 15 to 40% of municipal waste depending upon economic profile, life style and consumption patterns
- Though not harmful by itself, plastics in waste can cause a number of secondary problems such as when co-disposed as municipal waste it causes formation of pockets of anaerobic decomposition leading to emission of methane
- If properly segregated , plastics can be recycled both as a source of material as well as energy.
- UNEP-IETC has prepared a compendium of technologies for converting waste plastics into fuels. It is available for free download on our website.





# Trends of new emerging waste streams in Asia and their impact on health, ecosystem and resiliency contd.

## 9. Waste containing nanomaterials

- Waste stream of the future
- With increasing use of nanomaterials the waste bearing nanomaterials is also increasing
- Study on management of waste containing nanomaterials is still undergoing in many OECD countries

## 10. Other wastes

- Construction and demolition waste – can be 10 to 15% of total waste
- Mining waste – it is estimated that globally mining of iron, copper and gold alone requires removal of 33 billion tons of material



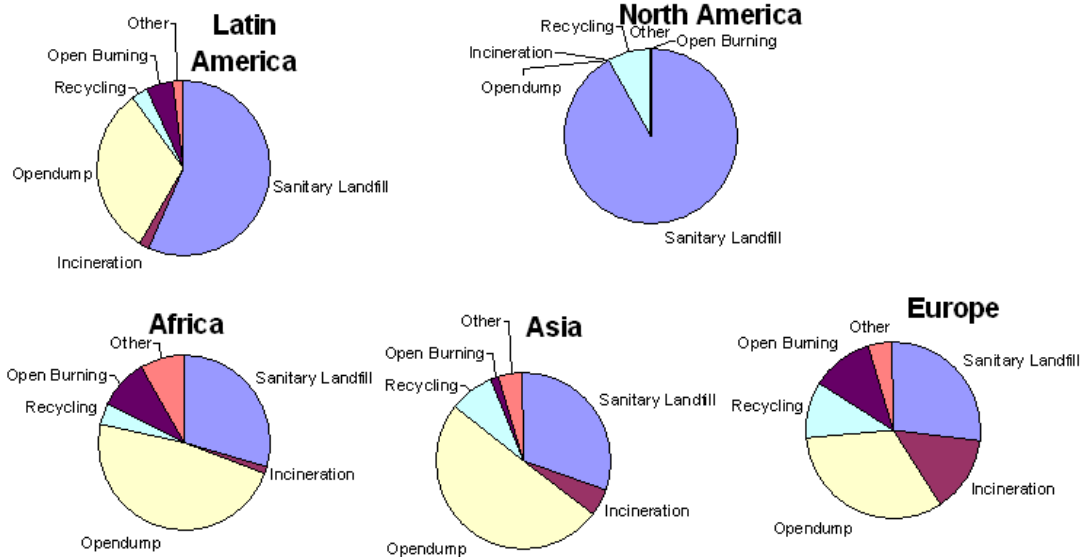


# What to do with waste

## Only 3 options:

- Recycle
- Burn
- Bury

## Global distribution of deployment of various technologies





## What to do with waste contd.

### Recycling

**Extent of recovery/recycling depends on several factors:**

- Market for recycled materials
- Price for recycled materials
- Quality of recycled materials

**Estimated size of main world secondary metals market**

- Steel – 405 million tons (40% of total steel production)
- Aluminum – 7.6 million tons (20% of total aluminum production)
- Copper – 2 millions tons (13% of total copper production)
- Nickel – 0.46 million tons (40% of total nickel production)
- Zinc – 2 million tons

**The positive environmental aspects do not require further mention. Just for example; recycling aluminum requires only 10% energy compared to virgin aluminum thus every ton of recycled aluminum prevents emission of 2 tons of CO<sub>2</sub>**



# What to do with waste contd.

## Burn (Incineration)

Waste can also be burnt (or incinerated). It offers three advantages:

- Volume reduction
- Reduction in hazardous nature (e.g. pathogen destruction)
- Possibility of energy recovery

Incineration equipment need to be carefully designed, operated with arrangements for control of resultant gaseous, liquid and solid emissions





# What to do with waste contd.

## Bury (landfill)

Most widely used technology for waste disposal is landfill (sanitary landfill, secured landfill for hazardous wastes or even open dumps).

Landfills are least expensive, however they allow no material or energy recovery (except landfill gas in some cases).

Improperly designed landfill can cause a number of problems such as emission of methane (a greenhouse gas), discharge of leachate, odour etc.



# Policy, institutional, technology and infrastructure issues in Asia



## Issues for waste management

### 1. As per waste management chain

#### a) Source segregation, collection

- Organized and scientifically planned source segregation missing in many developing countries
- Segregation usually driven by economic factors
- Sorting mostly done by unorganized sectors and rarely by waste generators
- Consequently efficiency of segregation is usually low

#### b) Treatment and disposal

- Generally no treatment given in developing countries prior to waste disposal
- Progress in moving towards sanitary landfills and/or incinerators is rather slow

#### c) Resource generation

- Several types of material such as cellulosic materials, plastic, metals, glass can be recovered
- Material recovery from waste is a source of livelihood to millions in developing countries
- Organic waste is often not recovered



# Policy, institutional, technology and infrastructure issues in Asia contd.



## 2. As per action category

### a) Policy issues

- In many developing countries, a robust policy framework for ensuring environmentally sound waste management does not exist
- Generally, no national targets have been set up
- Environmental policies continue to be based on ‘discharge-end control’ rather than ‘source-end management based
- Specific policies to promote segregation, reuse at source and to promote conversion of waste into useful materials/energy are rather few.

### b) Technology issues

- Need for large-scale uptake of technologies for material and energy recovery
- Need for pilot demonstration projects to build confidence and test the applicability of technologies
- Need for extensive data collection (waste characterization and quantification)
- Need for capacity building for technology assessment and selection

# Policy, institutional, technology and infrastructure issues in Asia contd.



## c) **Financing issues**

- **Availability of funds to support waste management continues to be the most pressing issue**
- **Cost of waste management is increasing on several accounts**
- **New and innovative financing mechanisms need to be put in place**

## d) **Trans-boundary movement and associated illegal trade in hazardous waste**

- **Intra and inter-country waste movement is a major issue**
- **Movement of some types of waste (e.g. Scrap metals, paper) is sometimes welcomed by recipient countries**
- **E-waste has emerged as a major stream undergoing trans-boundary movement**

## e) **Other issues**

- **Waste issues in Small Island Developing States (SIDS)**
- **Need for extensive awareness raising and capacity building**
- **Need to establish a regional approach**

# Some effective techniques for waste management



The conventional waste management philosophy of collect-transport-dispose may no longer be effective in the current and forthcoming waste scenario. We need to develop and implement innovative techniques, which firstly promote minimizing the generation of waste, and, secondly considers waste as a resource and thus providing business opportunities.

## 1. Focus on Reduce, Reuse, Recycle (3Rs)

- Application of 3Rs results in savings in current waste management costs
- Recovered materials provide an additional source of revenue
- Provides additional employment opportunities
- Generates new business opportunities

## 2. Waste Minimization

- Essentially a part of 3R, but a specific mention made due to tremendous scope and potential
- Helps enhance competitiveness
- Reduces waste treatment and disposal costs

# Some effective techniques for waste management contd.



## 3. Urban mining

- Waste landfills are ‘urban mines’
- It is economically viable to recover materials and energy from urban mines
- Industries based on urban mines benefit from a cheap and perennial supply of input materials

## 4. Waste to energy

- Organic material in municipal waste can be used to generate bio-gas
- Materials such as plastic and paper which are not recyclable can also be converted into energy
- Waste agricultural biomass has a tremendous potential for conversion to energy

# Some effective techniques for waste management contd.



## 5. Involvement of the private sector

- Private sector has an important role to play in waste management
- There is a huge potential for private sector involvement both in recycling industries and further down-stream industries based on recycled materials.

## 6. Building cooperation between producers and consumers

- Producer and consumer – the two actors in waste generation
- Waste generated during production processes is the responsibility of producers
- Several techniques developed to reduce waste impacts from used products such as 'take-back systems', 'design for recycle', product-service systems
- Need for greater consumer awareness raising
- Need for policy measures to promote preferential buying of 'green products'

# International cooperation in addressing new emerging waste streams contd.



- 1. Providing capacity building and technology support for effective waste management**
  - Capacity building at all levels to strengthen implementation of 3R, waste management projects
  - Requires approaches that integrate awareness raising, training, enabling policies and technology support
  - Technology transfer alone is not enough. It needs to be coupled with development of institutions and supportive policy framework
  - Development of technical guidelines (such as those developed under Basel conventions), manuals technology compendiums (such as those developed by IETC) and providing easy accessibility is important

# International cooperation in addressing new emerging waste streams contd.



## 2. Financing and investing in sustainable waste management

- Global waste market, from collection to recycling, estimated to be US\$ 410 billion a year
- Sustainable waste management creates more employment opportunities than business as usual
- Government investments in waste management projects are increasing particularly waste to energy projects
- However, government funding is not enough. Private sector investment is also required
- Financing options like micro financing and hybrid financing have proved to be successful

## 3. Building Partnerships

- Engagement of all stakeholders is vital
- Public-private partnerships have an important role to play
- Initiatives like International Partnership for expanding waste management services of Local Authorities (IPLA), Global Partnership on Waste Management (GPWM) and the partnerships under the Basel Convention (e.g. Mobile Phone Partnership Initiative, Partnership for Action on Computing Equipment) need to be further strengthened and expanded.



# The way forward – the “future we want”

- A number of international and national initiatives have been launched to promote environmentally sound waste management
- UNEP-IETC is intensifying and strengthening its activities in the field of waste management focussing on capacity building, information and technology support
- The 3R initiative launched by the Government of Japan in 2004
- Much more remains to be done, for example:
  - Improving quality and reliability of waste related data
  - Intensive capacity building on all aspects: waste related data collection; assessment, selection and implementation of technologies; development of locally suitable technologies
  - Enhancing availability of finances through innovative financing schemes
  - Formulation and implementation of policies to promote waste prevention and minimization, support effective management of residual waste, and support 3R
  - Mainstreaming social aspects especially the role of scavengers and rag pickers





# To end

**A paradigm shift**

**Waste management challenge of the 21<sup>st</sup> century should be;**

**How do we handle our discarded resources in ways which do not deprive future generations of some, if not all, of their value**

**Dr. Paul Connett, Zero Waste**





## International Environmental Technology Centre

2-110 Ryokuchi Koen

Tsurumi-ku

Osaka 538-0036 Japan

tel : +81 (0) 6 6915 4581

fax : +81 (0) 6 6915 0304

e-mail : [ietc@unep.org](mailto:ietc@unep.org)

website: <http://www.unep.or.jp>