Cairo University Faculty of Engineering Chemical Engineering Department

Introductory lecture

Municipal Solid Waste Management: Current Practices, IWSM and Green SW Sector

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Outline

- 1. How We Study Solid Waste ?
- 2. Current Practices in SWM
- 3. The Evolution of ISWM Concepts and Practices
- 4. Evolution of Green Solid Waste Sector

This presentation is based on published literature, UNEP publications have been used extensively

1. How We Study Solid Waste ?

Solid Wastes: study its sources and Types



Solid Wastes: Study its Origin, Composition, Toxicity and Management

Prigin	Composition				
hat human activities generate waste?	m	what is waste ma	ade of?	_	
Extraction	ngs	Mercury	Cyanides		
waste		Tyres ()rganic waste		
Manufact	uring		Packaging		
Military wast	9] + 1 mg]	Plastics	waste		
Recycling Waste Agricu	Waste Agricultural		Glass		
waste Industriai wa	500	Ashes	Solid		
Jarbage Waste Por	tiaidan		waste		
Medical Sewage sludge		Textile			
waste Yard tri	mmings	Lead			
		Dirt	Bulky waste		
		Metal	Wood		
Hazardous Vs.	TUTAL	Paper	waste		
non-hazardous waste	WASTE				
Toxic	1				
Special Infectious	Wast	e collected			
waste		Municipal v	waste Urban waste		
Stabilized waste		sorted Was	ste	Life cycle	
	r	recycled transported approach			
Ecotoxic Poisonous	CO inci	composted dismantled waste as			
Explosive Corrosive	lan	dfilled	Waste	resource	
waste Flammable	Wast	e water	stored		
10000		Waste diam	e reduced		
POPs Pediasative	(de	en-well. surfa	ce disposals)		
nautodCt146		.,,			
oxicity	Mana	gement			
ow dangerous is it for human health	how is wa	aste handled? wh	o is in charge?		

Source: UNEP

Solid Wastes: Study of supply chain



Solid Waste: Waste index study



Source: Nippon Koei

SW Generation- Income relationship



Source: UNEP

2. Current Practices in SWM

MSW Generation rates in Egypt



Figure 3.1: Daily MSW generation rate for Egyptian governorates in 2006 and 2010 Sources: State of Environment, EEAA, 2006, State of Environment, EEAA, 2009, Egyptian Census 2006 and 2010 population projection

Current spectrum of practices

Spectrum of practices							
Collection	Curb side	Street Bins	Door to door	Chutes	Underground collection		
Transport	Man pulled cart	Donkey cart	Open bed vehicle	Covered vehicle	Compactor vehicle		
Transfer	None	Curb side	Vehicle to vehicle	Open lot	Transfer station		
Sorting & Treatment	None	Recycling	Recycling and composting	Incineration	Anaerobic digestion		
Disposal	Open burning	Curbside dumping	Uncontrolled dumpsite	Controlled dumpsite	Sanitary Landfilling		

Accumulated MSW in open dumpsites



MSW self ignition in open dumpsites



Dumping MSW in water canals and drains



قرية عزبة القصر - محافظة البحيرة

المنظومة القيمية تأقلمت علي الوضع الحالي



Pictures of Open Dumping in the Region

Open dump in Cairo



Open dump in Damascus



Open dump in Bahrain



Open dumping in water ways, Egypt



Few success stories: Sorting and recycling in south Cairo, Egypt









Composting Plant, south Cairo





Composting of the organic fraction of MSW

Current Practices in Egypt: Cross Cutting Issues ?

- Lack of national policies and strategies
- Lack of an integrated SWM master plan on the regional or local levels
- Low standards of waste disposal
- Difficulties in financing and cost recovery
- Growing amounts of solid waste generated
- Lack of coverage of proper waste collection and transport systems
- Lack of environmental monitoring at SWM facilities
- Insufficient SWM regulations and enforcement
- Lack of reliable data for planning and design purposes
- Shortage of competent human resources in SWM
- Lack of public awareness on SWM

3. The Evolution of Integrated solid waste management concepts and practices

Defining ISWM

Integrated solid waste management refers to the strategic approach to sustainable management of solid wastes covering all sources and all aspects, covering generation, segregation, transfer, sorting, treatment, recovery and disposal in an integrated manner, with an emphasis on maximizing resource use efficiency

Integrated SWM paradigm



Integrated Solid Waste Management Life-cycle Perspective

United Nations Environment Programme Division of Technology, Industry and Economics International Environmental Technology Centre



Integrated Solid Waste Management Generation Source Perspective

United Nations Environment Programme Division of Technology, Industry and Economics International Environmental Technology Centre



Integrated Solid Waste Management Stakeholders/Management Perspective



4. Evolution of green solid waste sector

Development of Greener Technologies

- Shift in the fundamental approach of solid waste management from "getting rid" of waste to a resource management approach of handling discarded resources in ways which do not deprive future generations of some of its value
- Combinations of waste management activities and technologies are used to <u>divert</u> waste away from landfill disposal and make use of otherwise wasted resources.
- Greener economies tend to stimulate increased investment in waste management directed towards developing means for waste diversion and resource conservation to reduce residuals going to landfills.

Waste Hierarchy



The EU concept



SW Treatment Technologies Map



Permitting Risks

Change to Green SW Sector

- Objective: to achieve a sustainable SWM practice that relies on waste diversion and resource conservation, and promotes investment in a green economy.
- Not only technologies and sophisticated treatment processes, but also other activities are necessary to improve SWM (especially waste minimization), expressed as the soft components,
- There may be several routes to achieving greener SWM, Ex.:
 - capital investment in advanced technologies to maximize waste diversion while gradually implementing 3R policies. (similar to the Stockholm model)
 - start with waste minimization (3R) policies for gradual waste diversion (Vancouver Model). This option may be more suitable for developing economies where the availability of capital investments are limited. It also utilizes more desirable alternatives of waste diversion.

Change to best Practices, Step 1:



Change to best Practices, Step 2:



Change to best Practices, Step 3:



Additional added value example : Plastic Recycling

Recycling industries





Additional added value example : Rubber tires and Home appliances Recycling

Tire recycling









Additional added value example : Compost By-Products



Additional added value example : Reject Utilization as Solid Fuel

