Solid Waste Management and Greenhouse Gases:

Capitalizing on Co-Benefits

Dr. Mushtaq Ahmed Memon

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

Mandate

- UNEP Government Council decision (GC 25/8) on Waste Management GC25/8 implementation of an Integrated Waste Management (IWM) approach.
- The Bali Declaration, by Conference of Parties under Basel Convention, on Waste Management for Human Health and Livelihood, re-confirms this decision.
- UN Commission on Sustainable Development (CSD) has also agreed to undertake waste as one of the focus areas for CSD 18

Challenge # 1: Waste Generation

Population growth – especially urban population

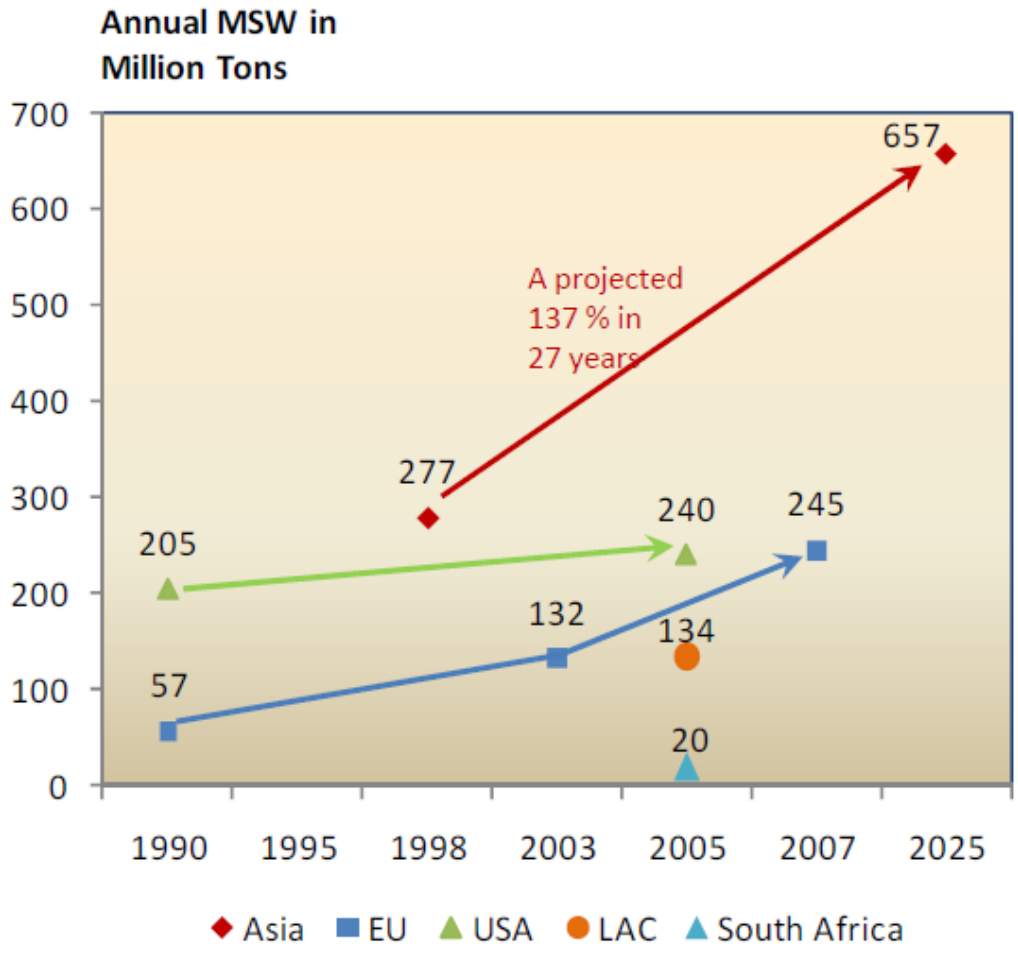
Economic growth – life styles and globalization

GDP $/capita/year	< $5,000	$5,000 - $15,000	> $20,000
Average consumption of paper/cardboard per inhabitant kg/capita/year	20	20 - 70	130 - 300
Municipal waste kg/capita/year	150 - 250	250 - 550	350 - 750
Collection rate	< 70%	70 % - 95 %	> 95%
Waste regulations	No National Environmental strategy; Regulations practically nonexistent; No statistics	National Environmental Strategy; National Environmental Agency; Environmental legislation; Few statistics	National Environmental Strategy; National Environmental Agency; Strict and complex regulations; Statistics
Composition of municipal waste % Food/Putrescible waste Paper and cardboard Plastics Metals Glass	 50 - 80 4 - 15 5 - 12 1 - 5 1 - 5	 20 - 65 15 - 40 7 - 15 1 - 5 1 - 5	 20 - 40 15 - 50 10 - 15 5 - 8 5 - 8
Humidity	50% - 80%	40% - 60 %	20% - 30%
Heating value kcal/kg	800 - 1,100	1,100 - 1,300	1,500 - 2,700
Waste treatment	Unauthorized deposits > 50%; Informal recycling 5% - 15%	Landfills > 90%; Start of selective collection; Organized recycling 5%	Selective collection; Incineration; Recycling > 20%

Source: Lacoste & Chalmin (2007)

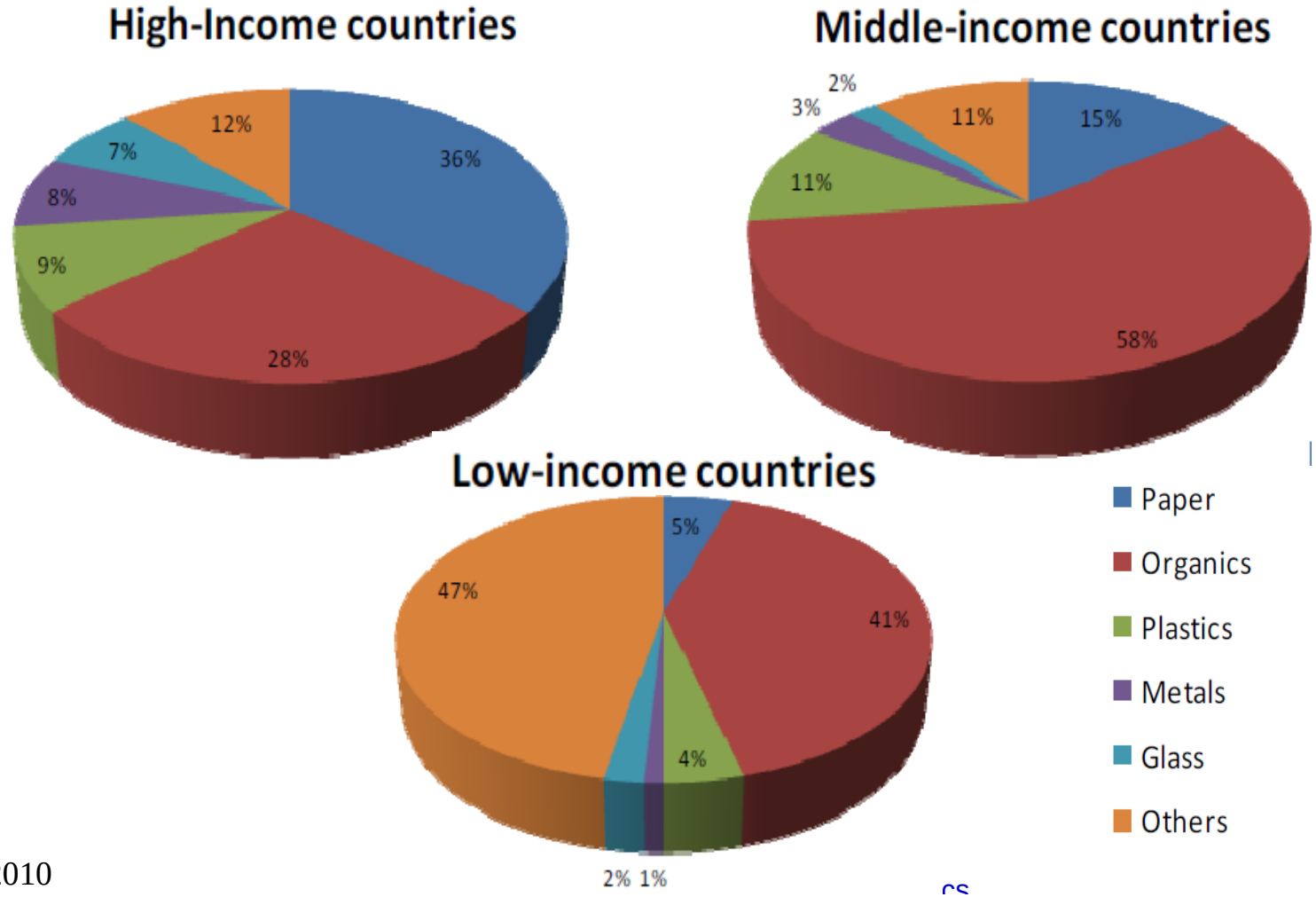
Globally, 2.5 to 4 billion tons of waste was generated in 2006

MSW	Worldwide: 1.84 billion tons (2004) 25 OECD countries: > 610 million tons (2006)
Industrial non-hazardous waste	Typically 1.1 – 1.8 billion tons in countries like EU, USA, China (2006)
C&D	10-15% of total waste in developed countries (2006)
Hazardous waste	338 million tons (2001)
E waste	20 – 50 million tons world wide (2005)
Automobile	8 – 9 million tons in EU (2006)



Source: Arunprasad, Swati. (2009) "Waste Management as a Sector of Green Economy," Presentation at International Forum on Green Economy, Beijing, China, November 2009.

- Shift from high organics to higher plastic and paper corresponding to increase in relative standard of living



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Challenge # 2: Severity of Impacts

Payatas, Philippines

- Severe health impacts particularly on community in vicinity of dumpsites.
- Pollution of surface and sub-surface water bodies due to leachate contamination.

Nairobi, Kenya

- Air pollution from emissions of spontaneous combustion in dumps.
- Adverse impacts on fauna and flora.
- Greenhouse gas emissions

Challenge # 3: Increasing Costs

OECD countries:

Municipal waste – USD120 billion/year

Industrial waste – USD150 billion/year

Developing countries:

20-50% of recurring budget of municipalities is spent on solid waste management although only 50% of urban population is covered. In low-income countries collection alone drains 80-90% of total waste management budget.

Challenge # 4: Limited Policy Framework

- Rely on end-of-pipe solutions with focus on collection and disposal
- Safe disposal
  - 30% practised only in middle-income developing countries
  - 5% practised only in low-income developing countries
- Lack of funding for creating waste management infrastructure
- Policy implementation at best in selected big cities

Challenge # 5: Lack of Political Priority

- Waste management and resource recovery still a low priority area
- Lack of national initiatives and fund allocation particularly in low-income countries
- Lack of comprehensive programme at national/local level

Turning Challenges into Opportunities

20th CENTURY	21st CENTURY
WASTE MANAGEMENT	RESOURCE MANAGEMENT
"How do we get rid of our waste efficiently with minimum damage to public health and the environment?"	"How do we handle our discarded resources in ways which do not deprive future generations of some, if not all, of their value?"

Source: Dr. Paul Connett, Zero Waste, Power Point

Opportunities

- Segregated organic waste can be composted to produce manure (for agricultural use) and/or biomethanated to produce biogas (to substitute fossil fuels). In developing countries 40-80% of municipal waste is organic waste
- Waste to energy conversion is rapidly increasing. Several technology routes now available, e.g., biomethanation (for organic waste, direct incineration with energy recovery, etc.)
- Waste management is a business opportunity with potential for job creation particularly for the vulnerable section of the society
- The waste market – High economic value being attributed to "waste"

  OECD municipal waste market – USD125 billion
  Emerging economies (Brazil, China, India) – USD25 billion
  Increase in global MSW market (2007-11) – 37.3%

Opportunities: GHG Reduction

- **Composting** excluding composting of waste streams from manure management

1 

- **Anaerobic digestion** with biogas collection and flaring or use

3 

- **Methane capture** from landfills

6 

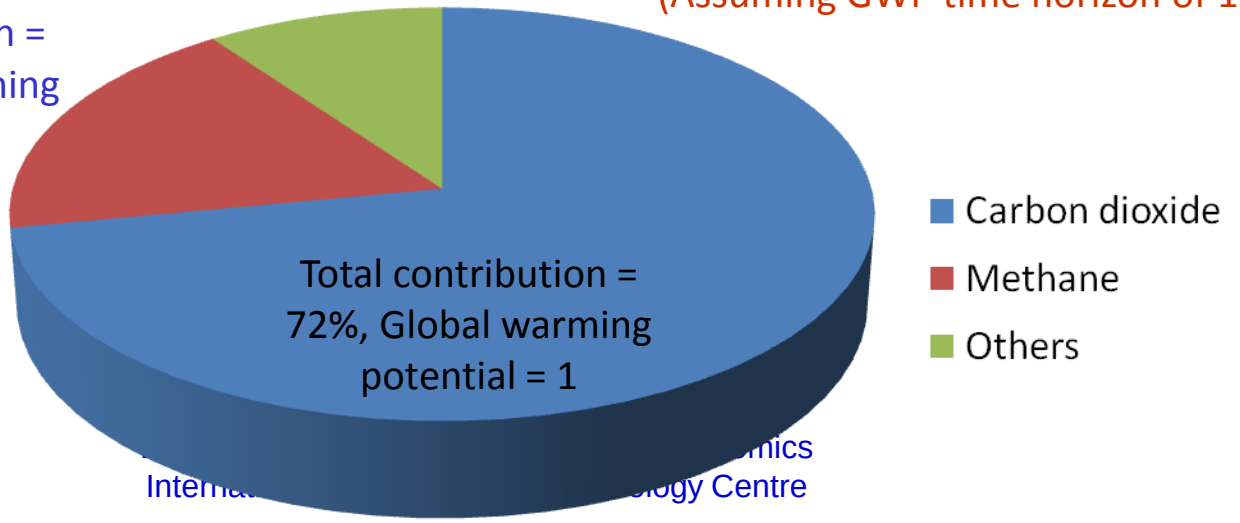
- **RDF**

5 

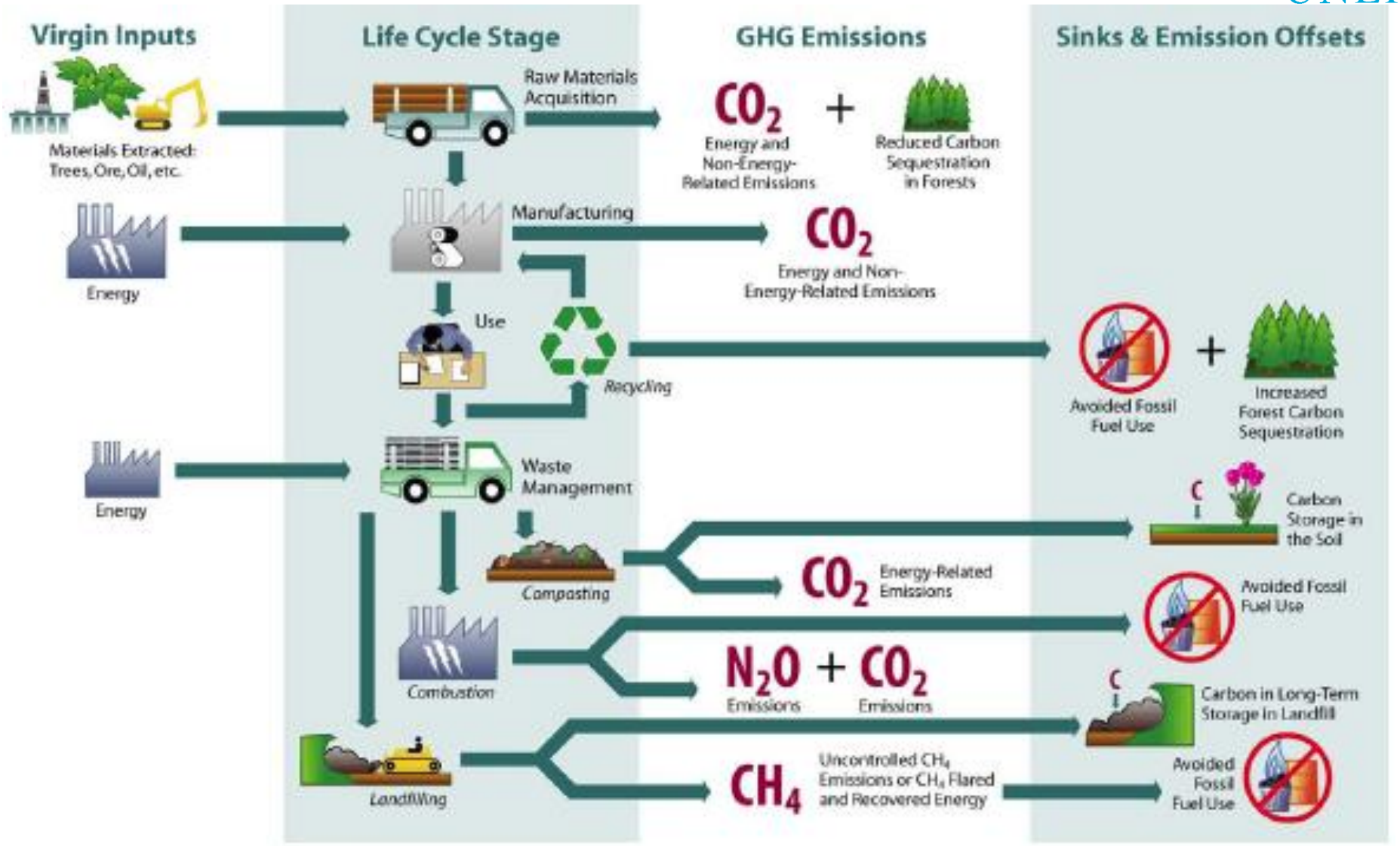
Total contribution = 10%, Global warming potential varies by gas

- Nitrous Oxide = 296
- Hydroflurocarbons = 12,000
- Perflourocarbons = 4,800 – 9,200
- Sulfur Hexafluoride = 22,200
- (Assuming GWP time horizon of 100 years)

Total contribution = 18%, Global warming potential = 23



GHG Sources and Sinks



UNEP Activities on ISWM

- ISWM Plan for Wuxi New District, China – Mar 08
- ISWM Plan for Pune City, India – Aug 08
- ISWM Plan for Maseru City, Lesotho – June 09
- ISWM Plan for Matale City, Sri Lanka – Oct 08
- ISWM Plan for Novo Hamburgo, Brazil – Aug 09
- ISWM Plan for Nairobi, Kenya – In progress
- ISWM Plan for Bahir Dar, Ethiopia - In progress
- ISWM Training Package on ISWM - online
- Regional Training for Africa in Mauritius – Mar 09
- Regional Training for Asia-Pacific in Osaka – Oct 09
- South-South Cooperation on ISWM – Bali 2008

UNEP Activities on Waste

- **E-waste management:**
  Manuals on E-waste Inventory - online
  Manual on E-waste Management - online
  E-waste management Plan for Pnom Penh City, Cambodia

- **Converting agricultural waste biomass into a resource:**
  Compendium of Technologies - online
  Piloting in Nepal, Pakistan, Philippines and Sri Lanka – In progress
  Recycling of waste palm trees in Malaysia – under development

- **Converting waste plastic into a resource:**
  Compendium of technologies -
  Baseline/Piloting in India, the Philippines and Thailand

- **Waste management in the context of climate change**

- **Destruction Technologies for Hazardous Waste** – 2010-11

Publications

- Resource Augmentation in Viet Nam
- E-waste Inventory Manual
- E-waste Management Manual
- Waste Characterization & Quantification
- Assessment of Waste Management System
- Target Setting and Issues of Concern for ISWM
- How to develop ISWM Plan
- Compendium of Technologies for Converting Waste Agricultural Biomass into Resource
- Compendium of Technologies for Converting Waste Plastics into Resource
- Assessment Methodology for Waste Plastics
- Sustainability Assessment of Technologies (SAT) Framework (Draft)
- Waste and Climate Change

Acting Locally to Impact Globally

Draft Paper:

"Waste & Climate Change:
Global trends and strategy framework

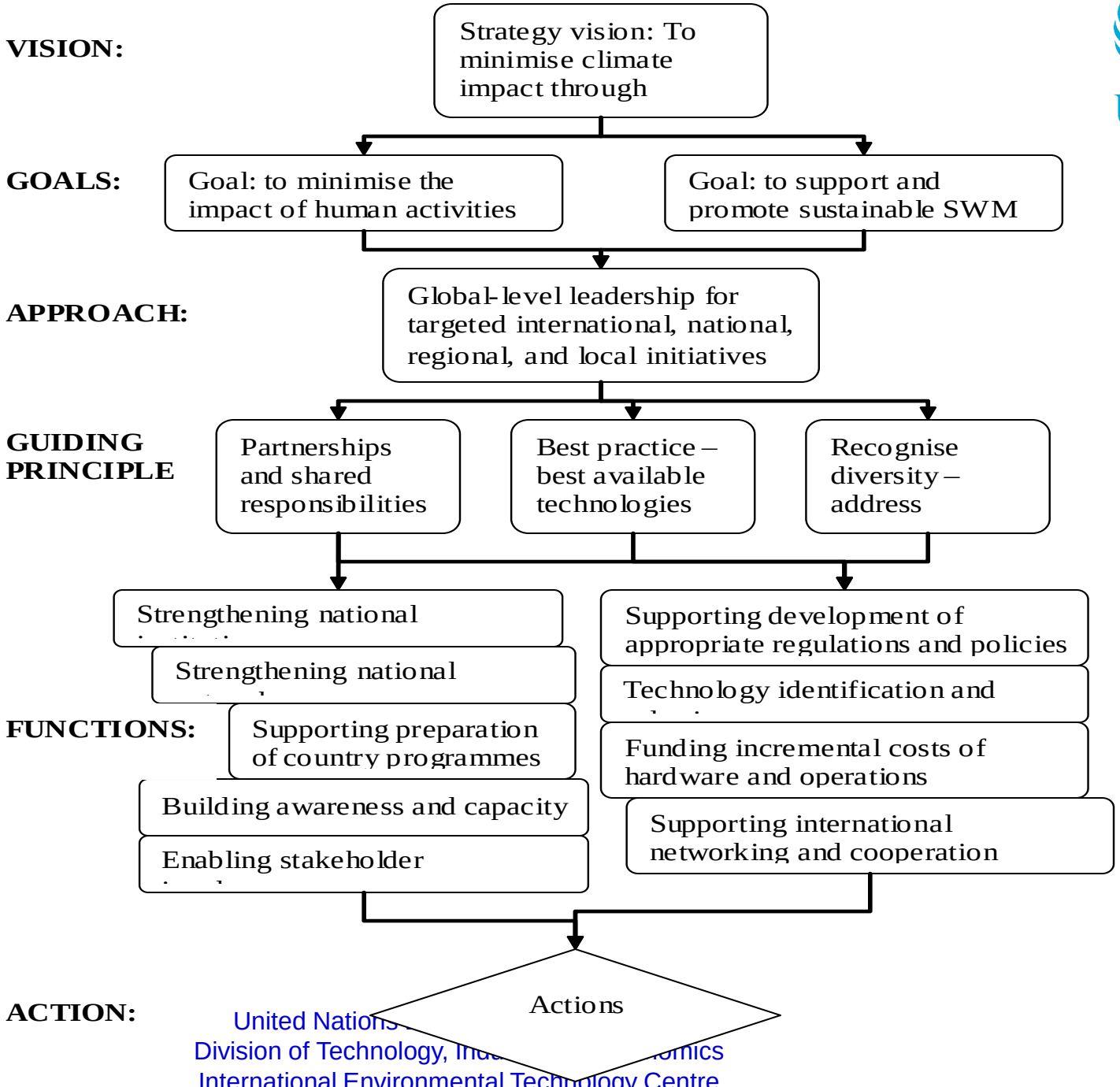
- Critically analyse existing information on links between waste and climate change
- Examine current activities of relevant international organisations
- Identify gaps
- Develop framework for international strategy
- Stakeholder consultation
- Closely working with ISWA and DAKOFA

Guiding principles

- Build on existing initiatives and strengths
- Partnerships and shared responsibilities
- Best practice – best available technologies
- Recognise diversity – address disparity

Proposed functions of UNEP-led strategy

1. Strengthening national institutions
2. Strengthening national networks
3. Supporting preparation of country programmes
4. Building awareness and capacity
5. Supporting development of appropriate regulations and policies
6. Technology identification and selection
7. Funding incremental costs of hardware and operations
8. Supporting international networking and cooperation
9. Enabling stakeholder involvement


VISION:
Strategy vision: To minimise climate impact through
GOALS:
Goal: to minimise the impact of human activities
Goal: to support and promote sustainable SWM
APPROACH:
Global-level leadership for targeted international, national, regional, and local initiatives
GUIDING PRINCIPLE
Partnerships and shared responsibilities
Best practice – best available technologies
Recognise diversity – address
FUNCTIONS:
Strengthening national
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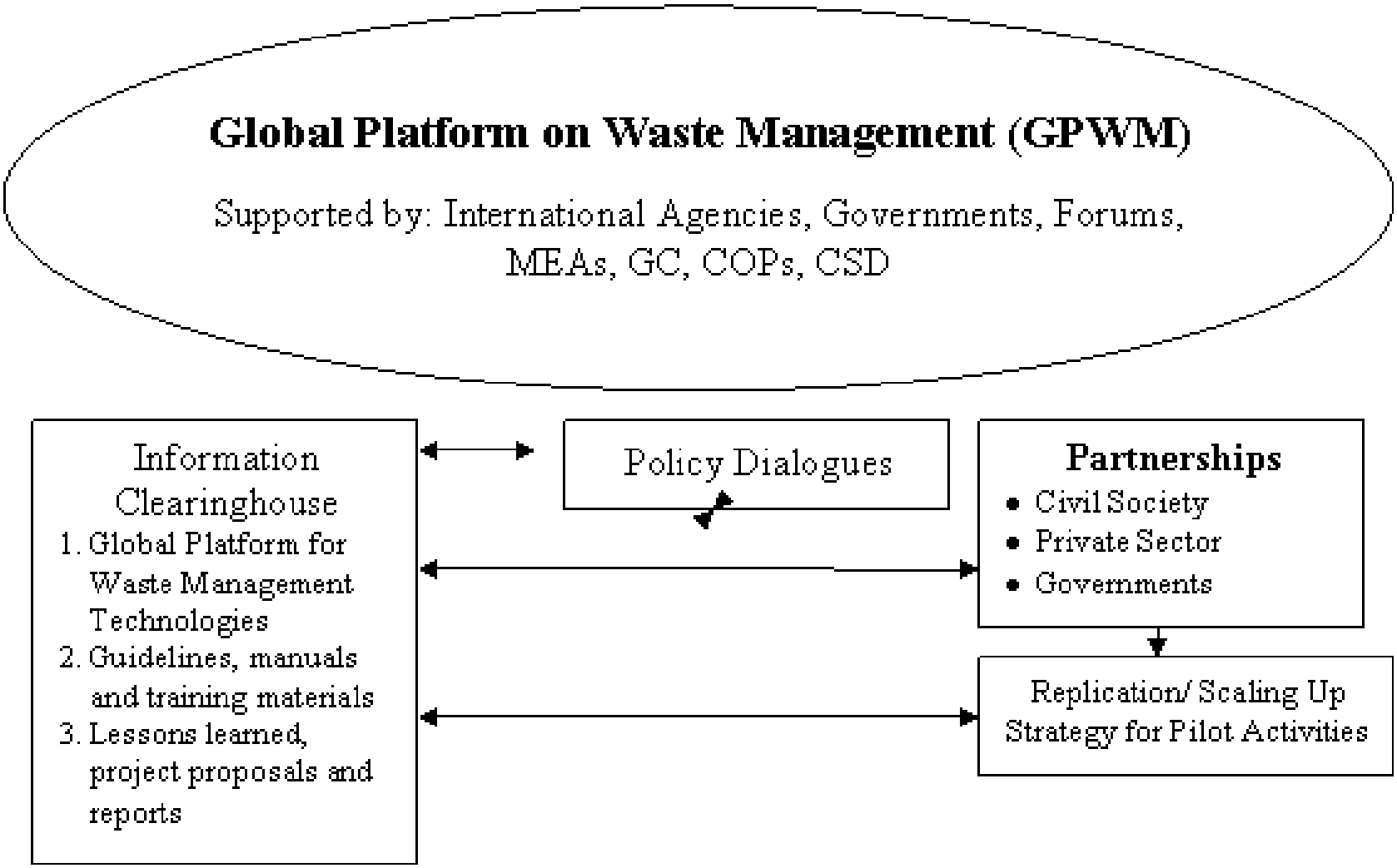
Supporting preparation of country programmes
Building awareness and capacity
Enabling stakeholder
Supporting development of appropriate regulations and policies
Technology identification and
Funding incremental costs of hardware and operations
Supporting international networking and cooperation
ACTION:
Actions

Framework for Facilitation



Summary

- The waste sector is in a unique position to become a net GHG reducer
- This should not be considered in isolation, but in the context of co-benefits due to myriad environmental, social and economic implications of waste management decisions; and there needs to be a balanced consideration
- UNEP has a key role to play to assist member countries and their cities on waste management including co-benefits for climate change
- Opportunities exist to develop a more cohesive global approach
- UNEP is seeking input to development of a strategy framework for “waste and climate change” and for its on-going activities on waste management

Thank You…