
Climate Change Mitigation/ Co-benefits/ CDM

Session 3: Challenges and Opportunities in the 3Rs/ Waste Management in Asia Cutting Issues

Presented by:
A. H. Md. Maqsood Sinha
Waste Concern

**Inaugural Meeting of the Regional 3R Forum
in Asia**

*Tokyo, Japan
November 11-12, 2009*



Presentation Outline

1. 3R Challenge in Asia?
2. Human Response to Climate Change
3. Linkages Between 3R and Climate Change Mitigation and CDM
4. Potential Sectors
5. Experience in Waste Sector
6. Co-benefits of 3R
7. Way Forward

3R Challenge in Asia?



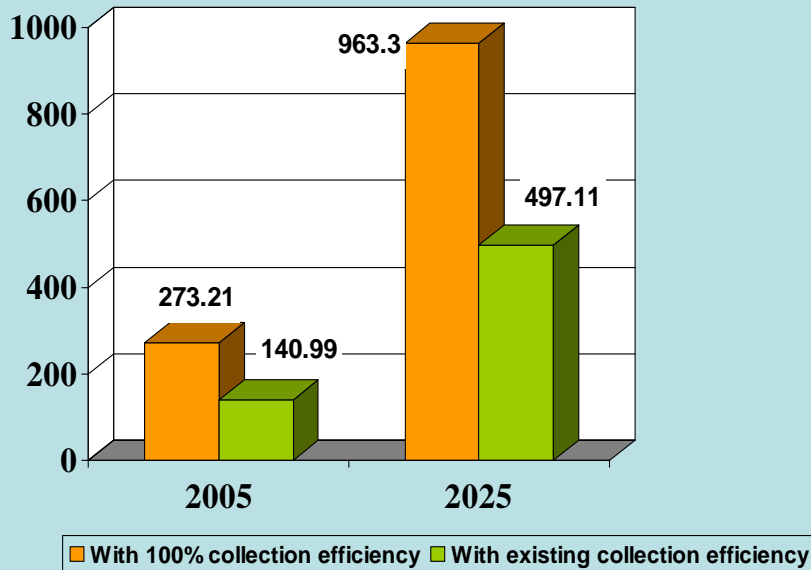
Human activities create waste, which is posing risks to the environment and to public health, if not managed properly....

Most of the Asian cities and towns as a whole are experiencing rapid urbanization, increasing population, industrialization and changing lifestyle and consumption patterns are resulting in the generation of increasing amounts of wastes.

Waste management is mainly focused with end-of-pipe solution which is based on collection, transportation and Disposal.

3R Challenge in Asia?

- In Asian developing countries municipal solid waste management costs consume **20%-50%** of municipal revenues and
- Collection service level remain low with only **50%-70%** of resident receiving service.
- Land is scarce and expensive for many cities in Asia



Projection of Future Landfill Requirement for Bangladesh Acre Per Year (4 m deep landfill area)



New Types of Waste Emerging in the Waste Stream



Used Lead Acid Battery



Plastic Waste



E-Waste



Bio-medical Waste

Rapidly changing consumption patterns are generating significantly increasing proportions of toxic chemicals in industrial waste, hazardous hospital waste, large quantities of electronic waste is a growing concern for developing countries of Asia

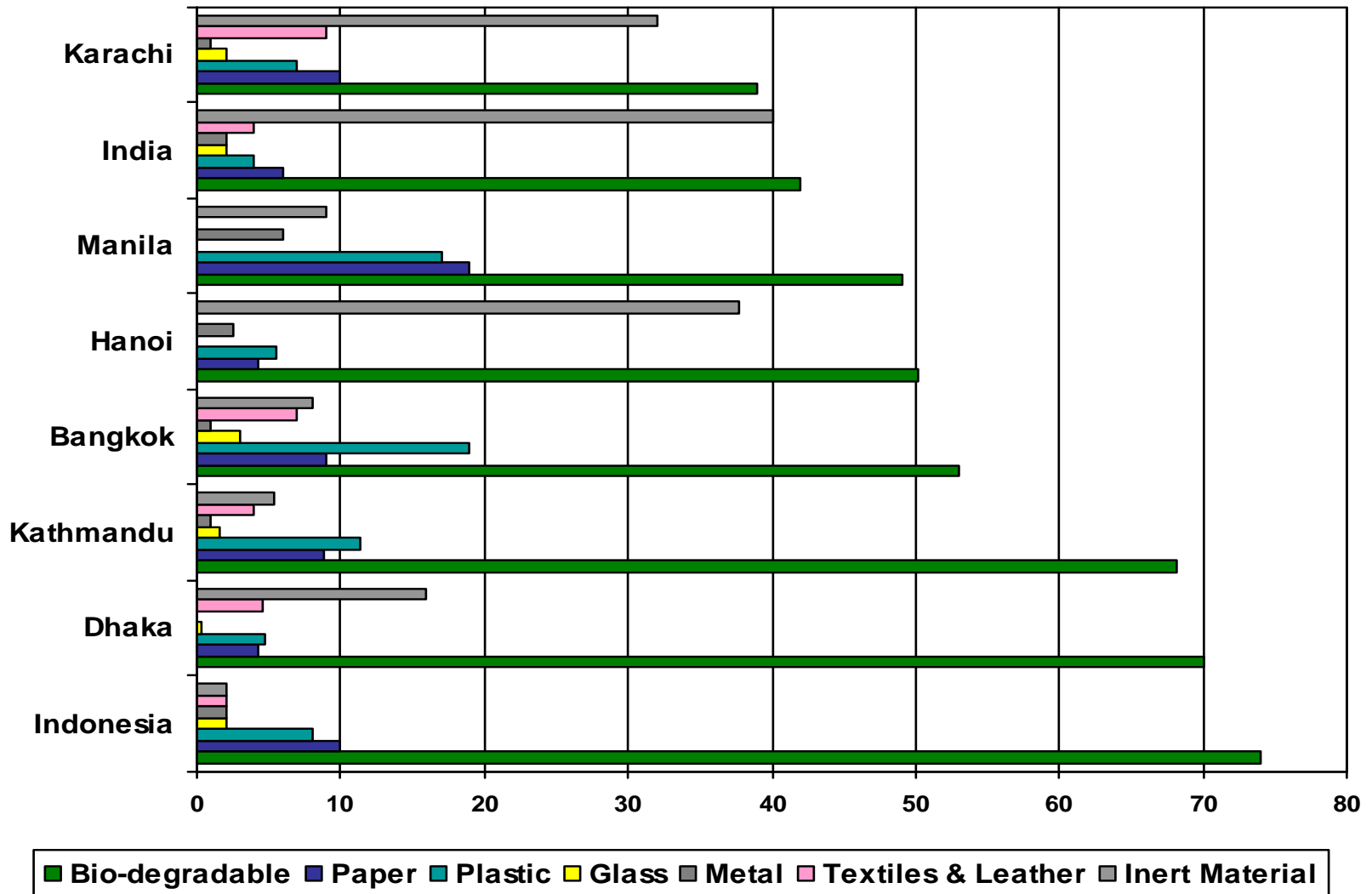
New Types of Waste Emerging in the Waste Stream



Industrial Waste

Untreated liquid and solid waste directly discharged in the water bodies, thus polluting the environment. Disposal of sludge from ETPs also becoming a major problem.

Typical Average Physical Composition of Waste in Urban Areas



Source: Zurbrugg, 2002

Waste Characteristic of Dhaka, Bangladesh

High organic matter >>(more than 70%)

High moisture content >>(more than 50%)

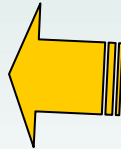
Low calorific value >>(less than 1000 Kcal/Kg)

3R Challenge in Asia?

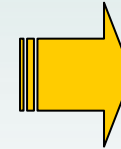
VERMINS
*Spreading more than
40 Diseases*



METHANE GAS
*Bad Odor &
Green House
gas*



LEACHATE
*Polluting
Ground
& Surface Water*



Open dumping practiced in most of the cities and towns, which is the cheapest and easiest solution for them...

Challenges Faced to **Promote 3R**

- **Waste streams from different sources are frequently mixed;**
- **City authorities are facing challenges to manage this mixed wastes;**
- **Lack of policy and regulations favoring 3R practice;**
- **Less incentives for reduce, reuse and recycling of wastes;**
- **Mostly unsanitary waste disposal method practiced;**
- **Lack of proper baseline information;**
- **Lack of awareness about the health impacts of improper waste disposal;**
- **Limited technical know how; and**
- **Limited financial resources;**



Climate Change & Kyoto Protocol

**Earth is
Getting
Warmer!**

Increasing scientific evidence reveals that earth is getting warmer due to rapid increase of **Green House Gases**. This phenomenon is known as **Global Warming** and changes in the atmosphere is known as **Climate Change**

1992

UNFCCC adopted framework to address Global Climate Change

United Nations Framework Convention On Climate Change (UNFCCC), adopted in 1992 and came into force in 1994 agreed to stabilize **Green House Gas** concentrations in the earth's atmosphere.

1997

Kyoto Protocol

The **Kyoto Protocol** to the UNFCCC, has set target for 39 industrialized countries for reducing green house gas emission to 5.2% below 1990 levels by 2008-2012

Human Response to Climate Change

```
graph TD; A[Human Response to Climate Change] --> B[ADAPTATION]; A --> C[MITIGATION]
```

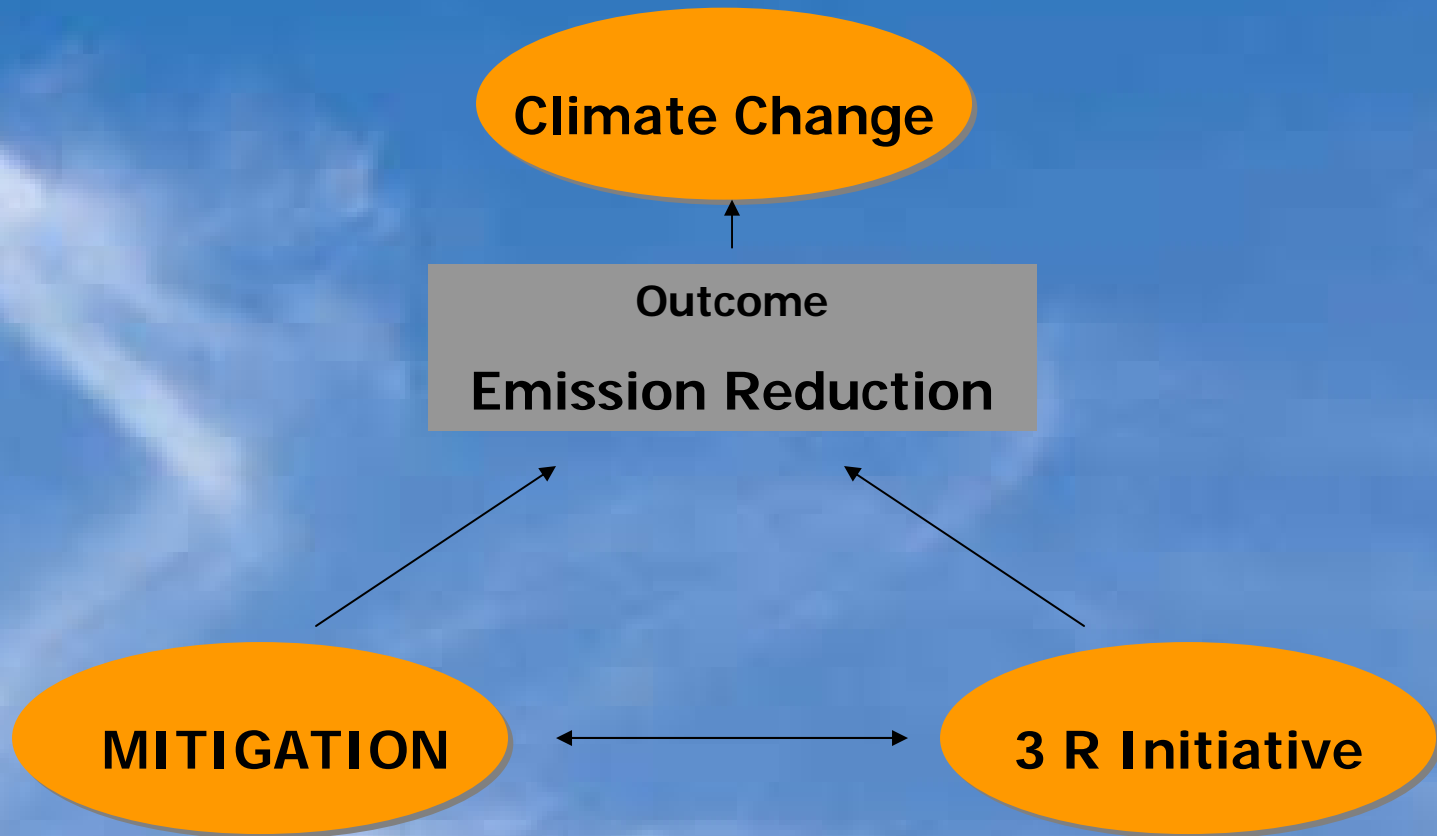
ADAPTATION

Adaptation involves developing ways to protect people and places by reducing their vulnerability to climate impacts.

MITIGATION

Mitigation involves attempts to slow the process of global climate change by lowering the level of green house gas emission in the atmosphere

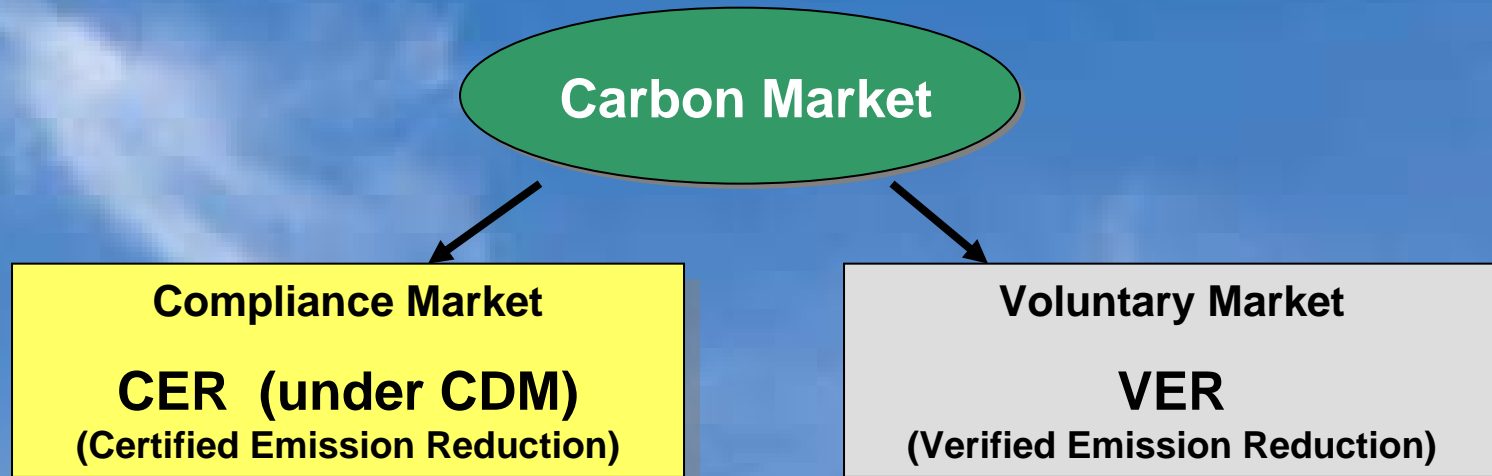
Linkages Between 3R and Climate Change Mitigation and CDM



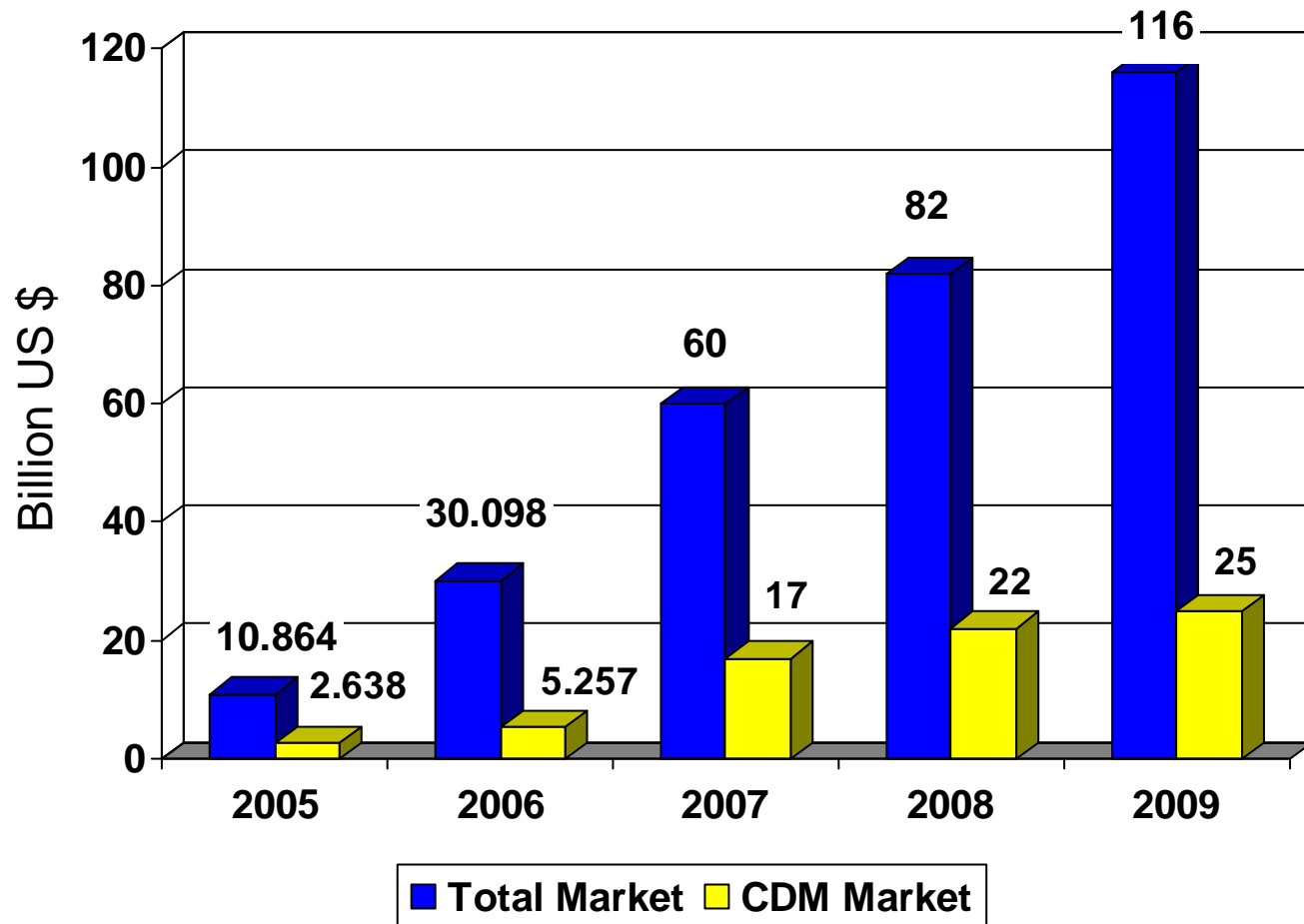
Mitigation involves attempts to slow the process of global climate change by lowering the level of green house gas emission in the atmosphere

3R also promotes energy efficiency and low material consumption as well as waste production. Thus lowering the use of fossil fuel and reducing green house gas emission

Linkages Between 3R and **Climate Change Mitigation and CDM**

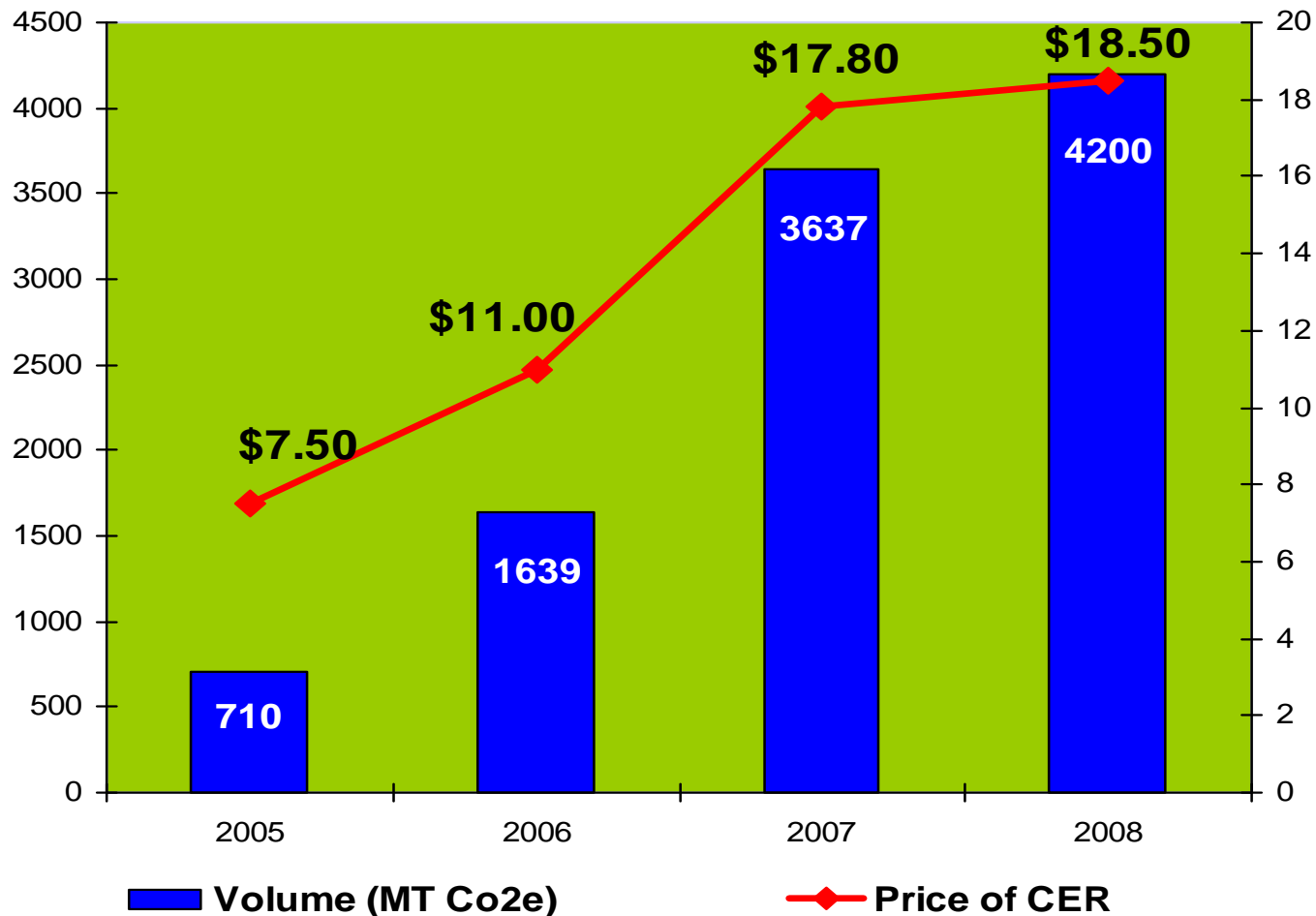


Global Carbon Market at a Glance 2005-2009



Source: 2005-2006 World Bank and IETA, May 2007 and 2008 Point Carbon (Press Release Feb 26, 2008)

Carbon Market at a Glance 2005-2009



CER in 2009 is US \$ 20.5 per ton

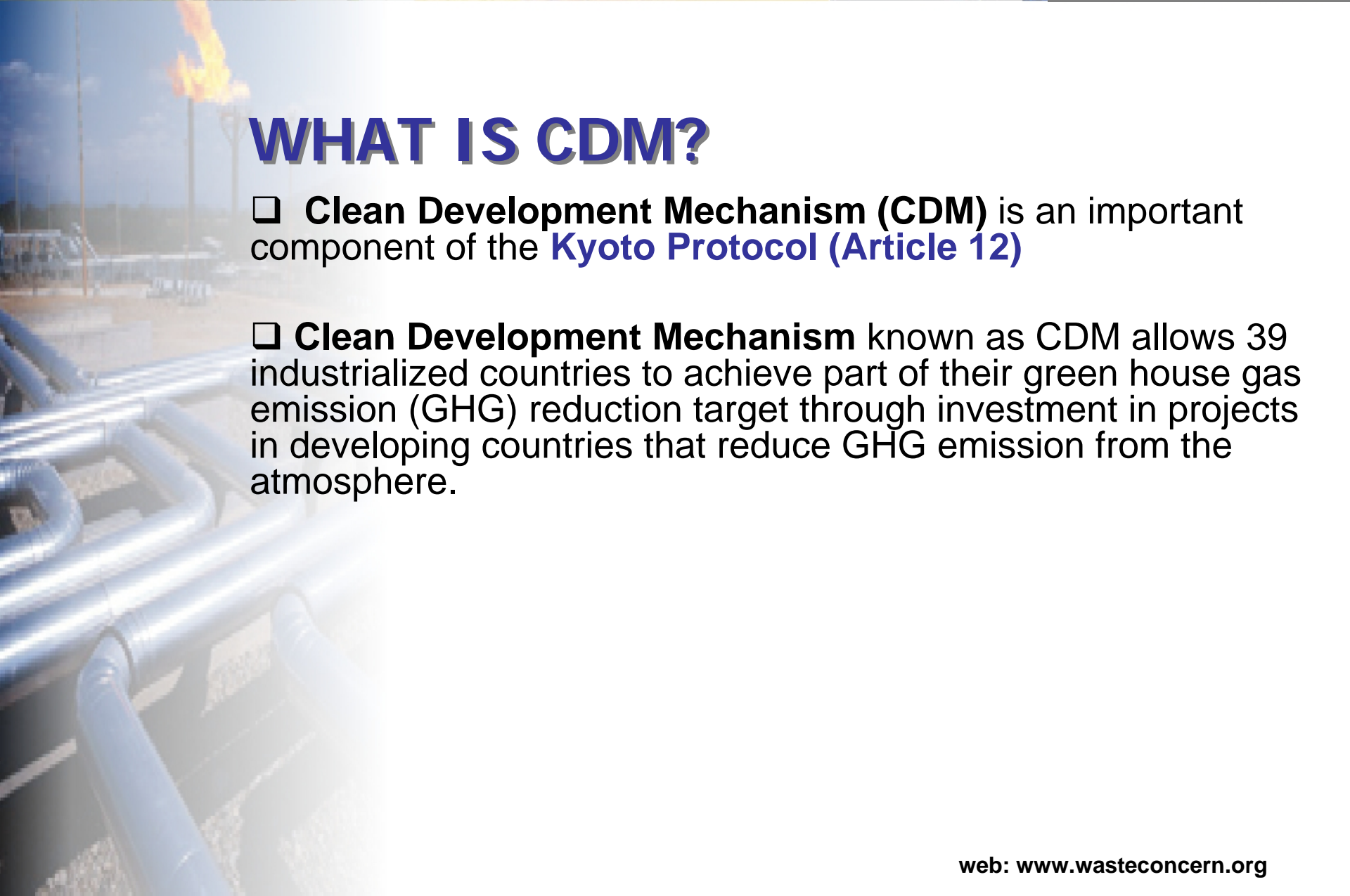
Potential CDM projects in Different Sectors

Sectors	Potential projects/activities
Wastes	<ul style="list-style-type: none"> • Composting from municipal organic waste. • Landfill gas recovery and use for electricity generation. • Waste-to-energy conversion activities (e.g. biogas, biogasification).
Energy	<ul style="list-style-type: none"> • Development of renewable energy sources (hydro, solar, wind and biomass). • Fuel substitution measures. • Improvement in electricity transmission and distribution network. • Reduction of leakage in transport, handling and distribution of oil and gas.
Buildings (residential, commercial and government)	<ul style="list-style-type: none"> • Energy-efficient design of buildings including cogeneration. • Energy-efficient appliances. • Energy conservation measures. • Reuse of waste water • Use of renewable energy sources.
Agriculture	<ul style="list-style-type: none"> • Solar and wind pumping • Improvement in use of agrochemicals (fertilizers and pesticides). • Reduction of energy use for irrigation through efficient pumps and demand-side management. • Improvement in cultivation practices to reduce methane emissions.
Forests	<ul style="list-style-type: none"> • Afforestation and reforestation.
Industry and Manufacturing	<ul style="list-style-type: none"> • Cogeneration • Energy conversion and energy-efficiency measures. • Process modifications in order to lower emissions. • Change of feedstock in boilers (e.g. oil to gas).
Mining	<ul style="list-style-type: none"> • Coal bed methane recovery.
Transport	<ul style="list-style-type: none"> • Introduction of alternate fuels (dedicated CNG vehicle). • Fuel-efficiency measures. • Improvement in public transport. • Urban planning and traffic management.



WHAT IS CDM?

- ❑ **Clean Development Mechanism (CDM)** is an important component of the **Kyoto Protocol (Article 12)**
- ❑ **Clean Development Mechanism** known as CDM allows 39 industrialized countries to achieve part of their green house gas emission (GHG) reduction target through investment in projects in developing countries that reduce GHG emission from the atmosphere.



How Does CDM Works?

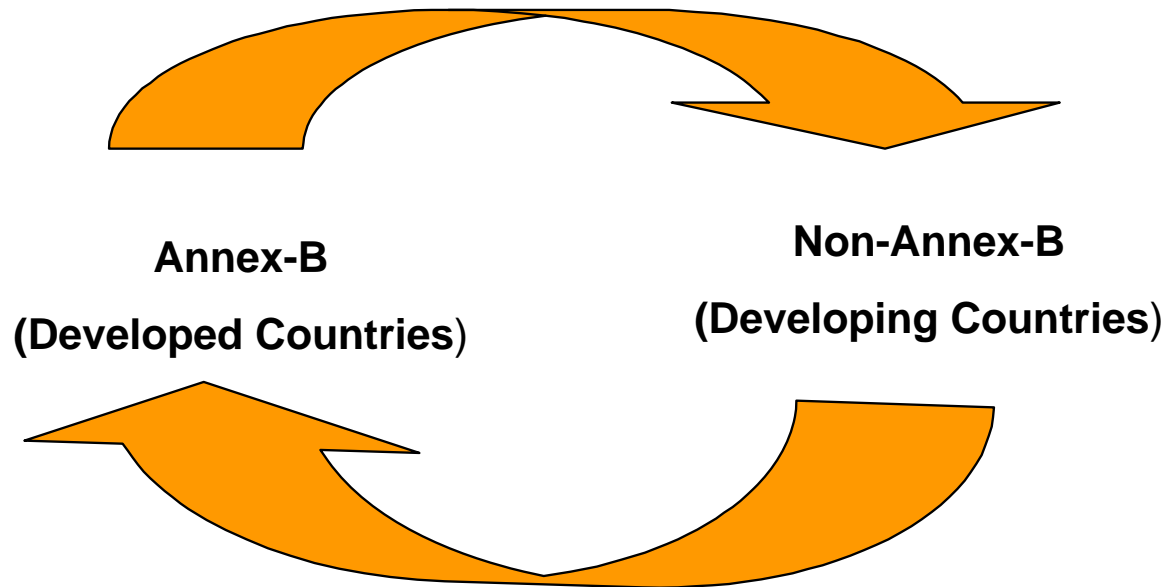
CDM allows developing country entrepreneurs and others to get investment fund for doing projects, which reduce Green House Gas.

Two things are important in CDM, namely,

- The project proponent from developing country must prove that the GHG reduction would not have occurred in the absence of the project
- The project must promote sustainable development

How Does CDM Works?

Flow of Finance



Flow of Emission Credit

- There is a flow of finance either up front or annually from developed countries.
- In return developing countries will reduce a certain quantity of Green House Gas, through projects, which will flow to developed countries as CERs after approval by the Executive Board of the UNFCCC.

3R practice
linked to Mitigation

Linkage Between Municipal Waste and **Climate Change**

- There is a clear linkages between municipal waste management and climate change in developing nations of the Asia-Pacific.
- Organic wastes in traditional landfills normally degrade under partly anaerobic conditions and generate methane emissions.
- Methane is a more potent GHG than carbon dioxide (CO₂) and is a major contributor to climate change.
- Collecting and using landfill gas, composting and biogas production from organic wastes are examined as possible ways of minimizing this GHG.
- Extracting energy (and raw materials) from waste is consistent with the “reduce, reuse, recycle” (3R) approach being adopted as part of sustainable development strategies and is further evidence of how the climate change and sustainable development can be integrated.

Experience from Waste Sector Projects

- ❑ Landfill Gas Recovery & Utilization
- ❑ Composting of Municipal Waste

The waste sector projects prevent the release of methane from bio-methanation processes.

The methane collected can be flared or used to generate electricity.

Project based carbon trading (CER/VER) between industrialized and developing countries

Dutch Company WWR and Banks, FMO and Triodos

CDM investment \$\$

Industrialized country



Emission reduction credits (CER)



Project Reducing GHG emissions in Dhaka

3R practice **linked to Mitigation**

CDM project

No Methane Emission

Land Fill Gas Recovery



Composting Plant



Proposed Project under CDM

Baseline Situation

Methane Emission



Existing Practice:
land filling of waste

City
Authorities
Collecting

Waste

The project is recycling organic vegetable waste and instead of disposing in landfill, it is converted into compost.

Waste Concern is involved in the design, implementation and now monitoring of the project

**Landfill Gas Extraction and Utilization
at Matuail Landfill Site in Dhaka**

Unsanitary Crude Dumping Practice



Landfill Gas Extraction Utilization at **Matuail Landfill Site in Dhaka**

Existing Landfill site at
Matuail, Dhaka



LFG Recovery project located at
the Netherlands by WWR/VAR



Feature of the Proposed Project

- ❑ CDM project Registered with UNFCCC
- ❑ Project cost: 3.5 million US\$
- ❑ Can take care of 59% of the total collected waste (1700 ton/day) of Dhaka City Corporation (DCC) per day
- ❑ This project will recover methane gas which is a major Green House Gas (GHG) from waste dumping site at Matuail and also to **generate 3 MW (minimum)**, using the recovered methane gas.
- ❑ Will increase the existing height (from existing 5 meter) of the Matuail waste dumping site to 25 meters to enhance the life to of the existing site
- ❑ Reduce 990,000 tons of carbon dioxide (GHG) over the 8-year period

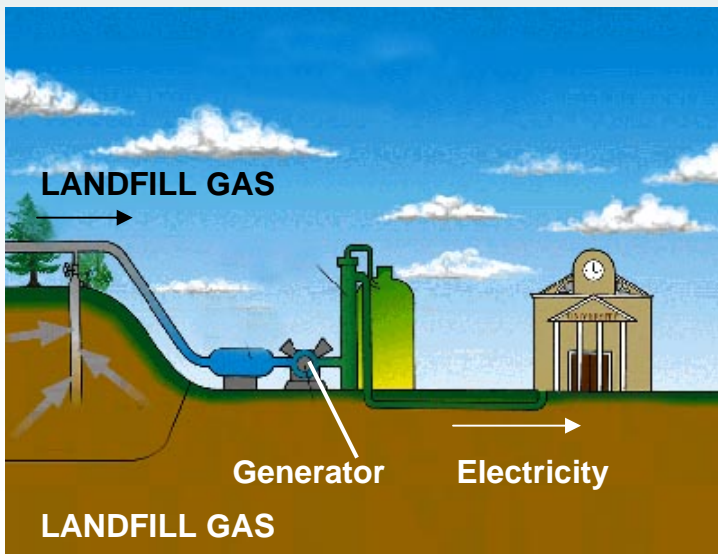
LFG Recovery project located at the Netherlands owned and operated by WWR/VAR



Feature of the Proposed Project

The project will use landfill gas collection technology in the existing landfill of Matuail.

✓ *No financial investment, no free or subsidized electricity or gas required from GoB*



**700 Tons/day Capacity Compost Plant
at Dhaka of Waste Concern**

Examples of 3R practice: Dhaka experience CDM



700 Tons/day Capacity Compost Plant at Dhaka of Waste Concern

Examples of 3R practice: Dhaka experience CDM



CDM – Executive Board

UNFCCC/CCNUCC



AM0025 / Version 0
Sectoral Scope 1
EB 2

NOTE: The following project activities are required to make the PDD publicly available as per the guidance in paragraph 29 of the report of twenty seventh meeting of the Board:

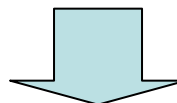
1. those that use mechanical process to produce refuse-derived fuel (RDF) from waste and its use for energy generation.

Revision to the approved baseline methodology AM0025

“Avoided emissions from organic waste through alternative waste treatment processes”

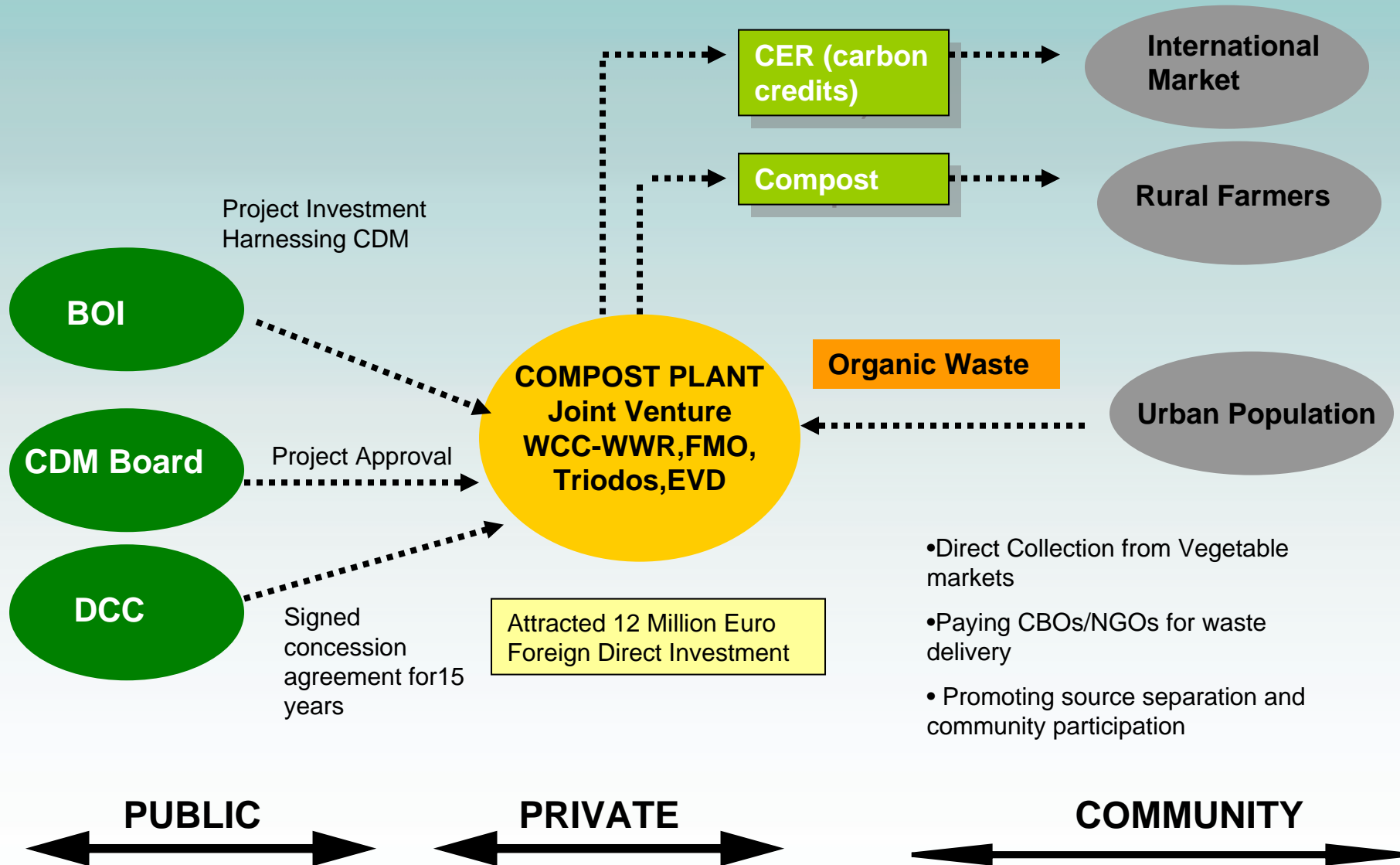
Source

This baseline methodology is based on the proposed methodologies submitted for the project “Organic waste composting at the Matuail landfill site Dhaka, Bangladesh,” whose baseline study, monitoring and verification plan and project design document were prepared by World Wide Recycling B.V. and Waste Concern. It has been revised to include elements from the methodology for the “PT Navigat



Obtained UNFCCC
approval on Sept 2005

Examples of 3R practice: Dhaka experience CDM



Before-After: Waste Collection System



Present Collection Practice



Improved Covered Collection by WWR

Parameters to be Monitored **During Implementation**



Weighing of Waste Input

Process Quality Control



Forced Aeration by Blowers to Provide Oxygen in the Compost Pile



Process Quality Control



Regular Oxygen Monitoring



Temperature Control

Working Condition



Informal sector working in unsafe working condition



Informal sector working in safe working condition

Comparative Analytical Results of Fertilizer Samples

Name of Product : Waste Concern Jaiba Sar Company:

উপাদান	অনুমোদিত মাত্রা	Analytical Results			Guaranteed analysis
		BARI	BINA	SRDI	
Physical					
Colour	Dark grey to black		Very dark greyish brown	Dark brown	
Physical condition	Non-granular form		Soft body, Granular in size	Non granular	
Odour	Absence of foul odour		Not smell	Odour less	
Moisture	Max. 15%	16.3	17.1	15.5	
Chemical					
pH	6.0 – 8.5	8.3	8.0	8.4	
Organic Carbon	10 – 25%	23.8	20.20	24.9	
Total Nitrogen (N)	0.5 – 4.0%	2.01	1.90	1.95	
C : N	Max. 20:1	11.8:1	10.63	12.8	
Phosphorus (P)	0.5 – 1.5%	1.7	2.2	1.25	
Potassium (K)	1.0 – 3.0%	2.68	2.52	2.60	
Sulphur (S)	0.1 - 0.5%	0.30	0.09	0.35	
Zinc (Zn)	Max. 0.1%	0.04	*	0.03	
Copper (Cu)	Max. 0.05%	0.009		0.008	
Arsenic (As)	Max. 20 ppm	19.3	*	*	
Chromium (Cr.)	Max. 50 ppm	*	*	20.2	
Cadmium (Cd)	Max. 5 ppm	3.81	*	2.28	
Lead (Pb)	Max. 30 ppm	27.4	*	26.0	
Mercury (Mg)	Max. 0.1 ppm	*	*	*	
Nickel (Ni)	Max. 30 ppm	16.85	*	26.1	
Inert material	Max. 1%	*			

*Not analysed

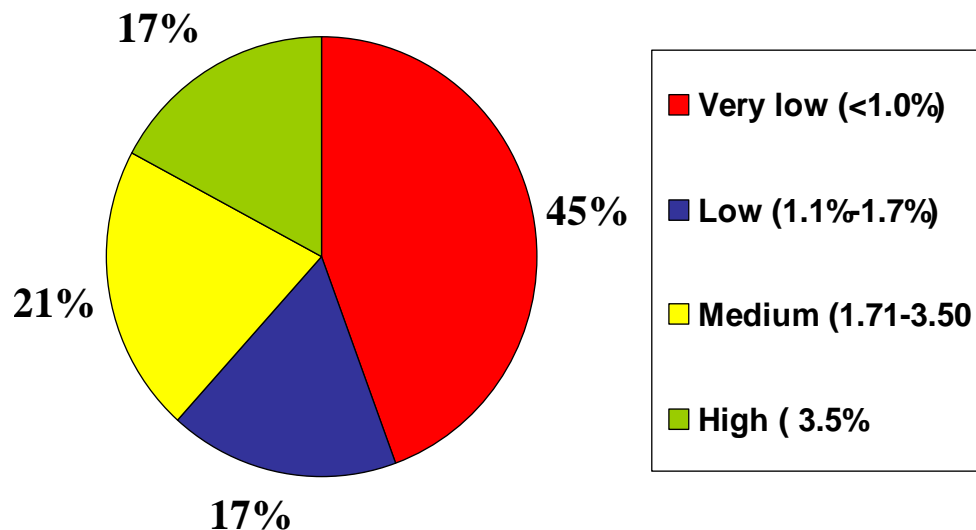
**Complies with GoB
Compost Standards of
2008**



Quality Control Laboratory

SOIL CONDITION AND **IMPACT OF COMPOST**

83% of cultivable land in Bangladesh has less than 3.5% organic matter (more than 3.5% is considered to be good soil)

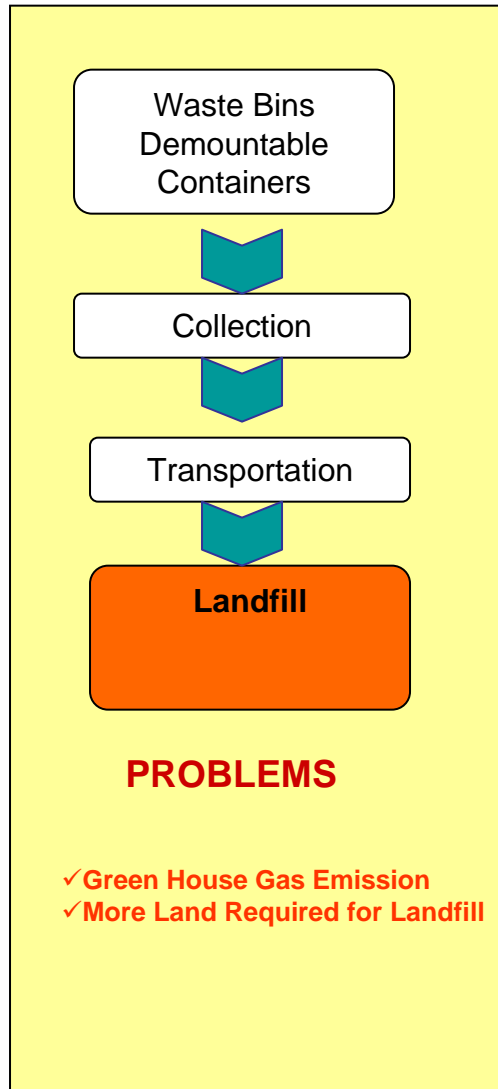


Pie Diagram Showing Depletion of Organic Matter From the Soil of Bangladesh



FIELD TRIAL OF COMPOST PRODUCED BY WWR ON RICE FROM AUGUST TO NOVEMBER, 2008
Reduces the use of chemical fertilizer 25-30
increased yield 30%

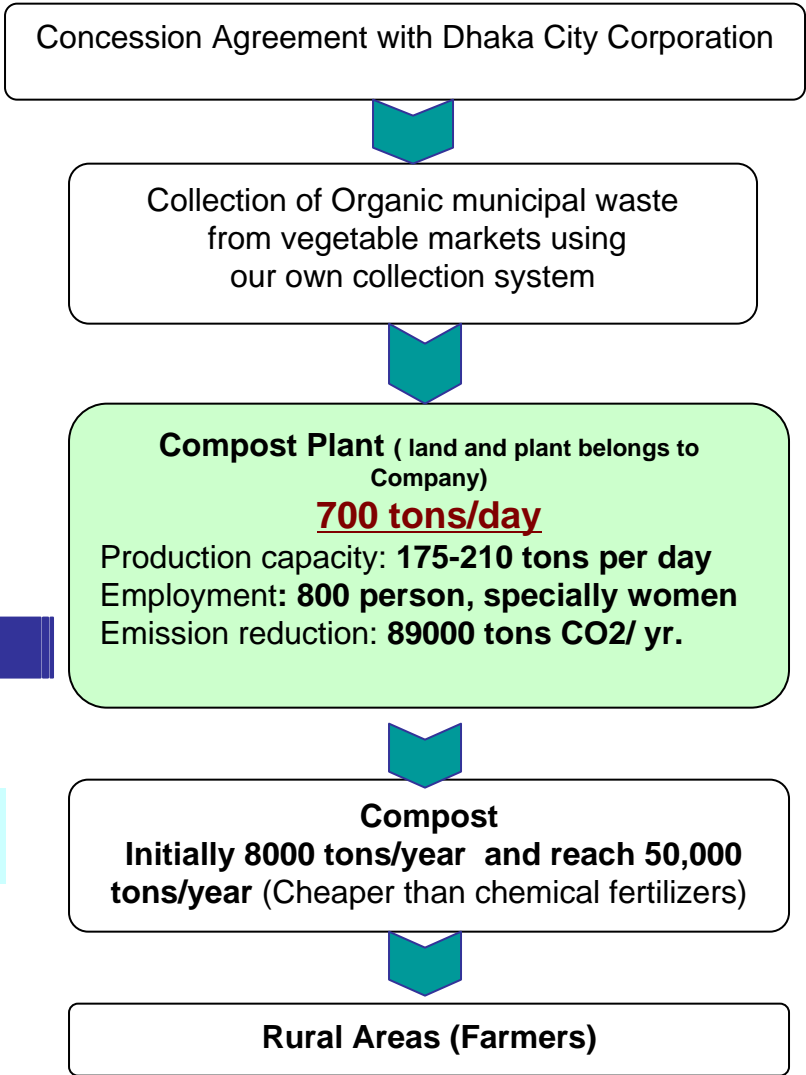
How the CDM project is implemented in Dhaka Using 3R Principle



700 tons/day
Saving of waste collection cost for D.C.C for **2,55,500 tons waste/yr**

700 tons/day
Saving **2,81,050 m3 land filling avoided per year**
Saving of disposal cost at dumpsite by avoiding **2,81,050 tons per day**.

No investment from public agency in this project



700 Tons/day Capacity Compost Plant at Dhaka

How 3R Can Help the Poor



Input

➤ Collection

(Organic Waste From Markets)

- Saving DCC cost

Pro-poor element

- **700 tons/ day** of waste collection Starting from 100 tons/day
- **Job Creation** 400 new jobs



Process

➤ Aerobic Composting

- Saving Landfill Area

Pro-poor element

- Creating 800 new jobs
- Focusing on Waste Pickers
- Health Insurance
- Daycare Center
- Free Meal



Output

- **Compost** (50,000 tons/year)

- **Carbon Credits** (89,000 ton Co2e/ year)

- Producing environment friendly product

Pro-poor element

- Cheaper
- Less Irrigation
- Soil Quality Improved
- Higher Yield
- Leads to higher income

Mitigation-Adaptation Loop

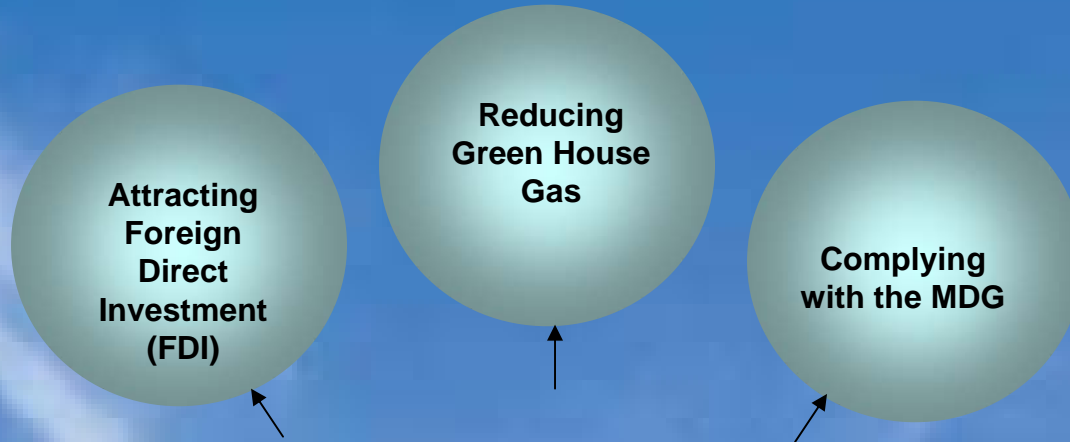
Mitigation



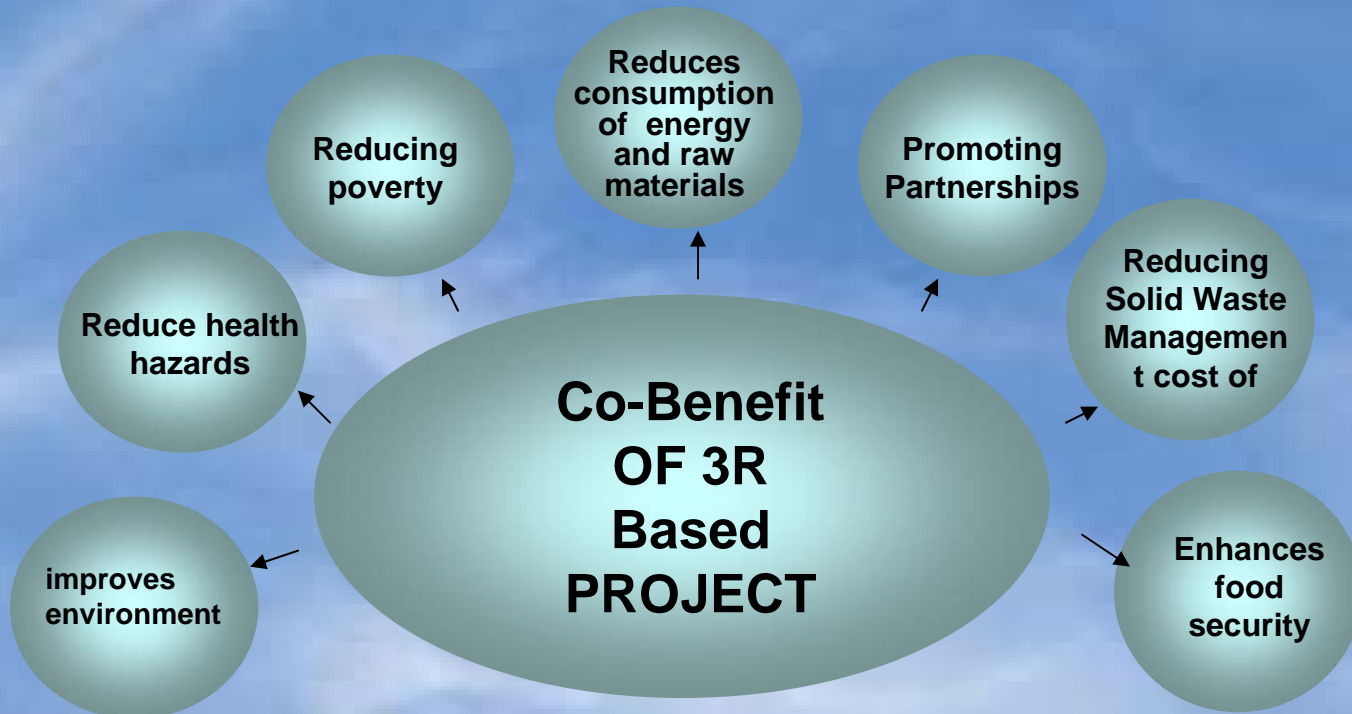
Adaptation



Global Impact



Local Impact



Way Forward

Developing countries will positively gain from 3R initiative

- ✓ Clear-cut policy package, incentives, guidelines needs to be promoted for 3R in most of the developing countries.
- ✓ Appropriate Technology are expensive, which should be subsidized by rich developed countries (for example technology transfer in CDM projects).
- ✓ Easy financial support should be promoted by bank/ financial organizations and incentives should be extended to 3R projects.
- ✓ *Lengthy CDM Project approval process needs to be simplified.*
- ✓ Capacity building training programs and research on 3R required for both public and private sector
- ✓ Public-Private-Community Partnership needs to be promoted to bring in investment in 3R projects.
- ✓ Informal sector should to be given special attention in 3R initiatives.
- ✓ Role of Media needs be promoted to inform people and raise mass awareness on 3R.

Thank You