



Green Jobs Created Through Composting of Organic Waste: a Case Study of Waste Concern

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Organized by:

ILO and Waste Concern Consultants

Supported by:

Aus Aid

Date: 18 - 19 April 2012

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Defination of Green Jobs

- “Green jobs” does not lend itself to a precise definition but includes **the direct employment which reduces environmental impact ultimately to the levels that are sustainable.**

This includes jobs that;

- help to reduce the consumption of energy and raw materials,
- decarbonizes the economy,
- protect and restore ecosystems and biodiversity,
- minimize the production of waste and pollution.
- Promotes decent work

Green jobs are thus both environmentally sound and also ‘decent’ in social terms.

Human Response to Climate Change

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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

Definition of Decent Work

Decent work has been defined by ILO representatives from governments, employers and workers' organizations in over 180 countries as: 'decent and productive work in conditions of freedom, equity, security and human dignity'.

Decent work combines adequate income from productive work with social security, respect for worker and social rights and the opportunity to voice and defend interests collectively.

“Decent work is relative and country-specific because countries differ socially and economically. None can aim for the same absolute conditions of work. Each country must set its own targets for decent work.”

Decent work can be assessed and measured using **10 broad Indicators**

1. **Employment opportunities:** All persons (women and men) who want work should be able to find work, and the decision to work should be voluntary, in accordance with the minimum age of access to employment.
2. **Unforced paid work:** Work should be freely chosen and not forced on individuals. Certain forms of work are completely unacceptable (e.g. bonded labour, slave labour, and child labour). Workers should have the freedom to join workers' organizations.
3. **Adequate earnings and productive work:** Workers must have acceptable livelihoods including remuneration for all work carried out. Remuneration — especially in the case of wage workers—should correspond to a fair and living wage. Work for equal value should ensure equal pay.
4. **Fair and equal treatment in employment:** Fair and equitable treatment and opportunity *at work* (coinciding with absence of discrimination) and *in access to work* on grounds of sex, national origin, race, and age (coinciding with absence of harassment on these same grounds).
5. **Decent work hours:** Working time arrangements concerning daily and weekly working hours, regular and overtime work, and breaks and rest periods should reflect fair and acceptable practices, and be compatible with social and family life. Work intensity leading to excessive hours threatens physical and mental health, and interferes with the balance between work and family.

Decent work can be assessed and measured using **10 broad Indicators**

6. **Fair balance of work and family life:** Workers with family responsibilities (those with young children or elderly and sick family to care for) should be able to exercise their right to engage in work if they wish to, without being subject to discrimination. Family responsibilities fall most heavily on women.
7. **Safe work environment:** The physical work environment should avoid extreme conditions (heat, dust, noise, workload, etc.) and ensure a safe working environment with appropriate prevention of work-related accidents, injuries, and occupational diseases.
8. **Stability and security of work:** This recognises workers' needs to limit insecurity associated with the possible loss of work and livelihood.
9. **Social protection:** Work conditions should be conducive to safeguarding health, pensions, and livelihoods and provide adequate financial and other protection in the event of work-related injuries or health-related contingencies.
10. **Social dialogue and workplace relations:** Workers should be treated with respect at work, and should be able to voice concerns and participate in decision-making about working conditions. Workers' freedom to organize and collectively represent their interests is an essential ingredient of ensuring dignity.

Potential Sectors for Green Jobs (Bangladesh)

Sector	Activities for Green Job
Agriculture	<ul style="list-style-type: none">• Soil conservation• Water efficiency in Irrigation• Organic farming (tea cultivation)• Reducing distance between farm and market
Forestry	<ul style="list-style-type: none">• Reforestation and afforestation• Sustainable forestry management by community• Halting of deforestation
Energy	<ul style="list-style-type: none">• Renewable Energy (solar, biogas, improved stove, biomass)• Manufacturing of energy efficient appliances such as CFL, efficient air conditions etc.



Potential Sectors for **Green Jobs** (Global Scenario)

Sector	Activities for Green Job
Transport	<ul style="list-style-type: none">• Fuel switching in vehicles (petrol, diesel to CNG)• Use of hybrid or fuel efficient vehicles• Mass transit• Bus rapid transit (BRT)- modal shift,• Car Pooling
Construction	<ul style="list-style-type: none">• Cement factory (energy efficiency)• Brick Manufacturing (energy efficiency)• Concrete Blocks• Green Building/Energy efficient Buildings



Potential Sectors for **Green Jobs** (Global Scenario)

Sector	Activities for Green Job
Manufacturing	<ul style="list-style-type: none">• Pollution control technologies such as ETP• Energy and materials efficiency
Waste Management	<ul style="list-style-type: none">• Recycling of municipal organic and inorganic waste (composting, biogas, biogas to energy, RDF etc, plastic waste recycling)• Recycling of lead acid battery• Extended producer responsibility (product take back and remanufacturing)



National Laws and Policies

- ❑ The National Environment Policy, 1992 and Implementation Programme
- ❑ The National Energy Policy, 1996
- ❑ The Draft Renewable Energy Policy
- ❑ The National Agriculture Policy and Pesticide Rules
- ❑ The National Conservation Strategy
- ❑ The National Biodiversity Strategy and Action Plan
- ❑ The National Environment Management Action Plan (NEMAP), 1995
- ❑ The Environment Conservation Act (ECA), 1995 and its subsequent amendments
- ❑ The Environment Conservation Rules (ECR), 1997 and its subsequent amendments
- ❑ The Environment Court Act, 2000 and its subsequent amendments
- ❑ Ozone Depleting Substances (Control) Rules 2004
- ❑ A Gazette Notification under ECA on recycling of Lead Acid Battery
- ❑ National CDM Strategy 2003
- ❑ Poverty Reduction Strategy Paper (PRSP)
- ❑ Bangladesh Labor Act 2006
- ❑ National 3 R Strategy for waste sector
- ❑ Draft National Urban Policy
- ❑ Draft Solid Waste Management Rules 2010
- ❑ Draft Industrial Policy 2010
- ❑ Sixth Five Year Plan (FY 2011-FY2015)
here under the theme Low Carbon Development 5 (five) programs were under taken
(renewable energy, urban waste, afforestation and reforestation, energy saving devices and energy efficiency in transport sector)
- ❑ National Climate Change Strategy and Action Plan (2009)

Initial review under this study finds that most of the these policies are addressing the issues of pollution control, sustainable environment, renewable energy, sustainable agriculture, green house gas mitigation etc., occupational health and safety, wages etc with no direct link green jobs.



Green Job Example in Bangladesh

Present Situation



New Types of Waste Emerging in the Waste Stream



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 Bangladesh

PROBLEMS

- ✓ Water Pollution
- ✓ Spread of Disease Vectors
- ✓ Green House Gas Emission
- ✓ Odor Pollution
- ✓ More Land Required for Landfill

- High organic matter**
- High moisture content**
- Low calorific value**

- >> (more than 70%)
- >> (more than 50%)
- >> (less than 1000 Kcal/Kg)

Waste Collection Efficiency (urban areas) : 50% (Average)

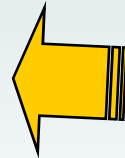
PROBLEMS FROM PRESENT PRACTICE

Solid Waste Management is based on end-of-pipe solution which is only focused on collection, transportation and final disposal...

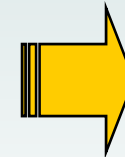
VERMINS
*Spreading more than
40 Diseases*



**METHANE
GAS**
*Bad Odor &
Green House
gas*

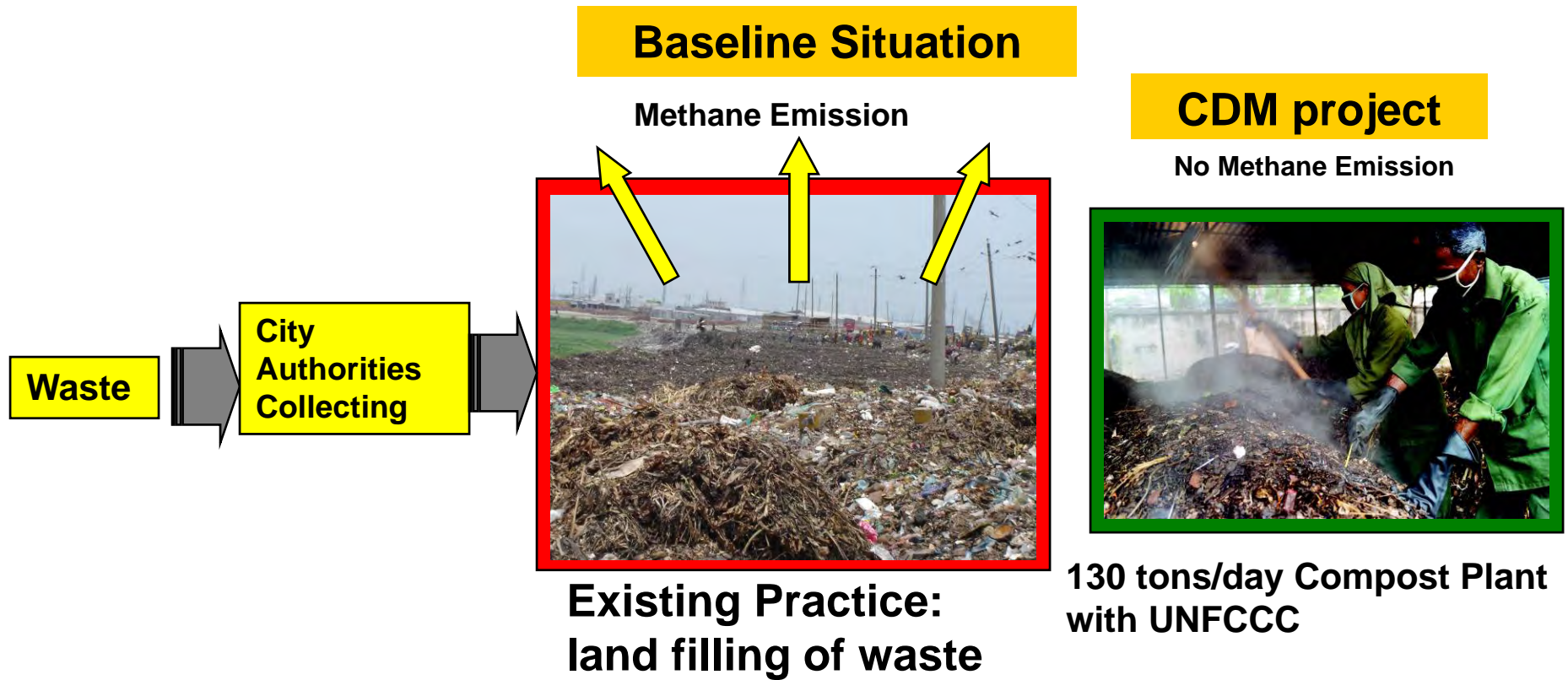


LEACHATE
*Polluting
Ground
& Surface
Water*



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

Decentralized Approach of Composting **Using Carbon Credits**



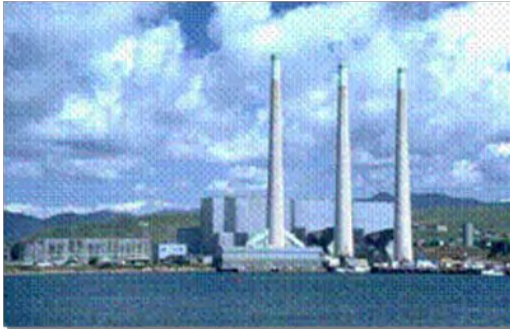
The project is recycling organic vegetable waste and instead of disposing in landfill, it is converted into compost.

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

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:

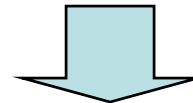
1. those that use mechanical process to produce refuse-derived fuel (RDF) from waste and its use for energy generation.

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

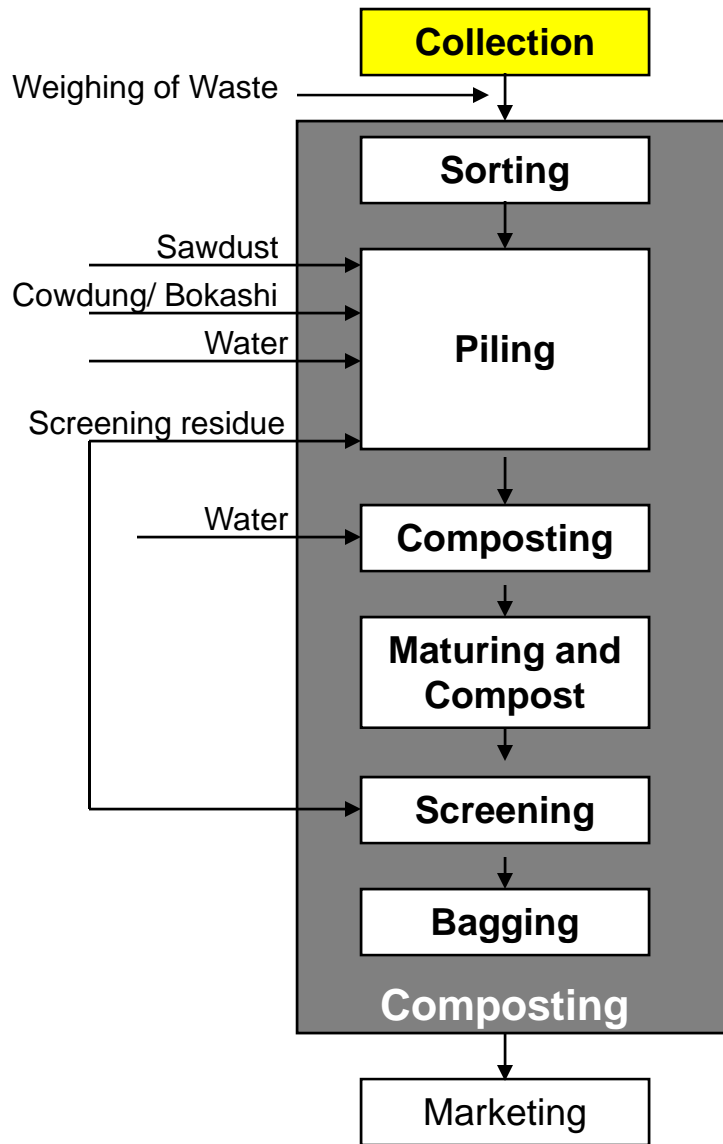


Obtained UNFCCC
approval on Sept 2005

Location Map

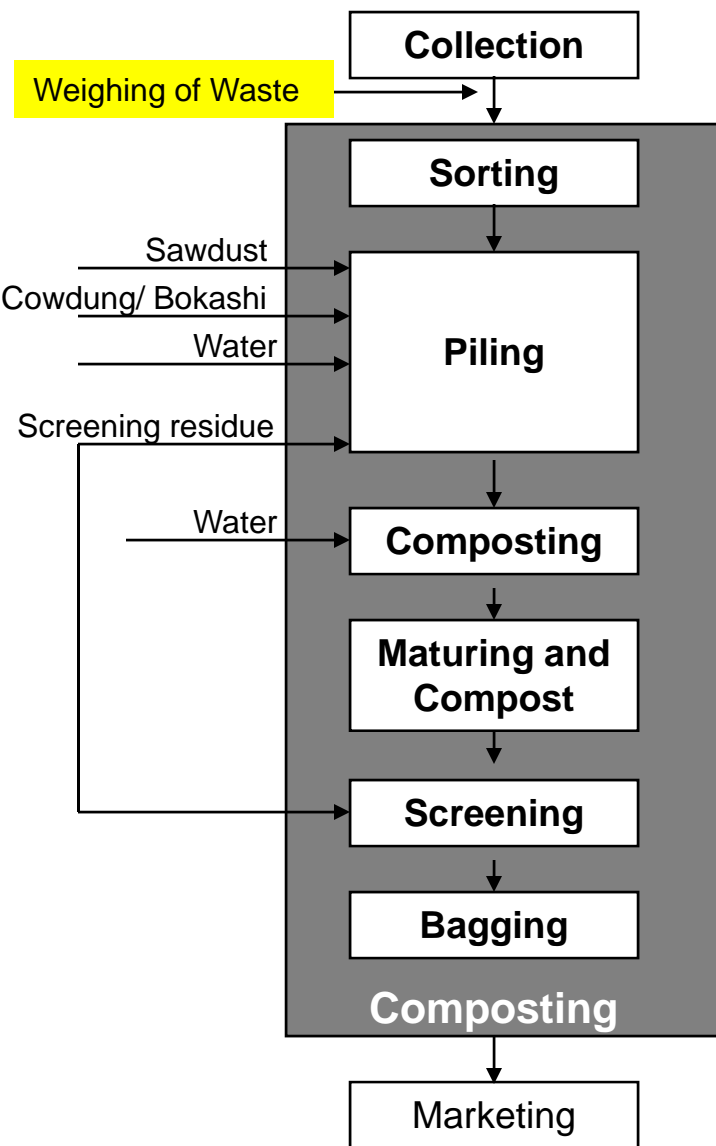


Different Steps of Composting Process



Collection

Parameters to be Monitored **During Implementation**



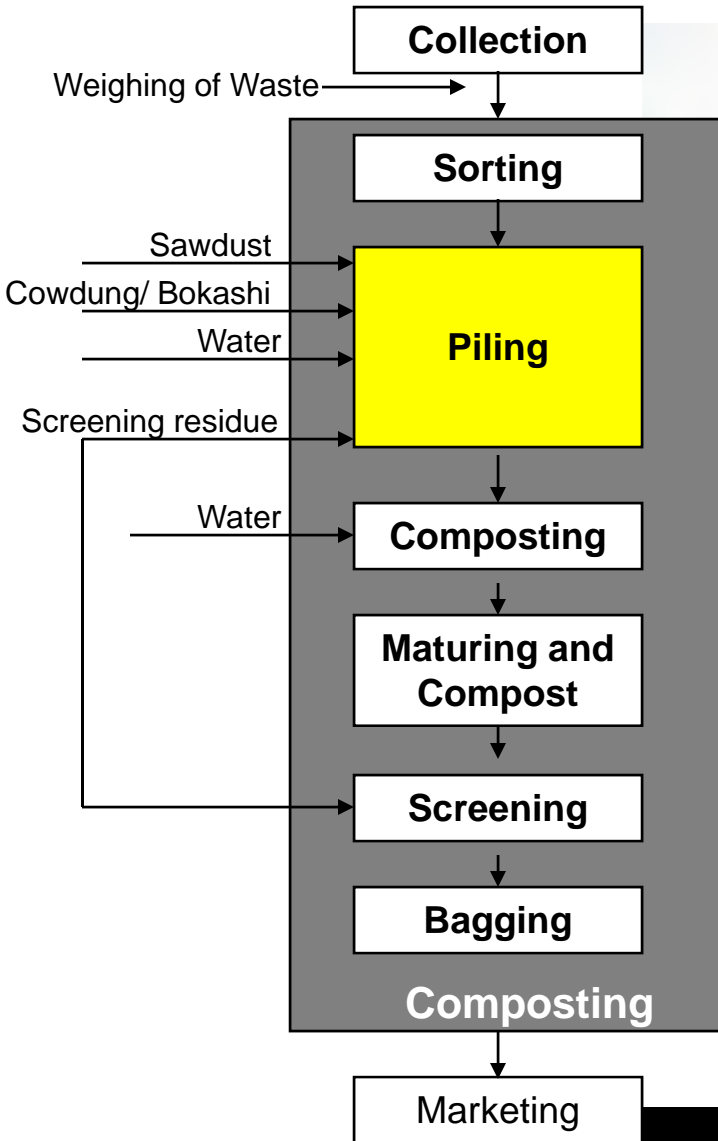
Weighing of Waste Input

Parameters to be Monitored **During Implementation**



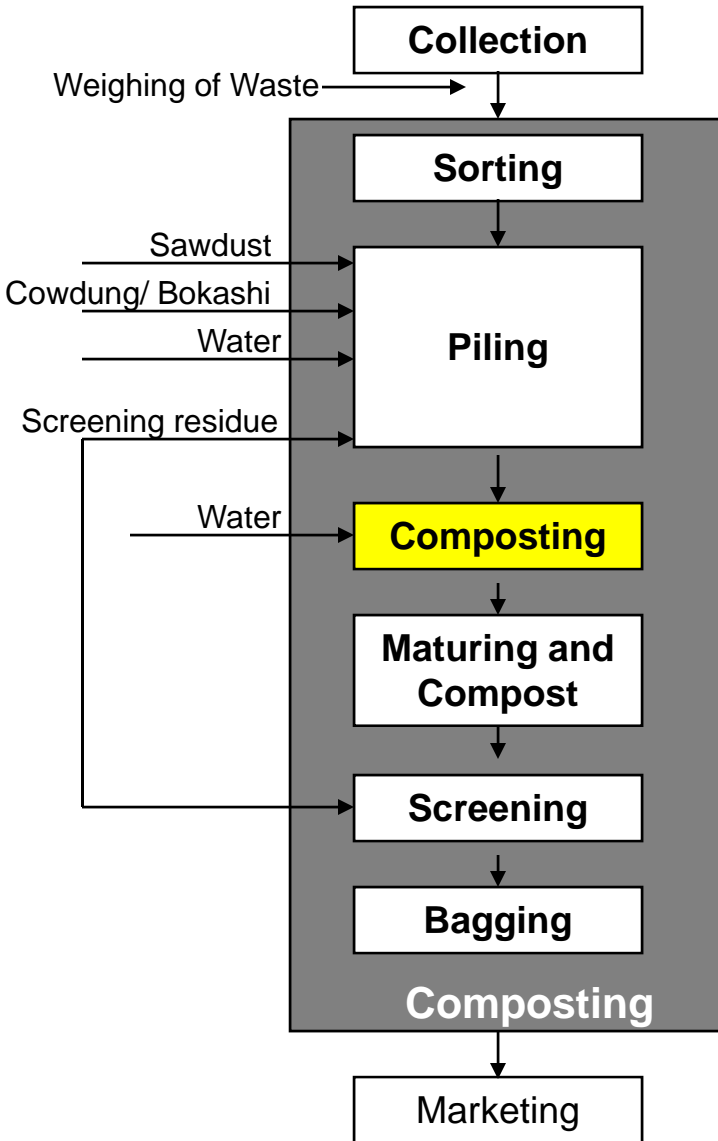
Unloading of Incoming Waste and Preliminary Sorting

Parameters to be Monitored **During Implementation**



Piling of Waste in the Pre-composting Box

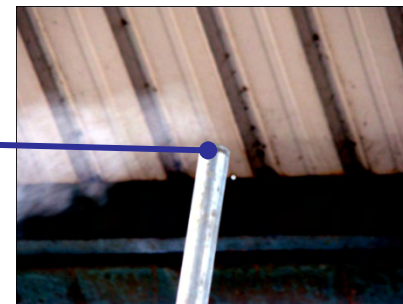
Parameters to be Monitored **During Implementation**



Moisture Control
Reuse of leachate water

Leachate Treatment System Introduced in the Compost Plant at Bulta, Roopganj, Greater Dhaka

Dark color leachate stored in the tank as input



A part of leachate transformed into Steam (**10% of input**) coming out from the machine

About **10%** of the dark leachate water input is transformed into sanitized liquid which can be sold as liquid fertilizer.



About **80%** of the dark leachate water input is transformed into clear distilled water within few seconds.

Three Major outputs from leachate water are shown in

Parameters to be Monitored During Implementation



Temperature Control

Process Quality Control



Regular Oxygen Monitoring



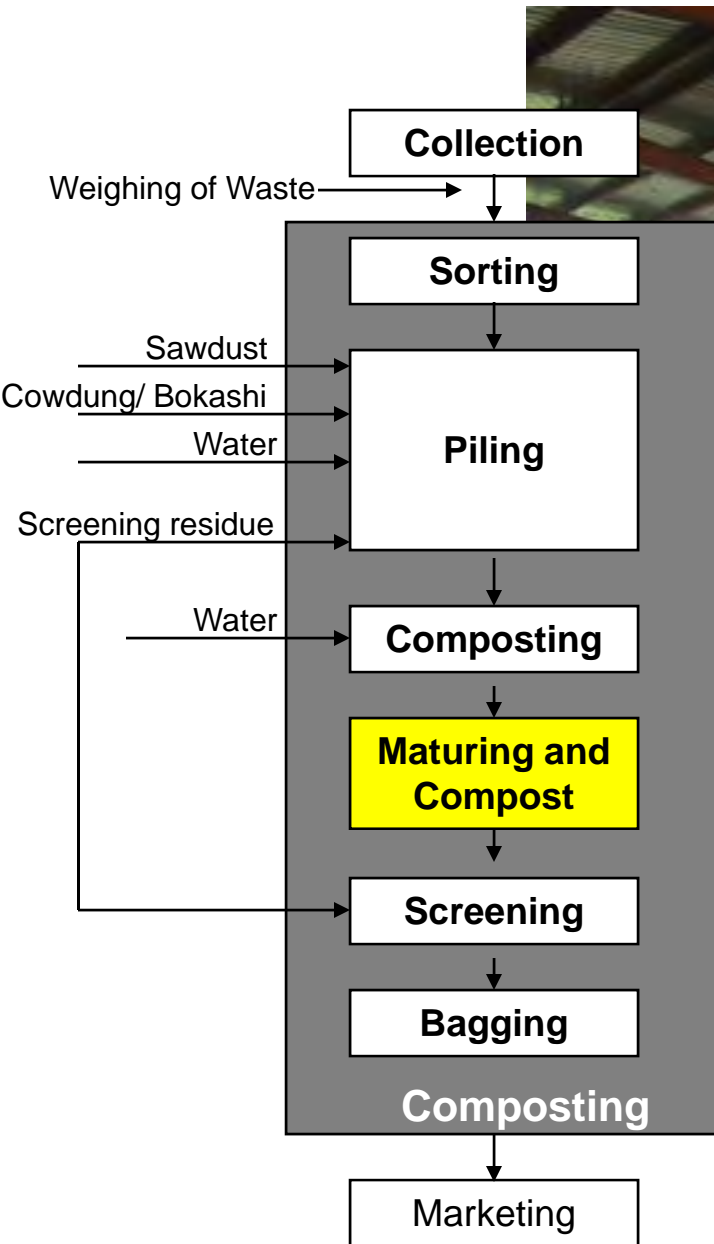
Forced Aeration and Leachate Collection System



Forced Aeration by Blowers to Provide Oxygen in the Compost Pile

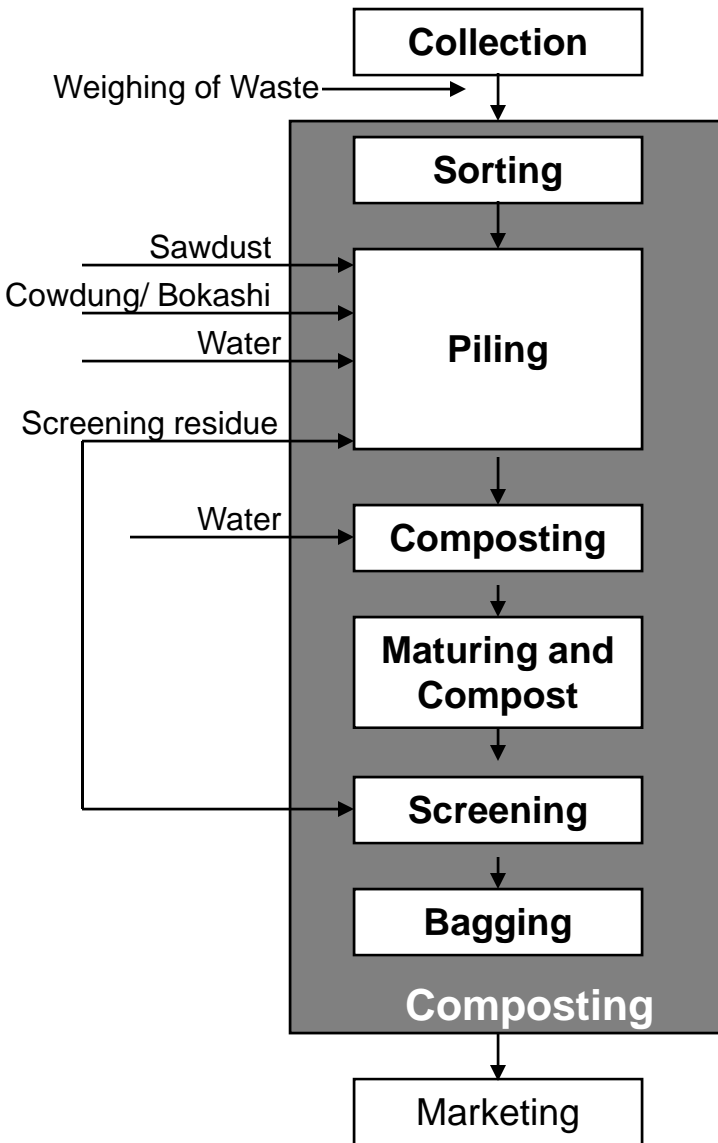


Different Steps of Composting Process



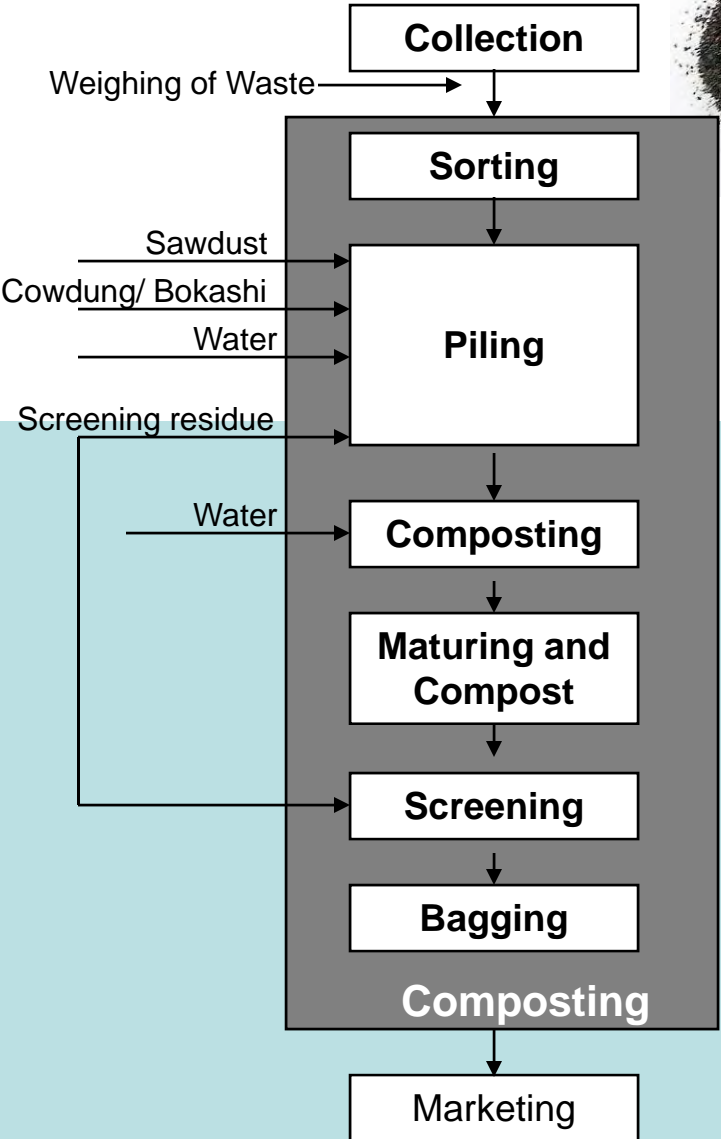
Maturing of Compost

Different Steps of Composting Process



Screening of Compost

Compost Produced from Organic Waste



Monitoring of Composting Process to Claim Carbon Credits in Composting Projects

Data Regarding Amount of Waste Composted

Weigh bridge is required to collect the data regarding amount of waste composted . **CALIBRATION of Weigh Bridge is MUST**

Temperature Data

Temperature meter is required to record temp data and to prove that the process is aerobic. **CALIBRATION of Temp Meter is MUST**

Oxygen Data

Gas meter is required to record % of oxygen in the pile and to prove that the process is aerobic. Oxygen level must be > 10% in the pile. **CALIBRATION of Gas Meter is MUST**

Data Regarding Amount of Compost Sold

Weigh bridge is required to collect the data regarding amount of compost sold. **CALIBRATION of Weigh Bridge is MUST.** Sales Invoice and name of the dealer marketing compost and location of use of compost is also required.

Data Regarding Energy Consumption

Electricity and Diesel Bill. This data is required to calculate on plant emission to produce compost.

Comparative Analytical Results of Fertilizer Samples

Name of Product : Waste Concern Jaiba Sar Company:

উপাদান	অনুমোদিত মান	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

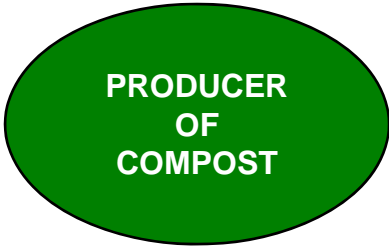
SOIL CONDITION AND **IMPACT OF COMPOST**



FIELD TRIAL EXPERIENCE

Field trial carried out by the Bangladesh Rice Research Institute (BRRI) of the Govt. of Bangladesh shows that Waste Concern's compost reduces the use of chemical fertilizer 25-30% and increases yield by 30%

MARKETING OF COMPOST BY WASTE CONCERN (INDIRECT



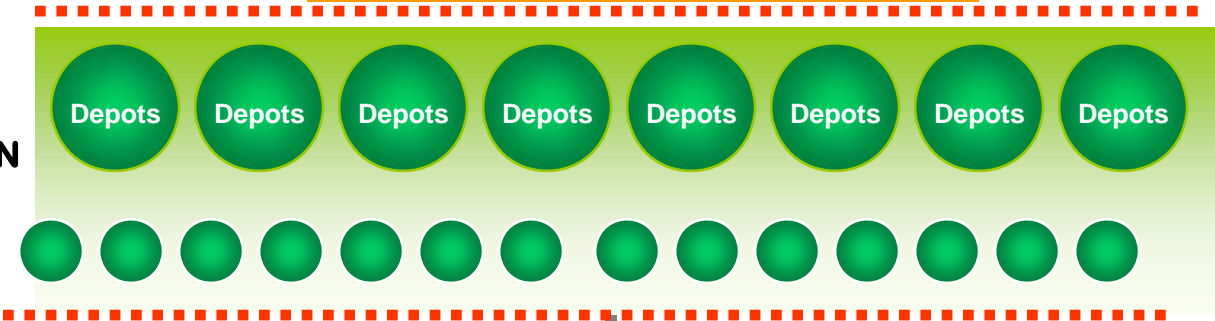
Compost Produced in Composting Plants at Dhaka (8mm 40kg bag @ Tk.6kg) Factory Gate Price US \$ 87/ton)



MARKETED BY ACI Fertilizer

Retail Price (8mm 40kg bag @ Tk.6kg)

DISTRIBUTION CHANNEL



Dealers/ retailers under distributors

FARMERS AT RURAL AREA

US \$130/ton)

Packaging and Branding of Compost



পঞ্চাভাতন্ত্রী বাংলাদেশ সরকারের কৃষি মন্ত্রণালয় কর্তৃক অনুমোদিত

ওয়েস্ট কনসার্ন জৈব সার

রেসিপিড ১৯৮-১৭৯-৪৯৯২

100%
জৈব সার

- মাটির স্বাস্থ্য বাড়ে
- সাময়িক সার অনুপ্রতির ক্ষেত্রে কম সার
- শস্যের পরিমাণ বাড়ে
- কমবেশে ফল ফল

"ওয়েস্ট কনসার্ন জৈব সার ব্যবহার করলে মাটির স্বাস্থ্য ভাল জড়বে অধিক ফল ফলে তুলবে"

80
কেজি

পরিবেশক :
টোটাল এগ্রো সাইন্স
৯/০২-৪, হাটল রাস্তা, মতিবন্দু, ঢাকা।

উৎপাদনকারী:
ডাব্লিউ. ডাব্লিউ. আর. বায়ো ফার্মিলাইজার বাংলাদেশ লিঃ
(বাংলাদেশ-কম্বোডিয়া জৈব উদ্যোগ)
ডাকঘর : কুমিল্লা, কুমিল্লা, বাংলাদেশ

Mitigation-Adaptation Loop

Mitigation



Adaptation



City Generating Organic Waste and producing compost



HOW?



URBAN-RURAL SYMBIOSIS

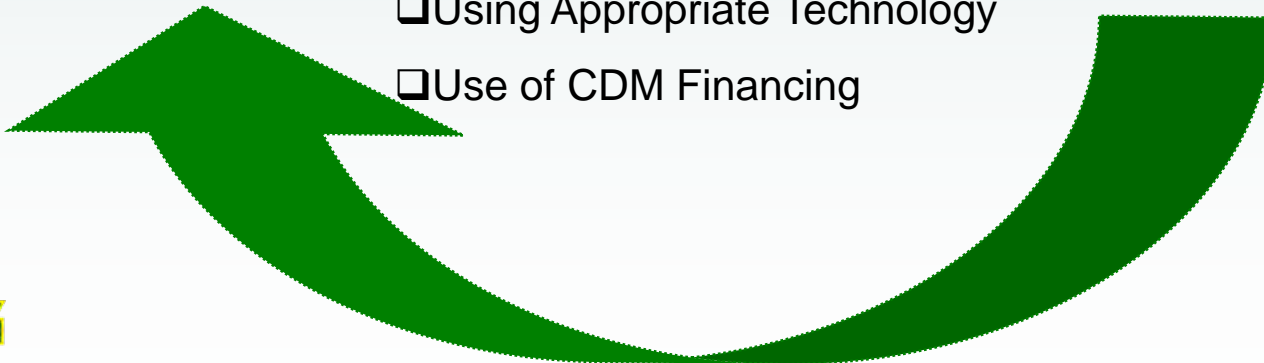


Urban Area

- Through Decentralized Composting
- Public-Private Partnership
- Using Appropriate Technology
- Use of CDM Financing

Rural Area

Rural Area Producing Food and Agricultural Products



Improved Working Condition



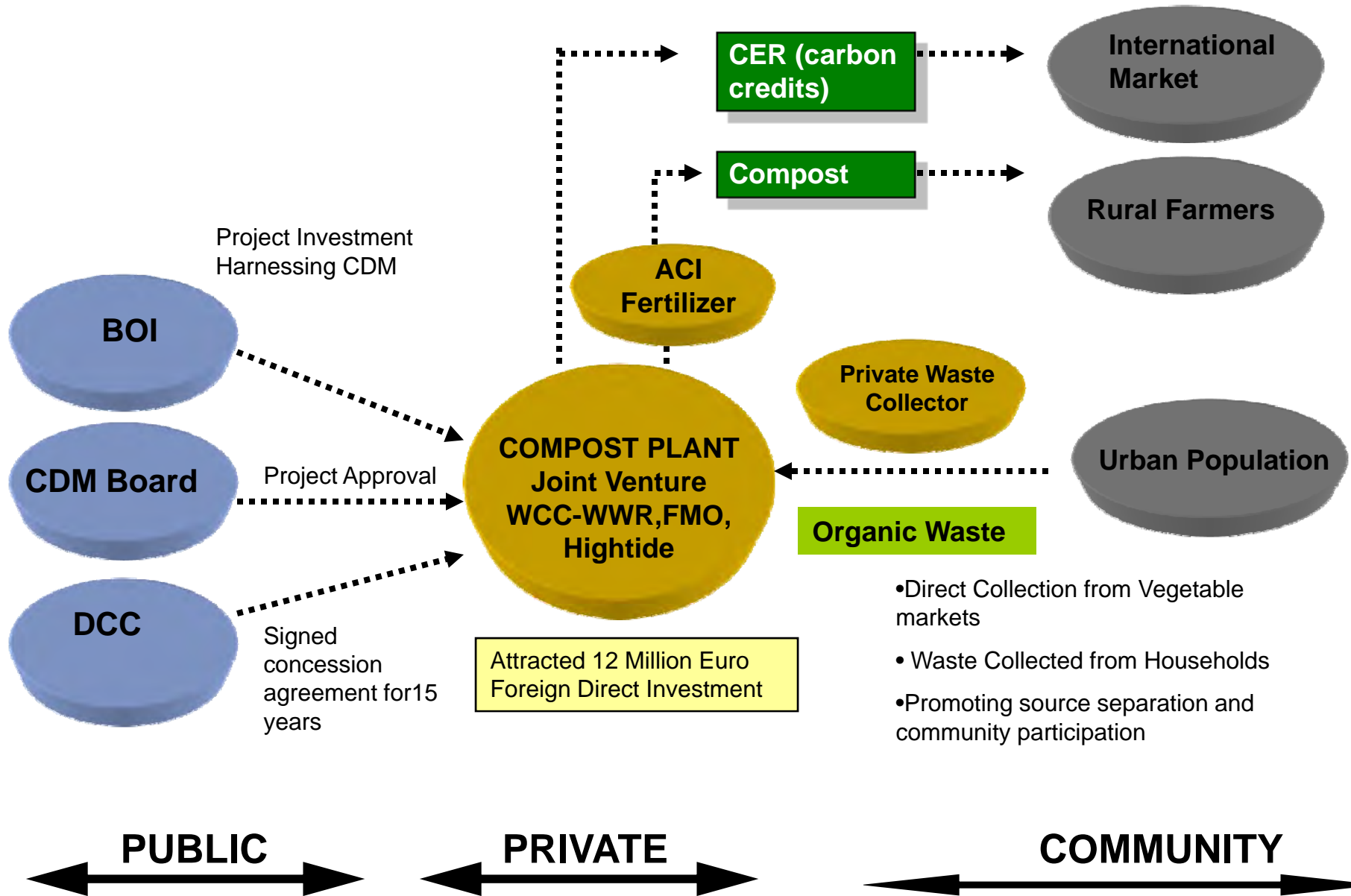
Informal sector working in unsafe working condition



- *6% of the operational expenditure spent for welfare of the workers in the plant*
- *Day care center for female workers*
- *Free meal for the workers*
- *Health insurance for the workers*

Informal Sector Given Better working Environment

Partnership Model



BOI-Board of Investment; DCC-Dhaka City Corporation; PPCP- Public Private Community Partnership

Sector Wise Distribution of **Green Jobs in Bangladesh** (**Estimated by Waste Concern, 2009, for ILO**)

SI	Sector	Green Jobs (numbers)
1	Agriculture & Forestry	8725
2	Transportation	147987
3	Manufacturing (energy Efficiency, Brick Klins)	11,081
4	Renewable Energy	14966
5	Waste Recycling (compost, production, sales and distribution)	29942
6	Building Construction	536,000
	Total	748,701

Sector Wise Distribution of **Green Jobs** in Bangladesh (Estimated by **GHK Consultants** for ILO, 2010)

	Core environment-related jobs	Green jobs
Sustainable agriculture	41,548	n.p. Not possible to estimate
Sustainable and participatory forestry	28,813	n.p.
Sustainable energy	18,823	18,823
Waste management and recycling	189,180	n.p.
Collection purification and distribution of water	8,441	n.a.
Climate adaptation activities	1,726,755	n.p.
Manufacturing and energy efficiency	10,934	10,934
Sustainable transportation	178,510	178,510
Sustainable construction	1,340,000	536,000 – 670,000 ^a
Total	3,543,004	811,268

Employment Creation

- As per Bangladesh Bureau of Statistics (BBS) Labour Force Survey 2005-06, total employed labor force is **47.4 million**
- Number the green jobs (estimated) in Bangladesh varies between **748,701- 811,268** which is **1.6%-1.72%** of the total employed labor force.

Constraints and Challenges

- ✓ Lack of awareness and capacity building to understand the concept of Green Jobs.
- ✓ Insufficient incentives & promotional measures.
- ✓ Inadequate research and development initiatives; and
- ✓ Insufficient Public Private Partnerships.
- ✓ Too many permits and license requires for project approval. For example Waste Concern CDM based project required more than 56 permissions for establishing the facility in Bangladesh.

Why this Project is Promoting **Green Jobs?**

- ✓ It is minimizing the production of waste and pollution from unmanaged waste
- ✓ Reducing Greenhouse Gas thus decarbonizing the waste sector.
- ✓ It helps to avoid excessive use of chemical fertilizer use in the soil and as a result reducing CO₂ emission during the production of chemical fertilizer
- ✓ It is protecting the ecological system by reducing harmful chemicals and pesticide uses in the agriculture.
- ✓ Compost improve the quaility of soil and improves food security.
- ✓ Compost use in soil reduces the need for irrigation
- ✓ As a result by promoting decent jobs, it improves the working conditions of the workers.

Definition of Decent Work

A universal social 'floor' applies to all countries, and includes respect for the following basic human rights:

- Freedom of association and the effective recognition of collective bargaining rights ;
- Elimination of all forms of forced or compulsory labour;
- Effective abolition of child labour and the right of children to learn and develop rather than work; and
- Elimination of discrimination in respect of employment and occupation.

Gaps between people's decent work aspirations and reality exist everywhere. The challenge is to reduce these gaps. Progress towards decent work should be the central goal of all economic and social policies and strategies.

Way Forward

- Sufficient baseline information including inventory on Green Jobs and Regular Update of Inventor
- Capacity building and training.
- Promotion of cleaner technologies including R & D.
- Measures to include existing informal sector operators .
- Promotion of Public-Private Partnerships.
- Mobilization of resources (CDM, GoB and others).
- Target setting for increased Green Jobs.

Thanks

Preliminary Sectors Identified Under this Study

	SECTORS	PROJECTS/PROGRAMMES	INVOLVED ORGANIZATION/ENTERPRISES
1	Transportation	CNG use as fuel	<ul style="list-style-type: none"> • RPGCL • Dept. of Explosive, GOB • BERC • BRTA • Importers
			• Conversion & filling station owners
2	Agriculture & Forestry	Nursery Organic Tea	Nursery Association Kazi & Kazi Tea
3	Waste Recycling	Composting of Organic Municipal Waste	Waste Concern
		Lead acid Battery recycling	Informal sector
		Municipal solid waste recycling	Informal sector
4	Electricity, gas, water	Renewable energy Solar Power generation	Rahimafrooz Grameen Shakti
		Biogas	BCSIR
		Biomass Electricity generation from Rice husk	Dreams Power Ltd
5	Manufacturing	Green technology Compact Fluorescent Lamp	Energy Pac

Source: Field Survey by Waste Concern (July 2008)

General Profile of Industries **Creating Green Jobs**



Industry	Surveyed organization	Production Capacity	Number of beneficiaries	Number of green jobs created
Transportation	Bangladesh CNG Filling Station & Conversion Workshop Owners Association (250 filling station, 121 conversion centres)	32 filling stations /yr 14333 vehicles /yr (estimated from the average of 2002-2007 data)	Users of 137987 vehicles	147987

General Profile of Industries **Creating Green Jobs**



Industry	Surveyed organization	Production Capacity	Number of beneficiaries	Number of green jobs created
Agriculture & Forestry	Kazi & Kazi Tea	2,30,000 kg (40% increase rate)	0.84% of local consumers (27.5 million kg tea consumed locally)	725
	National Nursery Consortium	1,50,00,000 Saplings/year	-	8000

Source: Field Survey by Waste Concern (July 2008)

General Profile of Industries **Creating Green Jobs**



Industry	Surveyed organization	Production Capacity	Number of beneficiaries	Number of green jobs created
Electricity	Dreams Power Ltd (biomass generated electricity production & distribution)	300 KW	500 households	22
	Grameen Shakti (Solar Home Systems & Improved cooked stove)	32MW/yr.	1500000	2500

General Profile of Industries **Creating Green Jobs**



continued.

Industry	Surveyed organization	Number of beneficiaries (HHs)	Number of green jobs created
Electricity	IFRD,BCSIR (Biogas plant &stove)	3,73,889	11994
	Rahimafrooz (solar power generation)	30,000	450

Source: Field Survey by Waste Concern (July 2008)

General Profile of Industries **Creating Green Jobs**



Industry	Surveyed organization	Production Capacity	Number of green jobs created
Manufacturing	Energy Pac	CFL 20,00,000 Pcs EB 10,00,000 Pcs	147

Source: Field Survey by Waste Concern (July 2008)

General Profile of Industries **Creating Green Jobs**



Industry	Surveyed organization/ industries	Production Capacity	Number of beneficiaries	Number of green jobs created
Waste recycling	Waste Concern (ACI, Baraka, dealers) Others (waste collection, composting, marketing and distribution)	16425 tons/year compost produced	4,50,000	1150 28, 792
	Plastic Recycling Industries (informal sector)	244833 tons/year recycled resin processed	-	22792
	Used Lead Acid Battery recycling (Informal Sector)	6000 tons/year lead recycling from used lead acid battery	-	5000

Contributions from Green Jobs: Examples

Sl.	Surveyed organization/ industries	Potential Impact
1	Plastic Recycling Industries	<p>Process: 2,44,833 tons/year recycled resin</p> <p>Jobs Created: 22792 nos.</p> <p>Saving Foreign Currency: US\$ 350 million/year by avoiding import of virgin plastic resin</p>
2	Used Lead Acid Battery by Informal Sector	<p>Process: 6000 tons/year (lead recycled from used lead acid battery)</p> <p>Jobs Created: 6000 nos.</p> <p>Saving Foreign Currency: US\$4.73 million/year By avoiding import of imported lead</p>
3	Energy Pac	<p>Energy Saved: lamp ensures 80% of energy saving</p> <p>Can Save: 960 MW electricity Nationally</p>
4	Waste Concern	<p>Process: 700 tons/day organic waste process</p> <p>Produce: 50,000 tons/year compost production</p> <p>Green House Gas Reduced: 89,000 tons/year</p> <p>Saving DCC Expenditure: 36,500 tons per day saving of disposal cost at dumpsite by avoiding it (Within the year 2010)</p>