RESULTS-BASED FINANCING FOR MUNICIPAL SOLID WASTE

WORLD BANK GROUP

November 2014
1. The problem of Municipal Solid Waste (MSW)

2. Results-Based Financing (RBF)

3. Case studies:
   a) **Improving Service Delivery and User Fee Collection** (*Nepal and the West Bank*)
   b) **Source Separation and Recycling** (*China, Malaysia, and Indonesia*)
   c) **Waste Collection and Transport in Underserved Communities** (*Tanzania and Jamaica*)

4. Lessons-Learned
THE PROBLEM OF MUNICIPAL SOLID WASTE (MSW)

- In 2011, cities around the world generated about 1.3 billion tons of MSW.
- By 2025, this is expected to increase to 2.2 billion tons due to rapid urbanization and rising incomes.
- 30 to 60% of solid waste in developing country cities remains uncollected.
- Waste that is not properly collected and disposed poses hazards to human health, the environment, and local economies. The urban poor are disproportionately affected, being often co-located by this waste and with the least social, political, and economic capital to take action.
- Post-consumer waste is estimated to account for 5% of total greenhouse gas emissions. Methane from landfills represent 12-15% of total global methane emissions; methane has a Global Warming Potential 21 times greater than carbon dioxide.
WASTE GENERATION (2012)

**Waste Generation by Region**
- OECD: 44%
- EAP: 21%
- LAC: 12%
- ECA: 7%
- MENA: 6%
- SAR: 5%
- AFR: 5%

**Waste Generation by Income**
- High Income: 46%
- Upper Middle Income: 19%
- Lower Middle Income: 29%
- Lower Income: 6%
- Middle Income: 29%
WASTE COLLECTION (2012)

By Region

By Income
COMMON CHALLENGES ALONG THE MSW VALUE CHAIN

Generation
- High growth rate of waste generated
- Lack of policies to reduce waste generation

Collection/Transport
- Low collection rate in low income countries
- Low willingness to pay for collection services
- Inefficient collection equipment
- Inefficient routing

Recycling/Organic diversion
- Lack of integration of the informal sector
- Low rate of organic waste diversion

Disposal
- Large use of unsanitary dumpsites and open burning
- Land constraints for future sanitary landfills
- Severe environmental impact
- Lack of financial or technical capacity to operate sanitary landfills

Energy Recovery
- Untapped opportunity to generate energy from landfill gas
- Landfill gas to energy systems not installed or in poor condition
- Local context unsuitable for waste-to-energy
FINANCING MSW

Financing MSW has always been a critical bottleneck to improving services and outcomes.

- Municipalities commonly spend 20-50% of their budgets on SWM but this may only provide services for less than 50% of citizens.
- Others urban services are considered higher priority for local governments.
- In low-income countries, 80-90% of the MSW budget is spent on collection; in high-income countries it is only 10%.
- Cost recovery is low due to resident’s low ‘willingness-to-pay’ and inefficiencies in MSW services.
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RESULTS-BASED FINANCING (RBF)

Results-Based Financing (RBF) is an innovative development finance tool that helps ensure that public funds are used efficiently and transparently. Payment for services or behavior is conditioned upon the achievement and verification of explicit, pre-determined performance targets.

Examples of RBF mechanisms
**DIFFERENCES FROM AN INPUT-BASED APPROACH**

In a traditional input-based approach, there is an assumption that *inputs* lead to *outputs* that lead to *outcomes*.

<table>
<thead>
<tr>
<th>Input-based</th>
<th>Output/Results-based</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Funds finance inputs, such as the construction of a building</td>
<td>• Funds finance independently verified outputs or results</td>
</tr>
<tr>
<td>• Theory of Change is established by the donor</td>
<td>• Theory of Change is established by service provider, thus encouraging locally appropriate and efficient solutions</td>
</tr>
<tr>
<td>• Funds flow from Donor → Government → Service provider</td>
<td>• Funds flow from Donor → Government → Service provider</td>
</tr>
<tr>
<td>• Performance risk is placed on the donor</td>
<td>• Performance risk is placed on the service provider</td>
</tr>
</tbody>
</table>
RBF FOR MSW PILOT CITIES (2011-2014)

CITIES WHERE WORK WAS UNDERTAKEN
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4. Lessons-Learned
**NEPAL – CONTEXT**

**Problem:**

- Less than 50% is collected; of this most is informally dumped

- Low levels of financial sustainability; without increasing revenues from MSW services, cities cannot finance improvements

**Situation:**

- Cities growing rapidly. Urbanization rate more than 3.5%/year.

- 700,000 tons of waste generated per year
NEPAL – DESIGN SOLUTION

- An output-based aid (OBA) subsidy is given to participating cities (Dhankuta, Tansen, Leknath, Pokhara, and Lalitpur) to help bridge the gap between current SWM services and future service improvements.
- The amount of the subsidy is designed to decrease over time, as services improve and fee collection increases to contribute to final cost recovery.
- Implicit in this design is the assumption that residents’ willingness-to-pay increases as there are visible improvements to service coverage and delivery.
NEPAL – RESULTS FOR VERIFICATION

Part 1: Service provision indicators
Independent technical verification confirming acceptable municipal delivery of SWM services, based on a review of technical scorecards and sample on-site verification of the service provided

Part 2: Financial performance indicators
Independent financial verification confirming the level of beneficiary revenues collected (the basis for calculation of the OBA matching grant), based on a validation of the SWM tariffs/charges deposited in the municipality’s own account for SWM services.

- Prior to Parts 1 & 2, the cities are also verified to have developed:
  a) a SWM strategy and action plan and
  b) a performance monitoring system

- Successful verification of Part 1 → Verification of Part 2
  Successful verification of Part 2 → Payment of matching grant
**Problem:**

- Collection in Hebron and Bethlehem governorates suffer from poor planning, high O&M costs, limited financial resources and unsanitary disposal.

- New sanitary landfill but this upgraded system increases O&M costs; collection of SWM fees must be improved

**Situation:**

- 1.2 million tons of waste per year

- Collection rate is high (98%) but in the absence of a sanitary landfill, waste is disposed of in 19 unsanitary dumpsites

- Due to the politically fragile situation in the West Bank, international private investors consider project risky
WEST BANK – DESIGN SOLUTION

An output-based aid (OBA) subsidy is provided over a four-year period to partially support increased costs associated with waste disposal in the new sanitary landfill.

The subsidy is designed to decrease over time as fee collection increases, providing an incentive for the councils to increase efforts to collect solid waste fees and thus sustain operations in the long run.

As the OBA subsidy is funded by the International Finance Corporation (IFC) through GPOBA, the funds must flow directly to the private party. The grant funds will pay the landfill operator a portion of the final disposal bill on behalf of the councils.

This represents a payment guarantee to the international private investors, thus defraying risk and encouraging investment.
## WEST BANK – RESULTS FOR VERIFICATION

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output 1: Access to Improved Services</strong></td>
<td></td>
</tr>
<tr>
<td>SWM Strategy / Management of Information Systems (MIS)</td>
<td>• Develop plans for management and treatment of slaughterhouse and medical waste and closure &amp; rehabilitation of unsanitary dumpsites</td>
</tr>
<tr>
<td>Implementation</td>
<td>• Design and implementation of MIS</td>
</tr>
<tr>
<td>Cleanliness of Areas</td>
<td>• Measured using Cleanliness Index (CI), based on visual inspections, score assigned</td>
</tr>
<tr>
<td>Total Waste Managed</td>
<td>• Three waste streams monitored:</td>
</tr>
<tr>
<td></td>
<td>1. Waste deposited at Al Minya sanitary landfill</td>
</tr>
<tr>
<td></td>
<td>2. Waste diverted from Al Minya via recycling or re-use</td>
</tr>
<tr>
<td></td>
<td>3. Waste that is deposited at other dumpsites and not sanitarily treated</td>
</tr>
<tr>
<td><strong>Output 2: Improved Financial Sustainability</strong></td>
<td></td>
</tr>
<tr>
<td>Improvement in Fee Collection</td>
<td>• Fees collected divided by billings</td>
</tr>
<tr>
<td>Improvement in Cost Recovery</td>
<td>• Total billings divided by total operating costs</td>
</tr>
</tbody>
</table>
OUTLINE

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4. Lessons-Learned
CHINA (NINGBO) – CONTEXT

Problem:

- 85% of residents indicate that they do not separate waste at home, except for selling some valuable recyclables to market
- 21% report not knowing how to separate waste, 23% mention lack of space at home, 14% note lack of separation, collection and treatment facilities

Situation:

- Ningbo population of ~3.5 million.
- 1.2 tons of waste generated per year
- 2 waste-to-energy (WTE) facilities, 2 sanitary landfills
- By 2015, shortfall of disposal capacity: 1000 tons per day
CHINA (NINGBO) – DESIGN SOLUTION

As part of IBRD-supported investment to transform solid waste management in Ningbo, including financing facilities for waste separation, an RBF approach is used to address the issue of behavior-change and incentivizing household solid waste separation at source.

“Incentive payments” (i.e. cash awards) are given to Neighborhood Residents Committees if households successfully separate into food waste, recyclables, hazardous waste, and all other wastes.

The potential incentive payment amount is tied to municipal cost-savings (i.e. collection, transportation, disposal) that come from the source separation of waste.
Separated waste is evaluated on quality and quantity measures and given an overall score.

- **Quantity**
  - Food waste (QTF)
  - Recyclables (QTR)
  - Hazardous waste (QTH)

- **Quality (via visual inspection)**
  - Food waste (QLF)
  - Recyclables (QLR)

Each gets a score, and the total score a neighborhood receives is the Neighborhood Overall Score (NOS)

\[
NOS = QTF + QTR + QTH + QLF + QLR
\]

Based on the score, the communities receive an incentive payment, subject to both a minimum score and a maximum incentive payment.
MALAYSIA – CONTEXT

**Problem:**
- Of Penang’s waste, ~40-60% is organic (food and yard waste). This waste is landfilled and generates GHGs like methane.
- A significant portion of waste is from residential high-rise buildings, yet most residents in Penang do not separate their organic wastes.

**Situation:**
- Penang State has two highly urbanized municipalities—Penang Island (pop 750,000) and Seberang Perai (pop 815,767)
- Penang Island generates ~288,388 tons waste/year; Seberang Perai ~ 628,275
- Existing landfill capacity rapidly decreasing
MALAYSIA – DESIGN SOLUTION

“Incentive payments” (i.e. cash awards) used to address the issue of behavior-change and incentivizing source separation of organic wastes. The payments are given to participating high-rise communities if they successfully separate organic waste from all other wastes.

The potential incentive payment amount is tied to municipal cost-savings (i.e. collection, transport, and disposal) that come from the source separation of waste.

Different technologies were chosen and therefore their designs vary slightly:

• Penang Island: households separate and bring waste to an on-site organic waste processing machine
• Seberang Perai: households separate and the city collects the organic waste, transporting it to an private composting company
MALAYSIA – RESULTS FOR VERIFICATION

• On Penang Island, the machine that processes the organic waste at the highrise buildings will only take organic material; therefore, only a quantity performance metric is used.

• In Seberang Perai
  1. A quality score is taken via visual inspection.
  2. If the waste passes the quality evaluation, then its quantity is evaluated.

• Therefore, both cities ultimately measure quantity and highrise building residents receive a collective building score. Based on the score, the communities receive an incentive payment, subject to both a minimum score and a maximum incentive payment.
INDONESIA – CONTEXT

Problem:

• Of residential waste in these cities, about 25% is recyclable material but much less is actually source-separated and recycled.

• Waste banks (*bank sampah*) are small community-based operations that buy separated recyclable materials from local residents. However, they are not used by many households and do not exist at scale.

Situation:

• Tangerang: pop 1.8 million; waste generation 401,500 tons/year

Balikpapan: pop 640,000; waste generation 163,269 tons/year

Manado: pop 163,270; waste generation 86,135 tons/year

• Dumpsites rapidly filled & reaching capacity
INDONESIA – DESIGN SOLUTION

Incentive payments (i.e. cash awards) to be given to the cities if they successfully achieve a minimum percentage of household participation in “waste banks” that operate according to pre-determined criteria.

The incentive payments would be tied to potential municipal cost savings in O&M anticipated from the household source separation of recyclables. The payments would then used for local community development projects.

Incentive payments to be phased over time in three stages. A portion of the total potential incentive payment would be payable at the end of each stage– 10%, 40%, 50%. This is the maximum allowable if all performance criteria are met.
INDONESIA – RESULTS FOR VERIFICATION

The project is separated into three stages, with each stage having unique performance criteria for verification.

Stage 1 Indicators:
1. Participation rate (households registered at waste bank) is at least 10%
2. 90% of waste banks pass on criteria for staff, management, and data collection

Stage 2 Indicators:
1. Participation rate is at least 20%
2. Average amount deposited is at least 1 kg per account-holder per month

Stage 3 Indicators:
1. Average amount deposited is at least 2 kg per account-holder per month
2. A minimum percentage of deposits is sold to brokers
3. Depositors are active (at least 1 every 2 months)
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**TANZANIA – CONTEXT**

**Problem:**
- Primary collection is limited in certain low income communities.
- Secondary collection (from neighborhood collection points to dumpsite) is inefficient and often does not make it to the dumpsite.
- City faces low cost recovery, not enough to support secondary collection. Most households only pay for primary waste collection.

**Situation:**
- Dar es Salaam’s 4,200 tons per day (2011) is expected to triple by 2025 due to rapid urbanization.
- Less than 40% of generated waste is collected and disposed at the dumpsite.
- Where primary collection (to neighborhood collection points) exists, it is relatively effective as residents self-organize.
TANZANIA – DESIGN SOLUTION

The design solution is two-fold, to address the problems of both primary and secondary waste collection. A transitional subsidy would be provided over five years to:

1) **hand-cart primary collectors** to support primary collection within selected underserved, low income communities, and
2) the **municipality** to support secondary collection city-wide.

In both cases, the subsidy is designed to decrease gradually, as services improve and fee collection increases to contribute to final cost recovery. Implicit is the assumption that residents’ willingness-to-pay increases with improvements to service coverage and delivery.
1) Primary Collection

- Percentage of households served/skipped during a collection event
- Proof that waste collected is delivered to neighborhood collection points (or otherwise diverted for reuse, recycling, or composting)
- Neighborhood Cleanliness Index
- Percentage Cost Recovery

2) Secondary Collection

a) Improved Services

- Percentage waste remaining at collection point at end of a work day
- Proof that waste collected is disposed in an approved location (or otherwise diverted for reuse, recycling, or composting)
- Percentage of waste recycled or composted
JAMAICA – CONTEXT

Problem:

• Insufficient and irregular waste collection in inner city communities. Community and dumpster areas are ill-maintained and unclean.

• Waste separation (of recyclables and organic materials) is limited.

Situation:

• Kingston Metropolitan Area generates about 420,000 tons of waste per year.

• The National Solid Waste Management Authority (NSWMA) is in charge of solid waste collection but service is inadequate due to capacity and budgetary constraints.

• The budget shortfall for 2013/14 was approximately J$5.4 billion/US$54 million.
JAMAICA – DESIGN SOLUTION

As part of Jamaica Inner City Basic Services Project:

1) In-kind incentives (waste collection trucks equivalent to US$142,857 each) are given to the NSWMA if they provide sufficient and regular waste collection services.

2) Financial incentives are given to Environmental Wardens and Community-based Organizations (CBOs) if:
   a. Separated recyclables and organics meet a targeted weight and
   b. Communities and areas around communal waste dumpsters are sufficiently clean.

The scheme is 36 months long; evaluations are conducted every three months. Based on successful performance, NSWMA receives two waste collection trucks, Environmental Wardens earn 10 % salary bonus every three months, and CBOs have scalable earnings between US$1,200 and $2,400 every 6 months.
JAMAICA – RESULTS FOR VERIFICATION

1) Improved service (NSWMA)
   a) Absence of waste in the skips at the end of a working day
   b) Regularity of secondary collection

2) Improved neighborhood cleanliness (Environmental Wardens and CBOs)
   a) Overall community cleanliness index
   b) Waste skips cleanliness index
   c) Percentage of recyclable material diverted for recycling
   d) Percentage of organic waste diverted for composting

For both 1) and 2), the NSWMA and the Environmental Wardens/CBOs will have a potential total score of 100. They must receive 80/100 to qualify for the incentive payments.
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4. Lessons-Learned
GENERAL LESSONS AND RECOMMENDATIONS FOR SOLID WASTE PROJECTS

1. Collect sufficient baseline information to understand the needs of the sector.

2. Ensure active involvement of all stakeholders from early in the project preparation stages.

3. Get project prerequisites right from the beginning.

4. Improving SWM services does not always require more staff, more vehicles, more equipment, or a bigger landfill.
LESSONS FOR DESIGNING RBF PROJECTS FOR MSW

1. OBA subsidies may be more effectively targeted at municipalities than at individual households.

2. RBF incentives should be carefully aligned toward the agents of change.

3. Setting payment amounts accurately ensures fair compensation to service providers; however, if it is in the form of an reward, it is important to tie the amount to the value of the outcome of the desired behavior change.

4. Providing upfront financial assistance to service providers with limited access to credit may help facilitate the rest of the RBF project.

5. Focus on results and allow service providers flexibility to choose their own delivery models.
LESSONS FOR IMPLEMENTATION, MONITORING AND VERIFICATION

1. Supplement financial subsidies with educational outreach and technical assistance.

2. Linkages with larger investment projects provides leverage for implementation of RBF schemes.

3. Simplify institutional arrangements that govern the flow of funds, given the limited capacity of certain local agencies.

4. Balancing simplicity and meaningfulness of indicators is important. Simplifying verification may be necessary for project implementation.

5. Third-party verification is ideal for transparency but can be costly; alternative means for verification could reduce expenses.
LESSONS FOR THE SUSTAINABILITY OF RBF PROJECTS

1. Keep the broader SWM context in mind to ensure that there are no unintended consequences on other sectors or parts of the solid waste value chain.

2. Fundamental changes in behavior take time so set realistic targets to keep stakeholders motivated.