Management of Waste Resources – High Technology versus Low Technology

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Content

- Key considerations
- High versus low-technology
  - Industrialized countries
  - Developing countries
- Priorities for cities in developing countries
- Application of inappropriate technology
- Summary
Key considerations

• Debate over which is best: high or low-technology ongoing for several years
• Usually limited to municipalities in developing countries but point often raised in industrialized countries
• Here we focus on urban wastes
Main steps for proper waste management

• Accurately determine composition of material
• Ascertain quantity and availability of material
• Determine economic and labor conditions
• Identify markets for recyclables
• Other: social, cultural, financial, etc.
<table>
<thead>
<tr>
<th>Material</th>
<th>Ulaanbaatar, Mongolia</th>
<th>Quezon City, Philippines</th>
<th>Olongapo City, Philippines</th>
<th>Lima, Peru</th>
<th>Buenos Aires, Argentina</th>
</tr>
</thead>
<tbody>
<tr>
<td>Putrescibles</td>
<td>24.0</td>
<td>52.0</td>
<td>44.4</td>
<td>34.3</td>
<td>30.5</td>
</tr>
<tr>
<td>Paper</td>
<td>12.9</td>
<td>17.1</td>
<td>17.5</td>
<td>24.3</td>
<td>22.9</td>
</tr>
<tr>
<td>Metals</td>
<td>2.5</td>
<td>3.2</td>
<td>3.1</td>
<td>3.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Glass</td>
<td>6.4</td>
<td>3.1</td>
<td>2.0</td>
<td>1.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Plastics, rubber, leather</td>
<td>13.1</td>
<td>22.0</td>
<td>8.7</td>
<td>2.9</td>
<td>14.6</td>
</tr>
<tr>
<td>Textiles</td>
<td>4.4</td>
<td>0.3</td>
<td>2.9</td>
<td>1.7</td>
<td>2.5</td>
</tr>
<tr>
<td>Ceramics, dust, stones</td>
<td>36.7</td>
<td>2.3</td>
<td>21.4</td>
<td>31.7</td>
<td>21.6</td>
</tr>
<tr>
<td>Weight/cap/day (kg)</td>
<td>0.33</td>
<td>0.55</td>
<td>0.44</td>
<td>0.96</td>
<td>0.3 to 1.0</td>
</tr>
</tbody>
</table>

Composition of Generated MSW in the USA prior to Recycling (2003)

Paper, 36.3%
Yard waste, 12.1%
Plastics, 11.0%
Food waste, 11.3%
Metals, 7.9%
Rubber, leather, textiles, 7.0%
Glass, 5.4%
Wood, 5.6%
Other, 3.4%
Other, 3.4%


Recycling Rates in the United States (1960 to 2003)


Recycling rate was 63.3% in 2007.
MSW Management in California and Oregon (2002)

## Average Bulk Density of Residential Refuse

<table>
<thead>
<tr>
<th>Location</th>
<th>Density (kg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro Manila, Philippines</td>
<td>209</td>
</tr>
<tr>
<td>Lima, Peru</td>
<td>176</td>
</tr>
<tr>
<td>Caracas, Venezuela</td>
<td>220</td>
</tr>
<tr>
<td>Asuncion, Paraguay</td>
<td>390</td>
</tr>
<tr>
<td>California, USA a)</td>
<td>130</td>
</tr>
</tbody>
</table>

a) Excludes food residuals.
High versus Low Technology

- To design something within certain limitations means “to achieve more with less”
- In general, inability or unwillingness to impose limits is a very serious error
- In waste management - large infusions of cash and equipment alone cannot solve problems
- Need to determine economic and labor resources
High versus Low Technology

• Proper management of SW is a complex, expensive undertaking that need not be made more complex by seeking costly, complex solutions

• To the uninformed person burying or burning seems to be the simplest options
### Industrialized countries

- Major differences between industrialized and developing countries: waste reduction and materials recovery
- Reduction of markets for used materials
- Reduction of materials collected and deposited in landfills
- Established frameworks for waste reduction
- Public or consumer financing of several initiatives for waste reduction
Developing countries

- Waste reduction has traditionally been practiced
- Waste reduction not legislated
- Major amount of waste reduction achieved through network of itinerant buyers, dealers, brokers
- Large practice of repair and reuse
Priorities for cities in DCs

• Hierarchy embraced by most cities in industrialized countries may not be appropriate for communities in DCs

• First priority maybe to divert organic (putrescible) materials entering the MSW stream

• Organic matter usually largest component of waste stream

• Still these countries should be alert to the growth of wasteful practices (i.e., some plastic bags)
Use of inappropriate technologies

- Inappropriate selection of collection vehicles
- Vehicles kept or purchased beyond their useful life
- Lack of consideration of:
  - cultural and socioeconomic conditions and
  - consultation with the public
Summary

• Understanding that “low technology” does not mean “low quality technology”

• Industrialized countries: waste reduction, recycling

• Developing countries: improve basic phases of service first
Summary

• Responsible planning of integrated SWM requires thorough knowledge of: waste characteristics, equipment, processes (and their limitations)

• Non-technical factors: degree of economic development, regulatory framework, participation of civil society, training programs

• And ........
Innovation!!!
1st International Solid Waste Conference in Latin America
GRAL 2009

• To be held in Quito, Ecuador from June 23 to 25, 2009
• Expect to have more 300 participants from the public and private sectors
• Great opportunity to exchange ideas and look for new markets for a variety of equipment