Overview on Municipal Solid Waste Management in Thailand

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Status and Quo of MSM

(2009)
41,410 T/d

BMA
8,834 T/d

1,277 Municipalities
16,368 T/d

6,636 SAOs*
16,208 T/d

*SAOs = Sub-District Administrative Organizations (Oboto)
Status and Quo of MSM (2)

- Generated 100%: 15.11 M Tons
- Collected 84%: 12.69 M Tons
  - Remain 16%: 2.42 M Tons
  - Sanitary Disposed 47%: 5.97 M Tons
  - Improper Disposed 53%: 6.72 M Tons
- Recyclable Potential 26%: 3.86 M Tons
  - Actual Recycled 81%: 3.12 M Tons
  - Fermented Fertilizer 63%: 0.63 M Tons
  - Electricity/RDF 3%: 0.11 M Tons
Numbers of MSW Disposal Facilities

Sanitary Landfill - 107 sites
- In Operation - 93 sites
- Never Run - 8 sites
- Stop Operating - 6 sites

Incineration - 3 sites
- Phuket - 250 tons/day
- Samui Island* - 150 tons/day
- Lamphun* - 10 tons/day
  *Currently disfunction

Integrated Systems - 4 sites
- Wieng Fang (Chiang Mai) - 150 tons/day
- Rayong Municipality - 80 tons/day
- Mae Sai (Chiang Rai) - 60 tons/day
- Chonburi Provincial Administration** - 70 tons/day
  **Stop Operating

Source: Surveys of Waste and hazardous Substances Management Bureau, Pollution Control Department, 20010
Problems of Non-Waste Separation

Co-disposal HW and MSW
Illegal Dumping/Open Dumping
Problems of Landfill Operations

No Operational Procedures
No Environmental Controls
Policy Frameworks (1)

- Applying 3Rs for achieving waste reduction & utilization;
- Promoting the integrated waste management system to reduce the landfill areas and generate the renewable energy;
- Encouraging the cooperation of adjacent Local Governments for establishment of waste management facility;
- Endorsing public and private sectors to participate in waste management project.
National Waste Management Targets

Waste Reductions:
- Applying 3Rs
- Promoting Green Procurement

Waste Utilization Rate not less than 30%

Integrated Waste Management System

Waste Disposal in Engineered Practices not less than 40%

HHW properly managed at least 30%

Household Hazardous Waste Management System
Waste Management: Policy

Waste Reduction:
Applying 3Rs
promoting Green Procurement
Supporting Local Government Clusters to obtain long-term effectiveness of waste management
<table>
<thead>
<tr>
<th>Cluster Size</th>
<th>Waste Loading to System (T/ d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Cluster</td>
<td>&gt; 500</td>
</tr>
<tr>
<td>Medium Cluster</td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>250 - 500</td>
</tr>
<tr>
<td>M2</td>
<td>100 - 250</td>
</tr>
<tr>
<td>M3</td>
<td>50 - 100</td>
</tr>
<tr>
<td>Small Cluster</td>
<td>&lt; 50</td>
</tr>
</tbody>
</table>
## Clusters of Local Governments

<table>
<thead>
<tr>
<th>Cluster Sizes</th>
<th>Numbers</th>
<th>MOU Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LARGE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 500 tons/day</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>MEDIUM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>250 – 500 tons/day</td>
<td>206</td>
<td>140</td>
</tr>
<tr>
<td>100 – 250 tons/day</td>
<td>88</td>
<td>65</td>
</tr>
<tr>
<td>50 - 100 tons/day</td>
<td>92</td>
<td>57</td>
</tr>
<tr>
<td><strong>SMALL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 50 tons/day</td>
<td>92</td>
<td>64</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>301</td>
<td>207</td>
</tr>
</tbody>
</table>

Map of Thailand showing clusters of local governments.
MSW Management: Practical Concept

M = Municipality

SAO = Subdistrict Administrative Organization
Policy Frameworks (3)

Endorse the Partnership between Governments and Private Sectors for Implementing Integrated Waste Management.
Appropriate Technologies

M1
Sorting + Anaerobic Digestion + Gasification/Pyrolysis/ Stoker Incineration + Landfill

M2
Sorting + Bio-conversion Process + Pyrolysis/ Gasification + Landfill

M3
Sorting + Bio-conversion Process + Pyrolysis/ Gasification + Landfill

L
Sorting + Bio-conversion Process + Incineration + Landfill

S
Sorting + Bio-conversion Process + Landfill
WTE Objectives

- To handle waste generated by applying properly WTE technologies and retrieving renewable energy;
- To initiate public participation in WTE project;
- To perform WTE model for high potential Local Governments;
- To develop and demonstrate appropriate technologies on WTE through R&D projects and pilot plants.
According to Renewable Energy Strategy, the establishment of WTE project must not be less than 100 MW.
**WTE Goals**

- Local Governments have sufficient capacity for implementing WTE project to attain the targets indicated in 15-year Renewable Energy Development Plan;

- At least 1 facility would be developed as WTE pilot model;

- Regulatory consistency for private sector investment and supporting mechanisms would be encouraged;

- R&D on practical and cost effective technologies to generate renewable energy in the country would be supported.
## Renewable Energy Sources

<table>
<thead>
<tr>
<th>Sources</th>
<th>Present Generating Capacity (MW)</th>
<th>Target (MW)</th>
<th>Potential (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>1,507</td>
<td>2,800</td>
<td>3,300</td>
</tr>
<tr>
<td>Wind</td>
<td>0.958</td>
<td>115</td>
<td>1,600</td>
</tr>
<tr>
<td>Hydro Power</td>
<td>50</td>
<td>156</td>
<td>700</td>
</tr>
<tr>
<td>Biogas</td>
<td>29.2</td>
<td>60</td>
<td>190</td>
</tr>
<tr>
<td>Solar</td>
<td>32</td>
<td>45</td>
<td>&gt; 50,000</td>
</tr>
<tr>
<td>Waste</td>
<td>5.0</td>
<td>100</td>
<td>147</td>
</tr>
</tbody>
</table>

Source: DEDE (March 2008)
**WTE Strategic Approaches**

**Waste Reductions:** Applying 3Rs, Promoting Green Procurement

- **Recycled Waste**
- **Digestion**
- **Compost**
- **Biogas**
- **Heat/Electricity**
- **Wastewater Treatment Plant**
- **Incineration**
- **RDF**
- **Landfill**
- **Recycled Waste**
- **Organic Waste**
- **Combustible**
- **Non-Combustible**

**Integrated Waste Management System Specifically for Generating Renewable Energy**
Waste 15.11 Mton

Equivalent to 3.5 million tons of lignite

or

400 MW power generated

Waste as Renewable Energy Source
Scheme of Waste Management

- Integrated Waste Management System

Source reduction and separation

Waste Diversion
  - Composting
  - Energy recovery
  - Material recovery

Final Disposal (Sanitary Landfill)

- Waste Disposal Center (Cluster)

Municipal solid waste disposal facility for nearby Local Governments.
Examples of Integrated Waste Management System

100% Commingled Waste

Sorting System

Composting 50 - 60%

Recycled materials 20 - 30%

Leftover 10 - 20%

Conversion to RDF

Power and Energy Utilization

Final Disposal < 5%
Integrated MSW Practices

- Waste Separation
- Composting
- Incineration
- Landfill
Pilot Projects of MSM in Thailand
MSW Disposal Facility
Fang Municipality, Chiang Mai

150 T/d

Sorting
Recycled materials

Composting
Compost

Waste baling
Landfill
Organic Waste Compost and Energy Production Plant, Rayong

- 70-80 T/d
- Sorting
- Organic waste
- Power generated of 625 kW
- Gas Collection Tank
- Gas Digestor

Organic Waste Compost and Energy Production Plant, Rayong

Power generated of 625 kW
Phuket Incineration Plant

- 350-370 T/d
- Weighed Station
- Sorting
- Platform
- Buring 250 T/d
- Power generated of 2.5 MW
- Ash 50 t/d
- Cramping

Power generation of 2.5 MW
Q&A

Thank you

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