Integrated Solid Waste Management in Vietnam
- Proposal -

January 2016

Hideki Wada, Team Leader
Vietnam Waste Project
“Vietnam Waste Project”
Project outline

- **Project name**
  - Project for Capacity Development on Integrated Management of Municipal Solid Waste in Vietnam
  - Vietnam Waste Project (http://vietnamwastepj.blogspot.com)

- **Project scheme**
  - Technical assistance by Japan International Cooperation Agency (JICA)

- **Project purpose**
  - Capacity development for domestic waste, construction waste and septic tank sludge

- **Counterparts**
  - MOC
  - Hanoi
  - Thua Thien Hue Province as a model city

- **Major activities**
  - MOC
    - Review on existing laws/regulations
    - Arrangement of data monitoring system
    - Promotion of SWM complexes
  - Hanoi
    - Implementation of solid waste management master plan in Hanoi
    - Pre-F/S study on a SWM complex
    - Promotion of SWM complexes
  - Thua Thien Hue Province as a model city
    - Support for SWM planning and its implementation

- **Project duration**: four years (2014-2018)
- **Public outreach seminars**: once a year in January
Improvement of data qualities regarding the amount of discarded waste (from data monitoring results addressing to Decision 2149 and QCVN 07)
Do you use this?

QCVN07/2010/BXD

<table>
<thead>
<tr>
<th>Urban type</th>
<th>Amount of domestic waste (kg/capita/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special, I</td>
<td>1.3</td>
</tr>
<tr>
<td>II</td>
<td>1.0</td>
</tr>
<tr>
<td>III, IV</td>
<td>0.9</td>
</tr>
<tr>
<td>V</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Questionnaire by the project (N=21)

- a. Yes 81%
- b. No 19%
Is the QCVN realistic?

OECD Factbook 2010
We checked the real data of “amount of collected waste measured by weighbridges”.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of District (City, Urban District, Town and Rural District)</th>
<th>Administrative unit</th>
<th>Population (1000 persons)</th>
<th>Collected population (1000 Persons)</th>
<th>Uncollected population (1000 Persons)</th>
<th>Annual amount of domestic waste (ton/year)</th>
<th>Collection rate in term of the solid waste amount (%)</th>
<th>Collected amount measured by weigh-bridges?</th>
<th>Treatment</th>
<th>Sanitation Fee for residents city/district</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1. City</td>
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<tr>
<td>2</td>
<td>2. Urban District</td>
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<tr>
<td>3</td>
<td>3. Town</td>
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<tr>
<td>4</td>
<td>4. Rural District</td>
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</tr>
</tbody>
</table>

1. Landfilled
2. Open dumped
3. Composting
4. Incineration
5. Others (specify)

Minimum: Unit?
1. VND/hous.
2. VND/person

Maximum: Unit?
1. VND/hous.
2. VND/person
Collected data

- Data collection schedule
  - July 2015

- Target Provinces
  - 63 Cities/Provinces

- Visited Provinces
  - 30 Cities/Provinces were interviewed for data quality review.

- Basic principles for the data survey
  - To be based on the real data including weighbridge data
  - To be based on the Japanese data collection and calculation method
  - To utilize the statistics technique
The result was…

**Amount of collected domestic waste per capita per day =**

\[
\frac{\text{Amount of collected domestic solid waste (ton) \times 1000}}{\text{Collected population (1,000) \times 365}}
\]

City & Town: 911 g/capita/day
Rural District: 727 g/capita/day
Ratio of each type of intermediate treatment facilities
(Note1) Counted facilities includes small scale facilities located at rural areas.
(Note2) ‘Complex’ includes facility of ‘Composting’ and ‘Incineration’, etc.
(Note3) ‘Others’ includes unknown technologies.
### Ratio of each type of landfills

(Note) Counted facilities includes small scale landfills located at rural areas.

- **Sanitary landfill**: 29%
- **Open dumping**: 71%
- **Unknown**: 0%

Total number of landfills: 573
Tipping fee (Service price) of each type of intermediate treatment facilities

<table>
<thead>
<tr>
<th>Treatment Facility</th>
<th>Composting</th>
<th>Incineration</th>
<th>Complex</th>
<th>Landfill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tipping Fee (VND/ton)</td>
<td>129,712</td>
<td>243,579</td>
<td>298,872</td>
<td>106,502</td>
</tr>
</tbody>
</table>

- **Composting**: 129,712 VND/ton
- **Incineration**: 243,579 VND/ton
- **Complex**: 298,872 VND/ton
- **Landfill**: 106,502 VND/ton
<Tentative> Material balance of domestic solid waste in Vietnam in 2014
(Note) Each ratio is calculated based on collected amount of waste (100%).

Amount of collected domestic waste
13,213,268ton
100%

Amount of received waste at Intermediate treatment facilities
7,317,679ton
55%

Amount of reduced and recycled waste by treatment facilities
5,854,131ton
44%

Amount of landfilled waste
7,359,137ton
56%

Amount of direct landfilled waste
5,895,589ton
45%

Amount of landfilled waste after treatment facilities
1,463,548ton
11%
Can you achieve the targets?

Decision No. 2149/2009/QD-TTg

<table>
<thead>
<tr>
<th>Target wastes/ Actions</th>
<th>Targets</th>
<th>Current situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic waste in urban areas/ Collection and treatment meeting environmental standards</td>
<td>85%</td>
<td>90% 100%</td>
</tr>
<tr>
<td>Domestic waste collected in urban areas/ Recycled, reused, recovered energy, or used for organic fertilizer</td>
<td>60%</td>
<td>85% 90%</td>
</tr>
<tr>
<td>Domestic waste in urban areas/ Recycling and source separation</td>
<td>50%</td>
<td>80% 100%</td>
</tr>
<tr>
<td>Domestic waste in rural residential areas/ Collection and treatment meeting environmental standards</td>
<td>-</td>
<td>70% 90%</td>
</tr>
</tbody>
</table>
Targets used in Japan.

- **Resource productivity performance**
  \[
  \text{Resource productivity performance} = \frac{GDP(\text{JPY})}{\text{Natural Resource Consumption(ton)}}
  \]
  - Target (2020): 460,000 JPY per ton (81 million VND/ton)
  - Present (2011): 374,000 JPY/ton.

- **Recycled material rate**
  \[
  \text{Recycled material rate} = \frac{\text{Recycled material}}{\text{Recycled material} + \text{Natural resource consumption}}
  \]
  - Target (2020): 17%
  - Present (2011): 15.3%

- **Amount of landfilled waste**
  - Target (2020): 17 million tons
Requirements for the targets

- Control on waste stream
  - Proper management rate
  - Reduction rate
  - Direct dumping rate …

- Monitoring on socio/economic situation
  - Amount of waste per capita …

- Monitoring, targets and policies
Proposed targets for Vietnam (trial draft)

■ “D"
  - “D(SMR)”: Self-management rate of domestic waste (%) = $1 - \frac{\text{Waste collected population}}{\text{Total population}}$
  - “D(CR)”: Waste collection rate of domestic waste (%) = $\frac{\text{Collected population}}{\text{Total Population}}$

■ “W"
  - “W(GDP)”: Domestic waste amount per GDP (g/GDP) = $\frac{\text{Amount of annual waste}}{\text{GDP}} \times \frac{\text{Collected Population}}{\text{Total Population}}$
  - “W(Capita)”: Amount of collected domestic waste per capita per day (g/person/day) = $\frac{\text{Amount of daily waste}}{\text{Collected Population}}$

■ “RD&R"
  - “RD&R”: Domestic waste reduction & recycling rate (%) = $\frac{\text{Collected waste} - \text{Landfilled waste}}{\text{Collected waste}}$

■ “LD"
  - “LD”: Landfilled rate of domestic waste (%) = $\frac{\text{Landfilled waste}}{\text{Collected waste}}$
## Proposed numerical targets for Vietnam (trial draft)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Index</th>
<th>Area</th>
<th>2015 (current)</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(SMR)</td>
<td>Self-management rate for domestic waste</td>
<td>Whole Province</td>
<td>61%</td>
<td>52%</td>
<td>43%</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C&amp;T</td>
<td>22%</td>
<td>15%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RD</td>
<td>64%</td>
<td>55%</td>
<td>46%</td>
<td>37%</td>
</tr>
<tr>
<td>D(CR)</td>
<td>Domestic waste collection rate</td>
<td>Whole Province</td>
<td>39%</td>
<td>48%</td>
<td>57%</td>
<td>66%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C&amp;T</td>
<td>78%</td>
<td>85%</td>
<td>93%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RD</td>
<td>36%</td>
<td>45%</td>
<td>54%</td>
<td>63%</td>
</tr>
<tr>
<td>W(GDP)</td>
<td>Domestic waste amount per GDP</td>
<td>Whole Province</td>
<td>8692 g/mVND</td>
<td>8201</td>
<td>7726</td>
<td>7284</td>
</tr>
<tr>
<td>W(Capita)</td>
<td>Amount of collected domestic waste per capita per day</td>
<td>Whole Province</td>
<td>725 g/c/d</td>
<td>800</td>
<td>853</td>
<td>890</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C&amp;T</td>
<td>875</td>
<td>966</td>
<td>1030</td>
<td>1074</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RD</td>
<td>697</td>
<td>769</td>
<td>820</td>
<td>855</td>
</tr>
<tr>
<td>RD&amp;R</td>
<td>Domestic waste reduction &amp; recycling rate</td>
<td>Whole Province</td>
<td>44%</td>
<td>51%</td>
<td>58%</td>
<td>65%</td>
</tr>
<tr>
<td>LD</td>
<td>Landfill rate for domestic waste</td>
<td>Whole Province</td>
<td>56%</td>
<td>49%</td>
<td>42%</td>
<td>35%</td>
</tr>
</tbody>
</table>

Legend: “C&T”: City & Town; “RD”: Rural District
Necessary capacity development

- Intensive capacity development
  - Not given what can solve
  - But given how to think and solve

- Any certification program for motivating officials

<table>
<thead>
<tr>
<th>Planning</th>
<th>Data monitoring</th>
<th>Financial management of SWM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Making of a solid waste treatment master plan</td>
<td></td>
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</tr>
<tr>
<td>2. Selection of technologies &amp; technological principles</td>
<td>Data monitoring</td>
<td></td>
</tr>
<tr>
<td>3. Estimation of future amount of waste</td>
<td></td>
<td></td>
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<tr>
<td>4. Financial management of SWM</td>
<td></td>
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<tr>
<td>5.</td>
<td></td>
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<tr>
<td>6. Calling investors for waste treatment facilities</td>
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<tr>
<td>7. Public consensus making</td>
<td></td>
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<tr>
<td>8. Strategic publicity</td>
<td></td>
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<tr>
<td>9. Public involvement</td>
<td></td>
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</tbody>
</table>
Proposal as the conclusion

- Setting of the realistic national target which can be monitored quantitatively.
- Monitoring of the target every year by the data survey.
- Trying to achieve the targets by effective policies including various capacity development.
Realization of intermediate treatment facilities
- The next step -
Basic approach
Find the X day.
Introduce any facility by the X-day.
Find the next X-day toward sustainable SWM.
Master Plan formulation in Thua Thien Hue Province
Master Plan for Thua Thien Hue Province

- CHAPTER 1. FOREWORD
- CHAPTER 2. NATURAL AND SOCIO-ECONOMIC CONDITIONS OF THUA THIEN HUE PROVINCE
- CHAPTER 3. CURRENT SOLID WASTE MANAGEMENT SYSTEM
- CHAPTER 4. SUMMARY OF RELATED STRATEGIES, PLANS AND REGULATIONS OF SOLID WASTE TREATMENT
- CHAPTER 5. PLANNING CRITERIA AND TECHNICAL STANDARDS
- CHAPTER 6. MASTER PLAN ON SOLID WASTE MANAGEMENT TILL 2030, VISION TO 2050
- CHAPTER 7. MASTER PLAN IMPLEMENTATION
- CHAPTER 8. STRATEGIC ENVIRONMENTAL ASSESSMENT
- APPENDICES
Zoning and facility plan

WASTE MANAGEMENT PLANNING OF THUA THIEN HUE
WASTE ZONING TO BE DEVELOPED 2030
SCALE: 1/100,000

LEGEND
- Landfill
- Treat, emt Complex

Collection Area To:
- A Luoi District
- Huong Thuy District
- Huong Tra District
- Nam Dong District

Huong Dien Location: Huong Tra District
Capacity: 360 ton/yr

Phu Son Location: Huong Thuy District
Capacity: 360 ton/yr, 378,000 m³

Huong Lien Location: A Luoi District
Capacity: 336,800 m³

Huong Phu Location: Nam Dong District
Capacity: 62,000 m³
Waste process flow

- Combination of composting and Incinerator
- Residue recycling in cement industry

### Current intermediate treatment facility close in 2018 after the new facilities open. (Thuy Phuong)

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016-2020</td>
<td>360 ton/day (Composting &amp; Incinerator)</td>
</tr>
<tr>
<td>2021-2025</td>
<td>New treatment complex opens (Phu Son) 360 ton/day (Composting &amp; Incinerator)</td>
</tr>
<tr>
<td>2026-2030</td>
<td>-2040 -2050</td>
</tr>
<tr>
<td>2021</td>
<td>New intermediate treatment facility opens (Huong Binh) 360 ton/day (Composting &amp; Incinerator)</td>
</tr>
</tbody>
</table>

### Zone 1
- Domestic waste from urban areas
- Domestic waste from rural areas
- Sorting 360 t/d
- Composting 250 t/d
- Incineration 160 t/d
- Ash

### Zone 2
- Domestic waste from urban areas
- Domestic waste from rural areas
- Sorting 360 t/d
- Composting 250 t/d
- Incineration 160 t/d
- Ash

### Infographics
- Market Compost
- Cement factory
- Landfill
- Compost
- Market
Introduction of intermediate treatment facilities means…

- Inter-district transportation
- Cost difference
Inter-district coordination system in Japan.

- A locality establishment by the member municipality
  - Resource concentration for efficient management
  - Can be used for fee adjustment

![Diagram of inter-district coordination system]

- SWM service provision
- Mayer
- Administration
- Assembly
- Regional SWM body
- Member locality
- Membership fee

Member locality

Member locality
Challenge by “WM Integral Committee”

- **Functions**
  - Planning to improve existing SWM with studies and researches
  - Implementing MP with monitoring indicators
  - Calling investors
  - Promoting international cooperation
  - Monitoring operation of facilities
  - Directing related departments, such as DOC, DONRE...
  - Coordinating for involvement of relevant bodies and persons

- **Vertical coordination among City/Towns/Rural Districts**
  - Participation from the districts
  - Formulation of the five-year implementation plan
  - Annual reporting of progress of the five-year implementation plan to the committee
  - Every year and ad-hoc consultation to the committee
  - Others
Prioritized Projects in Thua Thien Hue Province with the Project Team

- Prioritize project 1. Promotion of community-based composting
- Prioritized project 2. Promotion of 3Rs through collaboration with businesses
- Prioritized project 3. Pilot trial for source separation
- Prioritized project 4. Facility development in Phu Son and Huong Binh
- Prioritized project 5. Cement feeding
- Prioritized project 6. Committee for implementation of the master plan
- Prioritized project 7. “White Paper” development
- Prioritized project 8. Introduction of comprehensive financial system
Proposal as the conclusion

- Planning intermediate facilities based on the limitations in landfill capacity and the projected waste amount.

- Establishment of the regional coordinating bodies or functions under the City/Province by horizontal and vertical institutional formation for inter-district coordination including adjustment of the cost gaps among the districts.
From the first phase to the second phase
From the first phase to the second phase

The First Phase

- Issue structure
- Necessary solutions
- Development of necessary tools

2014.4 → 2016.3

The Second Phase

- Application and review on the developed tools
- Intensive capacity development

2016.4 → 2018.2