FSM Cooperated with Sewerage in Japan

Introduction of MICS Program

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Outline

• Introduction of unique FSM history in Japan
• Current status of human excreta management in Japan
• Challenge for FSM of on-site sanitation and small scale STPs = Background of MICS
• Examples of MICS program
  • Cost effectiveness of MICS program
• Implications from MICS’s experiences and challenges
A recycling system between rural and urban area had been established in Edo era, more than 200 years ago.

Edo Era

Transportation by horses

until early 1950s

Collection/ Maturation/ Utilization

Source: “Shinyo no yukue” (image), Japan Environmental Sanitation Center
Along with economical growth: Breakdown of the recycle system

- Growth of Urban population
- Expanding urban area
- Utilization of chemical fertilizer
- More amount / less demand
- Collapse of recycling system
  ➔ Human Excreta overflowed

Source: “Shinyo no yukue” (image), Japan Environmental Sanitation Center
Human excreta collection and treatment system

- Developed based on the tradition of excreta containment and collection
- No discharge of effluent without treatment
- Semi-centralized FS treatment plant (called night-soil treatment plant, NSTPs)

Source: “Shinyo no yukue” (image), Japan Environmental Sanitation Center
Human excreta and domestic wastewater treatment systems in Japan

Municipality Population <50,000
Whole Japan

49.6% 77.6%
8.6% 3.0%
18.6% 8.9%
23.3% 10.5%

source: Japan Education Center for Environmental Sanitation
Application of domestic wastewater treatment systems

Johkasou

Lined pit

source: Japan Education Center for Environmental Sanitation
Challenge for FSM (Background of MICS)

Population decline

\[ \downarrow \]

Decrease of FS amount
- decentralized STPs
- *Johkaso* (on-site sanitation)
- raw human excreta

\[ \downarrow \]

Increased service cost per capita
and

Facility Reconstruction after life span would be very costly

MICS Program

- A subsidizing program, since 1995, promoting co-treatment of sludge from centralized and decentralized STPs, *johkasou*, and the lined pits.
- 107 projects by 2015
Examples of MICS projects in Hyogo Pref.
Example of MICS program (1), Town B

- Target population: 13,546
- A NSTP, which had treated FS, sludge from *johkasou* and 9 decentralized STPs, has been closed.
- FS from lined pit has relatively high %, and it is treated in wastewater treatment process after dilution.
- In the centralized STP, facilities to receive FS has been constructed.

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<thead>
<tr>
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<th>Before MICS</th>
<th>After MICS</th>
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<tbody>
<tr>
<td>Construction (million yen/year)</td>
<td>53.9</td>
<td>41.6</td>
</tr>
<tr>
<td>O &amp; M(million yen/year)</td>
<td>122.7</td>
<td>71.7</td>
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<tr>
<td>Cost reduction (%)</td>
<td>-</td>
<td>-35.9</td>
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Example of MICS program (2), Town C

- Target population: 9,942
- A NSTP, which had treated FS, sludge from johkasou and 19 decentralized STPs, has been closed.
- In the centralized STP, facility to receive FS has been constructed, and FS is treated in wastewater treatment process (oxidation ditch) after dilution.

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<th>Cost Reduction</th>
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<tbody>
<tr>
<td>Construction (yen)</td>
<td>661</td>
<td>139</td>
<td>-79.0%</td>
</tr>
<tr>
<td>O &amp; M (yen/year)</td>
<td>48.1</td>
<td>34.5</td>
<td>-28.3%</td>
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Example of MICS program (3), City A

- Target population: 48,900
- Previously, sludge disposal cost was expensive, to reduce its cost, a sludge dryer has been installed in the existing NSTP.
- Construction cost is not small compared to NSTP reconstruction.

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<tr>
<td>Construction (million yen/year)</td>
<td>134.3</td>
<td>135.1</td>
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<tr>
<td>O &amp; M (million yen/year)</td>
<td>211.7</td>
<td>159.7</td>
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<tr>
<td>Cost reduction (%)</td>
<td>-</td>
<td>-14.8</td>
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Summary and Implications from MICS's experiences

• FS treatment at centralized STP have been working well;
  • Sludge from decentralized STPs and Johkasou: Sludge treatment process (mechanical dewatering)
  • FS and sludge from Johkasou: Wastewater treatment process

• Cooperation of sewerage and FSM will bring cost effectiveness for the municipalities we have shown;
  • Cost reduction without NSTP reconstruction (Town B, C)
  • Effective O & M
    • Cost reduction of wastewater and sludge treatment
    • Reduction of sludge disposal cost (City A)
Challenges

• To establish FSM integrated sewerage development plan, following consideration must be required;
  • To accept FS, sludge treatment process must be carefully selected.
  • Determination of FS amount to be accepted into wastewater treatment process and/or sludge treatment process depends on various factors for individual cases.
Thank you for your attention!