FSM Cooperated with Sewerage in Japan

Introduction of MICS Program

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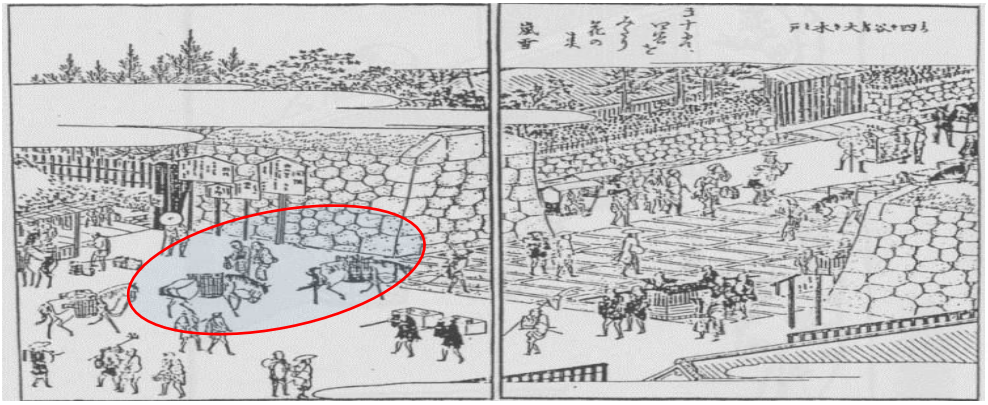
Outline

- 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



Farmers

肥桶を担ぐ農民　出典：『世渡風俗図会』

Source: http://sinyoken.sakura.ne.jp/

until early 1950s

Collection/ Maturation/ Utilization

Source: “Shinyo no yukue” (image), Japan Environmental Sanitation Center

Along with economical growth: Breakdown of the recycle system

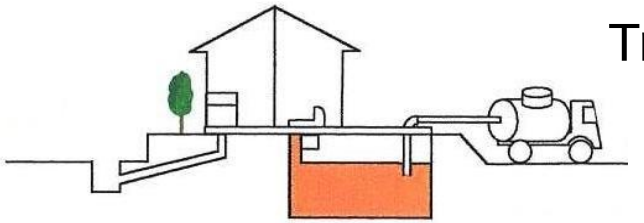
- Growth of Urban population
- Expanding urban area
- Utilization of chemical fertilizer
- More amount / less demand
- Collapse of recycling system
  ➔ Human Excreta overflowed

Human excreta dumping

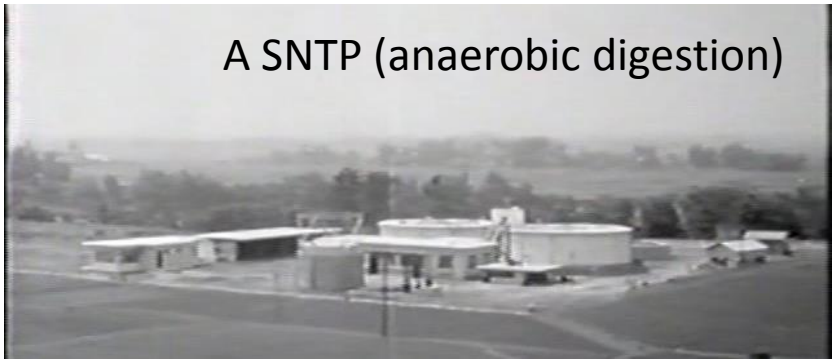
Source: “Shinyo no yukue” (image), Japan Environmental Sanitation Center

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)



Transportation → NSTPs → Effluent → Water bodies

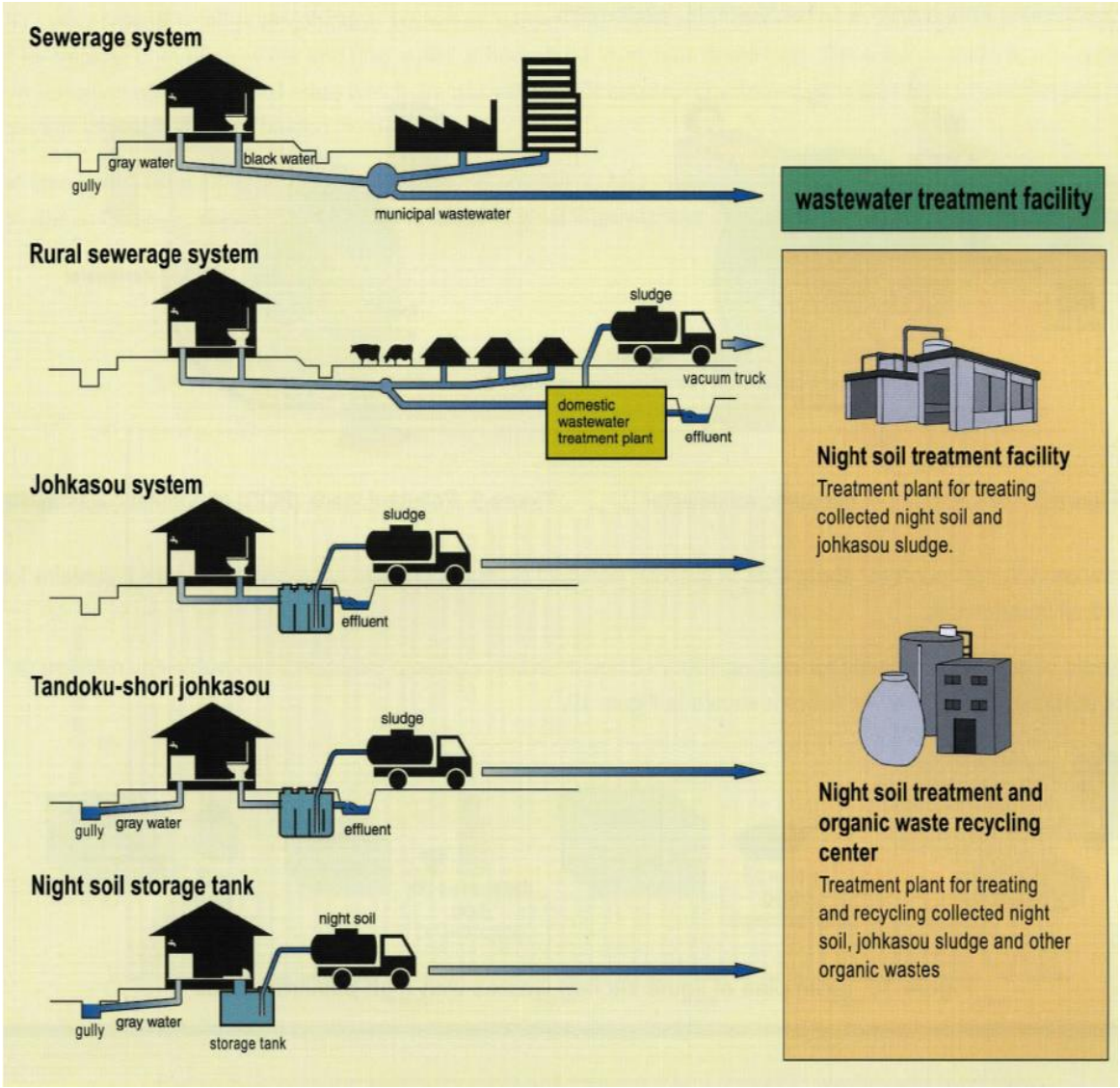


A SNTP (anaerobic digestion)

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%

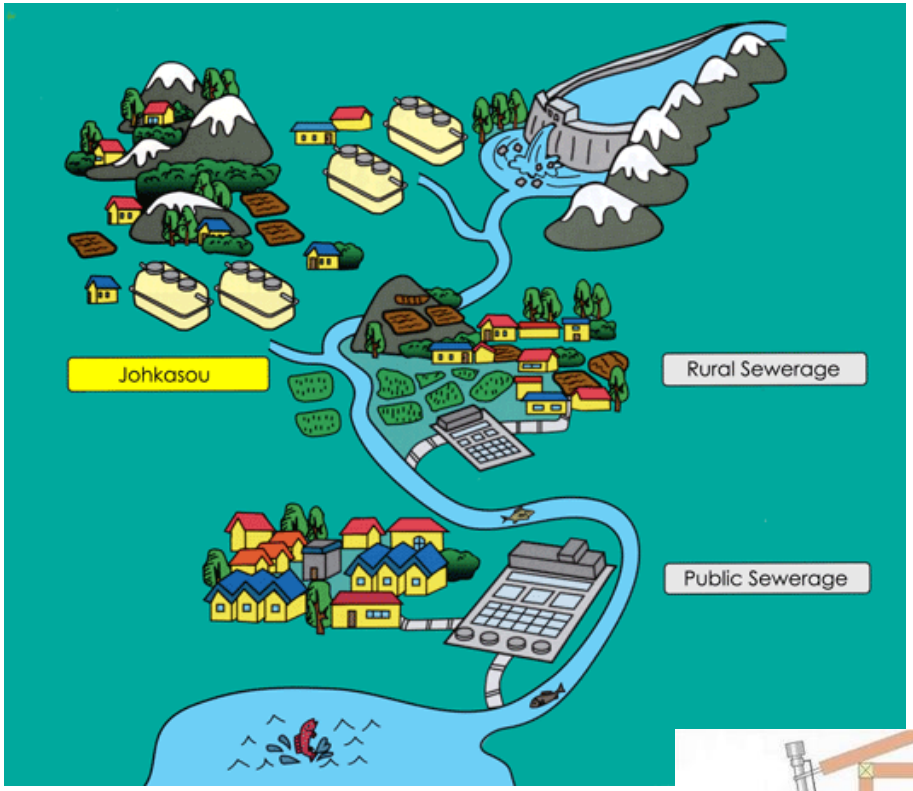


STP
App. 2,000 plants

NSTP
App. 1,000 plants

source: Japan Education Center for Environmental Sanitation

Application of domestic wastewater treatment systems



Johkasou

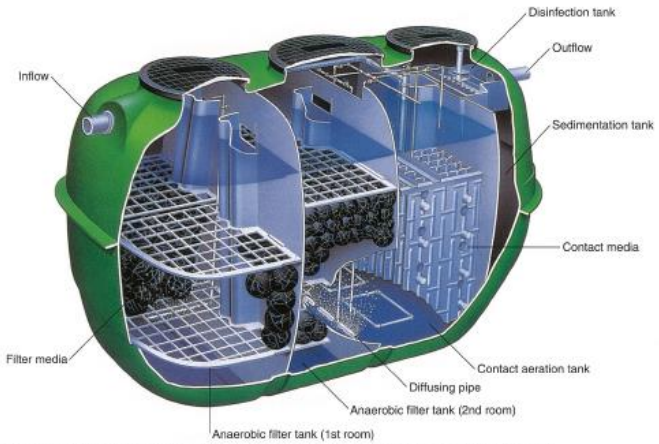
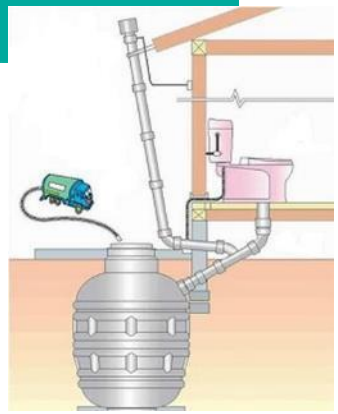


Figure 4.3 Schematics of structure of a small-scale johkasou (anaerobic filter - contact aeration process)

Lined pit



source: Japan Education Center for Environmental Sanitation

Challenge for FSM (Background of MICS)

Population decline

⬇

Decrease of FS amount

- decentralized STPs
- *Johkaso (*on-site sanitation)
- raw human excreta

⬇

Increased service cost per capita

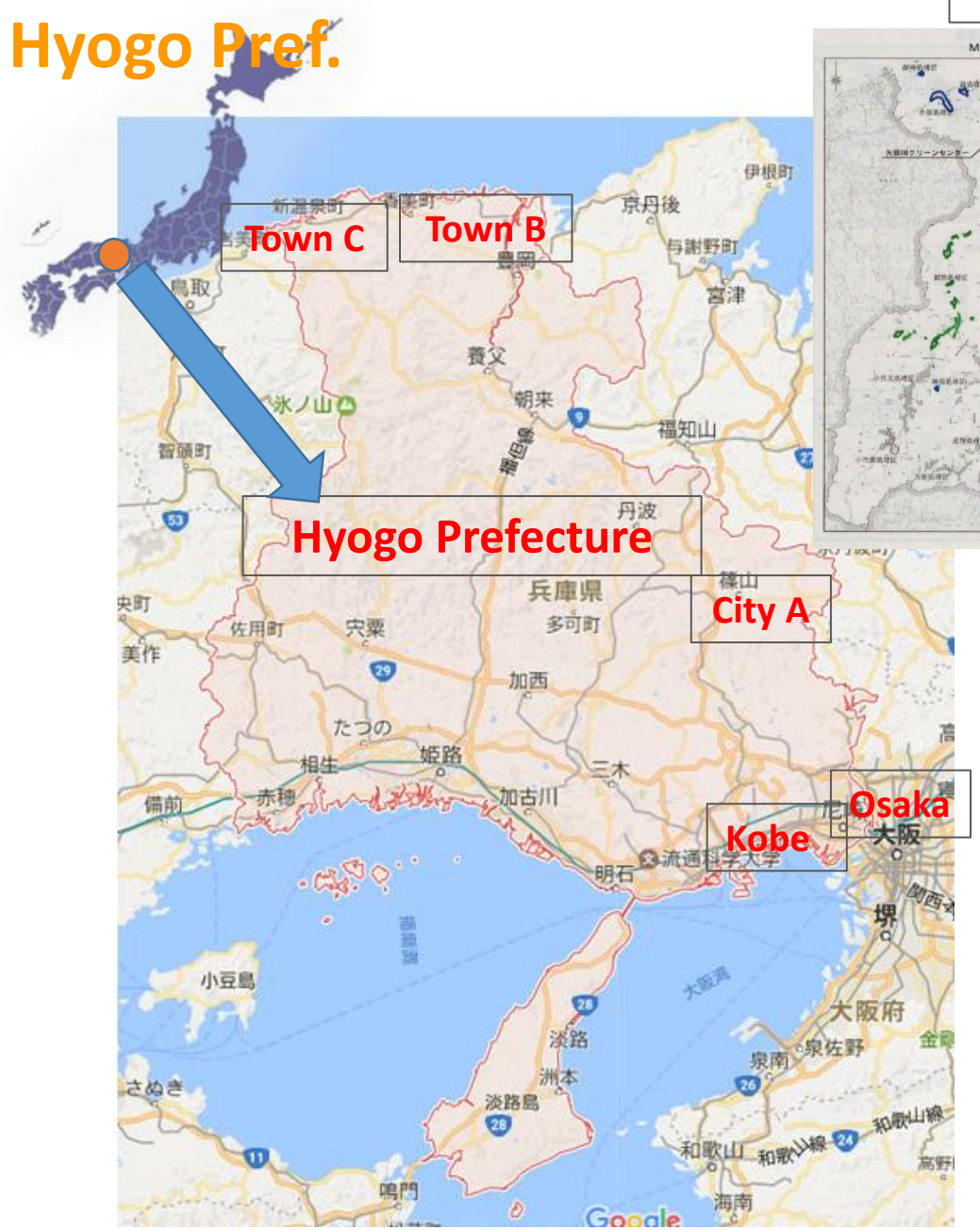
and

Facility Reconstruction after life span would be very costly

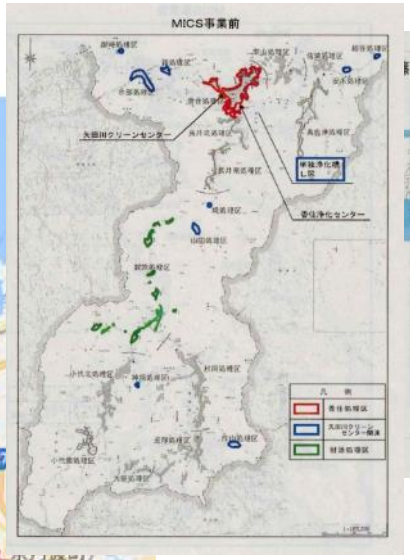
MICS Program

- A subsidizing program, since 1995, promoting co-treatment of sludge from centralized and decentralized STPs, *johkasou*, and the lined pits.
- 107 projects by 2015

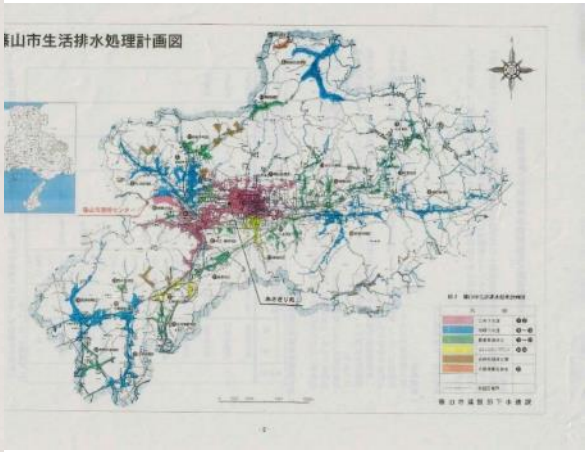
Examples of MICS projects in Hyogo Pref.



Town B

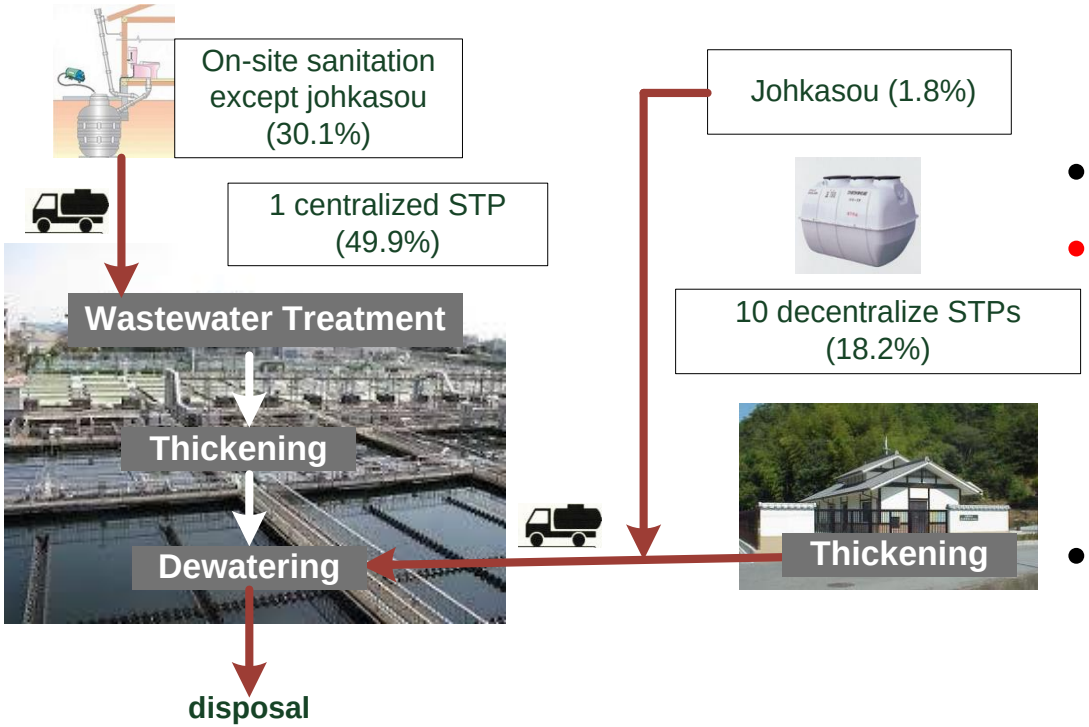


City A



Town C

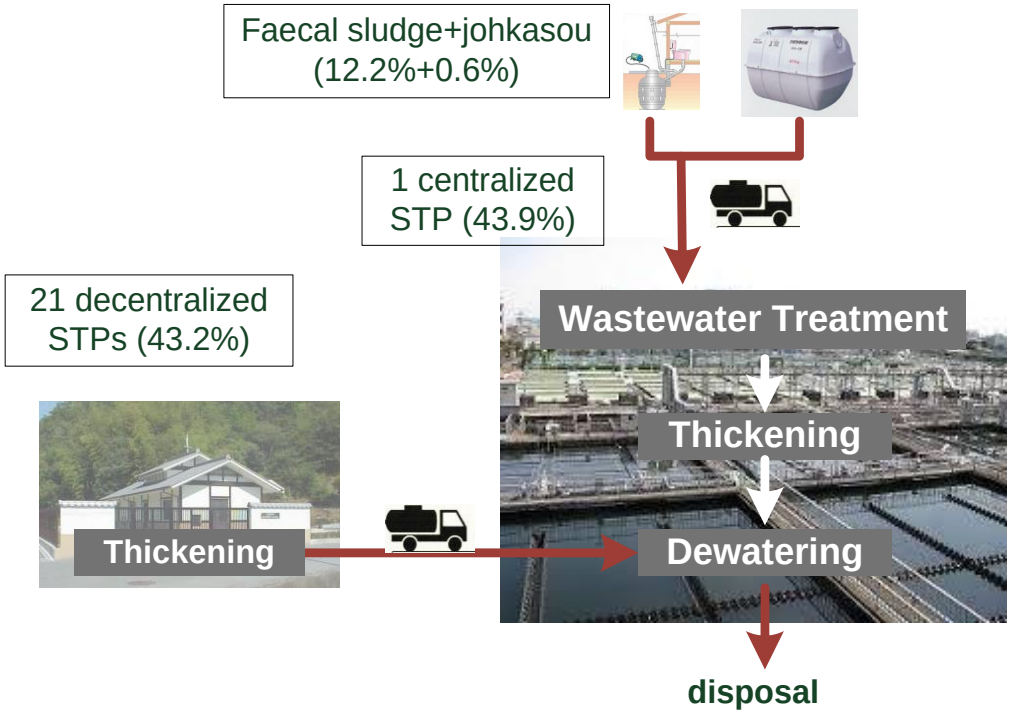
Example of MICS program (1), Town B



	Before MICS	After MICS
Construction (million yen/year)	53.9	41.6
O & M(million yen/year)	122.7	71.7
Cost reduction (%)	-	-35.9

- 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.

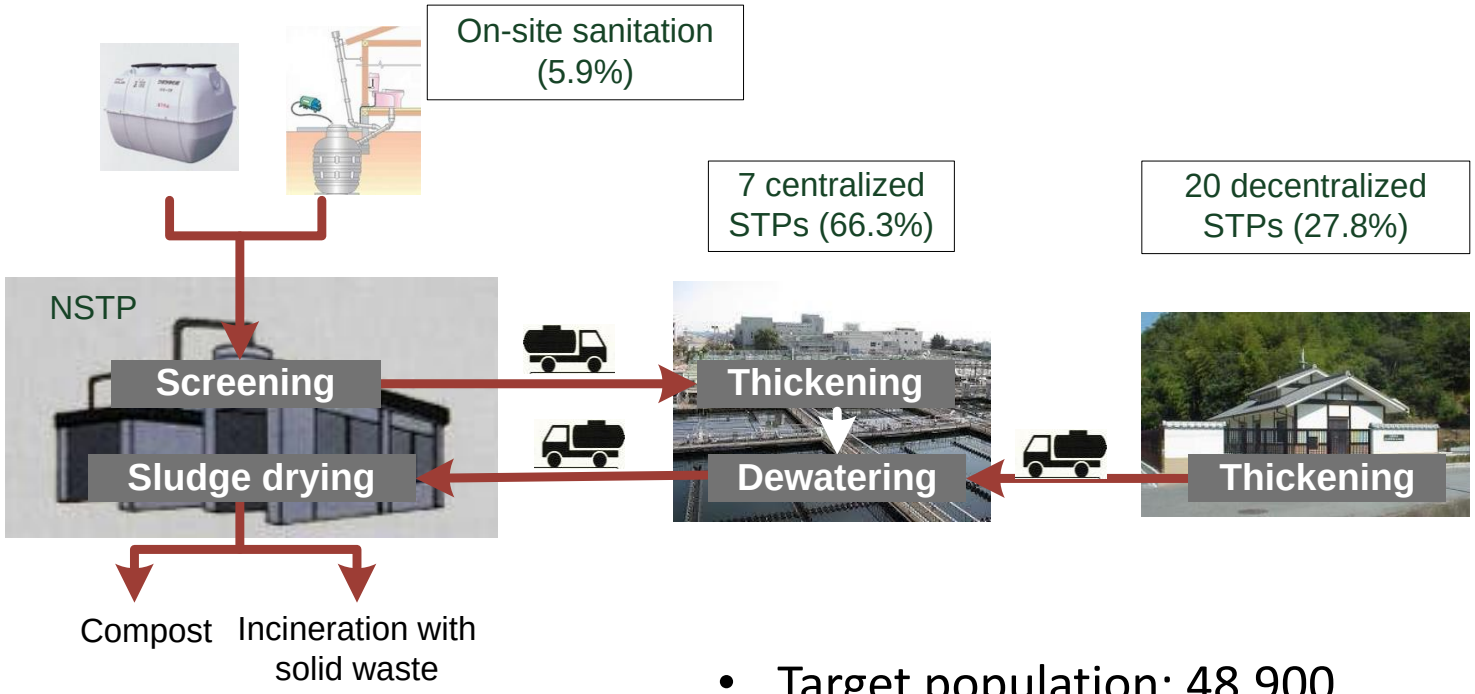
Example of MICS program (2), Town C



	Before MICS	After MICS	Cost Reduction
Construction (million yen)	661	139	-79.0%
O & M (million yen/year)	48.1	34.5	-28.3%

- 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.

Example of MICS program (3), City A



	Before MICS	After MICS
Construction (million yen/year)	134.3	135.1
O & M (million yen/year)	211.7	159.7
Cost reduction (%)	-	-14.8

- 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.

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!