Current water reuse practices and challenges in Japan

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Background

Water resources

Precipitation (mm/year)

Per capita precipitation volume (mm/person/year) Per capita natural renewable water resources (mm/person/year)





Precipitation (mm/year)

Per capita natural renewable water resources

Sewage works, as basis for water reuse

- Sewage work coverage: 73% (91 million capita), others by small centralized or decentralized systems
- Wastewater of 14 billion m³/year treated in 2,129 WWTPs
- Mainly secondary, 311 WWTPs adopts advanced treatment
- Maximize potential of water/sludge

Applications and select cases

Applications



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Social significance



Case 1: Fukuoka City

• Large scale dual system for toilet flushing





Central WWTP Capacity: 7,200 m³/year Service area: 1,013 ha Advanced treatment: Chemical precipitation, Ozonation, Sand filtration, Chlorination, Fibre filtration

Eastern WWTP

Capacity: 1,600 m³/year Service area: 291 ha Advanced treatment: Chemical precipitation, Ozonation, Biological filtration, Chlorination

(Fukuoka City's website)

Case 2: Tokyo

• Large scale dual system for toilet flushing





• River flow augmentation

Stream revitalization by reclaimed water of Ochiai WWTP 19,900 m3/day + 30,200 m3/day + 36,300 m3/day (at maximum)





• Train cleaning



• Road sprinkling





Case 4: Sapporo City



(Sapporo City's website)



(Sapporo City's website)

Use <u>wastewater</u> <u>regulating tanks</u> for snow melting in snow season

2 tanks with snow melting capacity of 10,000 m³/day, 6,000 m³/day Use <u>storage sewers</u> (CSO abatement) for snow melting in snow season

2 sewers with snow melting capacity of 2,200 m³/day, 4,000 m³/day





(Sapporo City's website)

Snow flowing gutters along trunk roads

In 6 areas with gutters, 300,000 m³ of snow is disposed per snow season.

Institutions for promotion

[1] National vision



[2] Water quality criteria

	Toilet flushing	Sprinkling in lawn/street, etc.	Landscape irrigation	Recreation
E.Coli	N.D./100ml		1,000CFU/100ml (provisional)	N.D./100ml
Turbidity	2	or less (maintenace ta	rget value)	2 or less
pН	5.8-8.6			
Appearance	Not unpleasant			
Colour	(Set according to users preference)		40 or less (set stricter according to users preference)	10 or less (set according to users preference)
Odour	Not unpleasant (odour intensity set according to users preference)			
Residual chlorine	0.1mg/l in free or 0.4mg/l in combined (maintenace target value)		N.A.	0.1mg/l in free or 0.4mg/l in combined (maintenace target value)

Important notes

Hygienic safety

- Requirements of water reclamation facilities
- Maintenance of residual chlorine in supply process
- Prevention of cross connection
- Prevention of accidental ingestion
- Emergency preparedness/response

Appearance/comfortableness

- Control of rusty water and colour/turbidity
- Control of water appearance in landscape irrigation/recreation facilities
- Control of midges in toilet flushing

Control of facility malfunction

• Control of corrosion/blockage in water reuse system

[3] Local ordinances on buildings/developments

• Big buildings/developments to use reclaimed water or rainwater for toilet flushing, etc.

Tokyo Prefecture

Target: <u>buildings</u> with total floor space of 10,000m² or more, and <u>developments</u> with area of 3,000m² or more

<u>Reclaimed water or rainwater</u> for non-potable water use (incl. toilet flushing)

Fukuoka City

Target: <u>buildings</u> with total floor space of 5,000m² (3,000m² in reclaimed water provided area) or more

<u>Reclaimed water or rainwater</u> for toilet flushing

[4] Subsidy for facility construction

• Specially subsidize sewerage projects taking new roles:

Water environment creation	Recycle promotion (sludge/energy)	IT/new technologies propagation		
➢ Water reuse for sound water	Emergency provision of reclaimed water in drought			
cycle systems	Snow melting/flowing by reclaimed water			
	Micro hydroelectric power generation by reclaimed water			

[5] Satellite MBR demonstration project

- Satellite system (sewer mining) is recommended in "National Vision", but practices are not common.
- MBR, space saving, is appropriate for satellite system.
- National project for Satellite MBR demonstration launched in fiscal 2009.
- Stability of reclaimed water quality, issues on maintenance, etc. surveyed in Nagoya City.



[6] Experiment on reclaimed water export

- Import iron ore through tankers from Austria. <u>Export reclaimed water</u> through the same tanker, <u>replacing seawater in ballast</u>.
- Chiba/Kawasaki Cities, Japan → Western Australia
- <u>Experiment on water quality degradation</u> from Japan to Australia this autumn
- Export starts in fiscal 2012 earliest. Application: industrial use (iron ore cleaning, etc.)

Future directions

- I. Evaluation of water reuse in realizing sound water/material cycle systems and better cities
 - Evaluate water reuse in realizing sound water/material cycle systems
 - Evaluate water reuse in realizing better cities
 - Promote water reuse for pollution loads reduction and global warming mitigation

II. Info sharing and advocacy of water reuse

Share info with other sectors to foster water reuse
 Actively disclose info on reclaimed water
 Share info on water availability with water providers

Advocate social significance of water reuse
 E.g., global warming mitigation

III. Establishment of water quality standards and new technology evaluation methodology

Establish water quality standards
 For agricultural and industrial uses
 Conduct study on hygienic safety

Establish new technology evaluation methodology
 E.g., membrane treatment technologies

- IV. Water reuse promotion through collaboration with private sectors, etc.
 - Provide groundwork for private sectors participation
 - E.g., reclaimed water distribution network by public sectors
 - Reduce cost through collaboration with other works
 E.g., laying sewers and reclaimed water distribution pipes together

V. Water reuse as energy

• Positively utilise thermal or potential energy of reclaimed water

E.g., reclaimed water distribution pipes or sewage system

Thank you for your attention.