International Workshop on Reclaimed Water Use in Urban Area
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Membrane Technology for Wastewater Reclamation: Current and Future Perspectives

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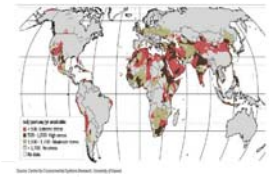
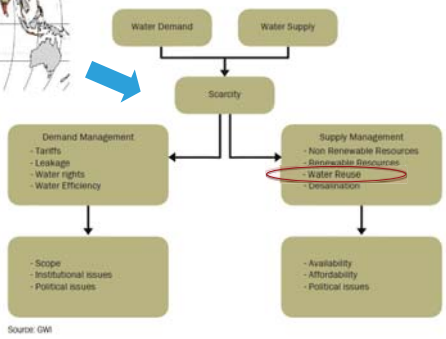
Contents

01 Wastewater Reuse and Membrane in Korea

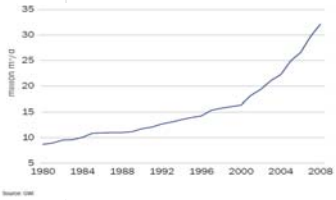
01 Water Scarcity and Wastewater Reuse



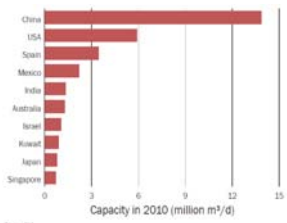


01 Wastewater Reuse in the World

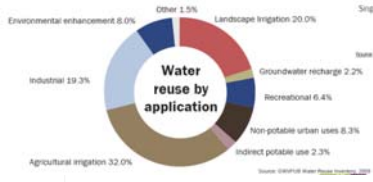
Volume Market Development (1980-2008)



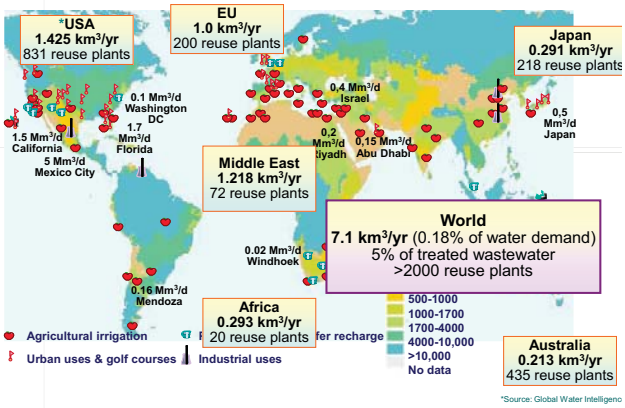
Top 10 countries by capacity (2010)



Water Reuse by Application

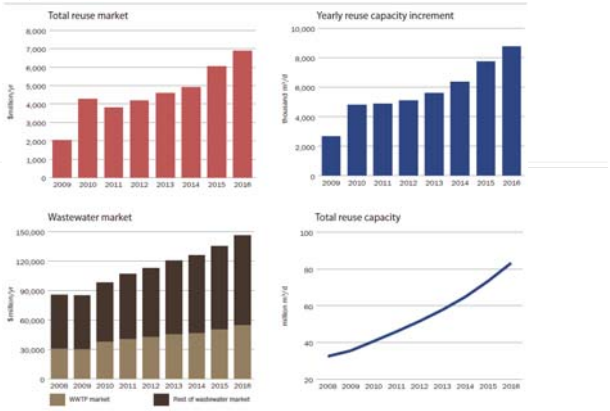


01 Wastewater Reuse in the World



*Source: Global Water Intelligenc

01 Market Forecast



*Source: Global Water Intelligenc

01 Wastewater Reuse in Korea

Grey Water Reuse

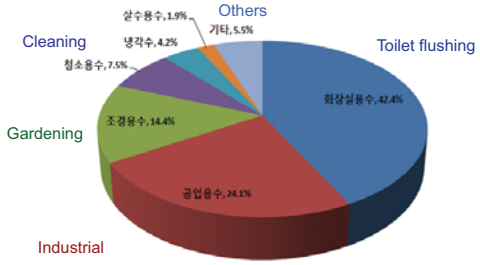
Source: Park, 2011

Region	No. of facilities	Current Status (ME, 2009)			
		Total floor area (m^2)	Treatment capacity (m^3/day)	Grey water Use (m^3/day)	Usage ratio (%)
Seoul	57	7,917,449	18,721	8,161	43.6
Pusan	22	2,211,099	7,066	4,907	69.4
Daegu	5	144,221	5,450	5,535	98.5
Incheon	5	241,547	23,400	6,932	29.6
Kwangju	7	342,356	2,040	1,280	62.7
Daejeon	5	12,796,321	226	1,617	14.0
Ulsan	3	279,582	1,216	298	24.5
Gyeonggi	58	7,874,258	77,087	41,922	54.4
Ganwon	9	1,122,564	21,310	3,382	15.9
Chungbuk	1	119,160	300	300	100.0
Chungnam	13	815,374	215,034	119,344	55.5
Jeonbuk	8	1,260,182	100,650	61,028	60.6
Jeonnam	11	6,339,309	280,566	54,104	19.3
Kyeongbuk	38	5,470,372	116,946	82,420	70.5
Kyeongnam	9	940,670	14,895	1,605	10.8
Jeju	5	179,643	655	324	49.5
K-Water	15	7,292,007	1,314,467	181,424	13.8
Total	271	55,346,114	2,201,505	573,107	26.0

01 Wastewater Reuse in Korea: Grey water

Grey Water Reuse by Application

➢ Toilet Flushing - 153 (42.3%), Industrial Water – 87 (24.1%), Gardening - 14.4%, Cleaning - 7.5%

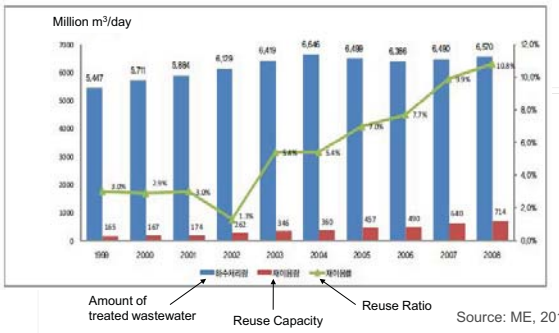


Source: STATISTICS OF SEWERAGE, 2010

01 Wastewater Reuse in Korea

Use of Treated Wastewater

➢ Usage Ratio of Treated Wastewater: 1.3% in 2002 → 10.8% in 2008



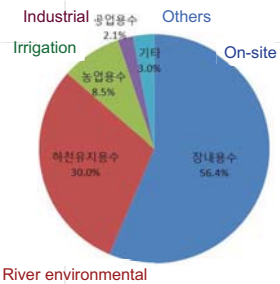
Source: ME, 2010

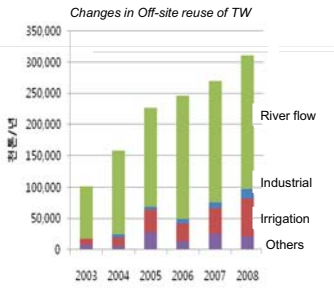
01 Wastewater Reuse in Korea

Use of Treated Wastewater by Application

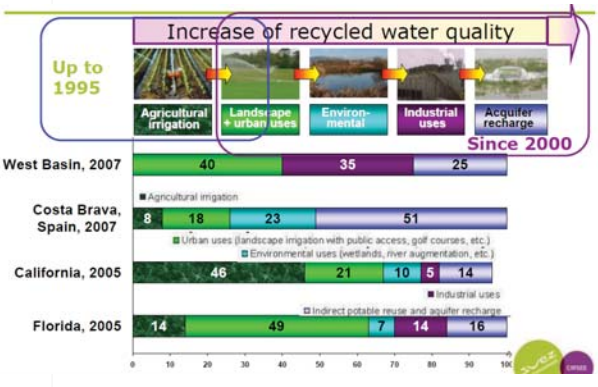
➢ On-site Reuse in WWTP: 56%

➢ Increasing interest in using treated wastewater for industrial application





01 Diversity of Wastewater Reuse

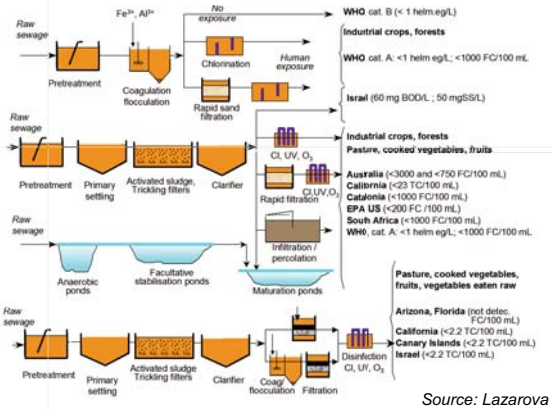


Source: Lazarova (2010)

01 Technologies for Wastewater Reuse

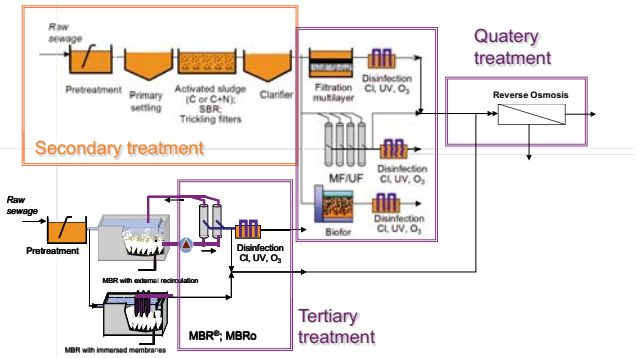
Preliminary Treatment	Screening and grit removal	Removal of coarse solids	
Primary Treatment	Sedimentation and skimming	Removal of organic and inorganic solids, oil, and greases	Water for irrigation of non-food crops
Secondary Treatment	Biological aerobic treatment and clarification	Removal of residual oragnics, BOD, suspended solids, and microorganisms	Water for irrigation of crops which are not eaten without cooking
Secondary Treatment	Chemical coagulation, sedimentation, and filtration	Removal of suspended solids, colloids, and nutrients	Water for washing and irrigation
Disinfection	Chlorination, ozonation, UV	Inactivation of pathogens	Water for unrestricted irrigation
Advanced Treatment	Reverse Osmosis and distillation	Removal of ions, and low molecular organics	Water for unrestricted use (including indirect potable use)

01 Conventional Treatment Technology



Source: Lazarova (2010)

01 Membrane Technology



Source: Lazarova (2010)

01 Membrane Technology

Desalting/Removal of Dissolved Organics

- Reverse Osmosis (RO)
- Nanofiltration (NF)

} *Dense membranes*

Membrane Filtration

- Ultrafiltration (UF)
- Microfiltration (MF)

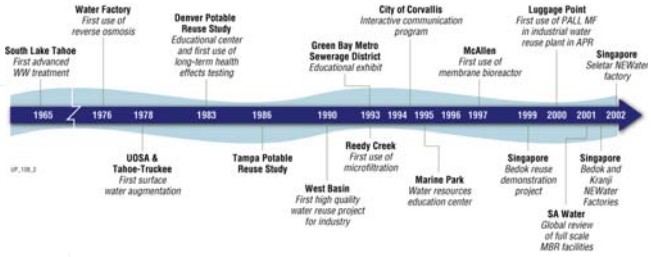
} *Porous membranes*

Membrane Bio-Reactors (MBR)

- UF and/or MF membranes coupled with aerobic bio-reactor

Source: Pearce (2010)

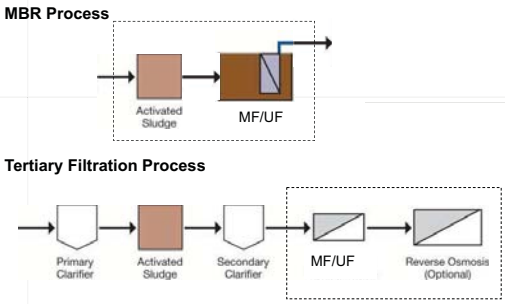
01 History of Membrane Technology for Wastewater Reuse



01 Membrane Process for Wastewater Reuse

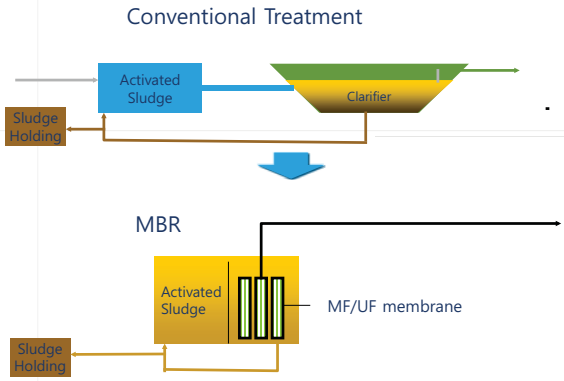
Inorganic Waste	Organic Waste	Heavy Metals / Complex Waste
MF/UF	MBR	
MF/UF + RO	MBR + RO	Zero Liquid Discharge
MF/UF + EDR	MBR + EDR	

02 Membrane Process for Wastewater Reuse



02 MBR

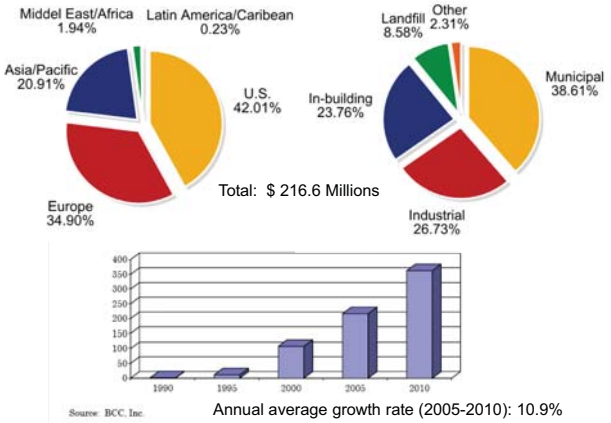
02 Basic Concept of MBR



02 History of MBR

1960's	: Side stream MBR Idea, South Africa
1970's	: Thetford System and Dorr Oliver, USA
1988	: First US Patent for submerged membrane by Professor Yamamoto of Tokyo University
1990's	: Commercial submerged MBRs
1998	: 1,900 m^3/day (Porlock, UK)
2007	: 144,000 m^3/day (King County, WA, USA)
2009	: 220,000 m^3/day (Jumeirah Golf Estates , UAE)

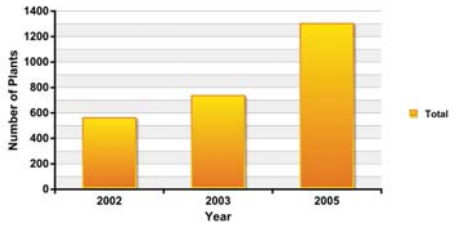
02 MBR Market by Global Region (2005)



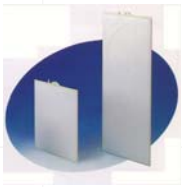
Annual average growth rate (2005-2010): 10.9%

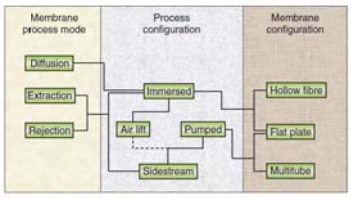
02 MBR Market in Korea

- Number of MBR Plants: more than 1,300 (including very small plants)
- Hollow fiber - 79%, Plate - 12%, Tubular - 9%
- Domestic membranes: 20~30%
- More than 60 % of total plants are less than 50 m^3/d



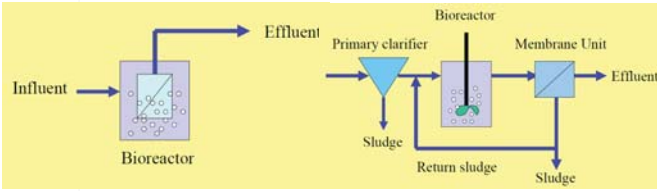
02 Membrane Modules for MBR





02 Comparison of MBR systems

(1) Submerged **(2) Side stream**

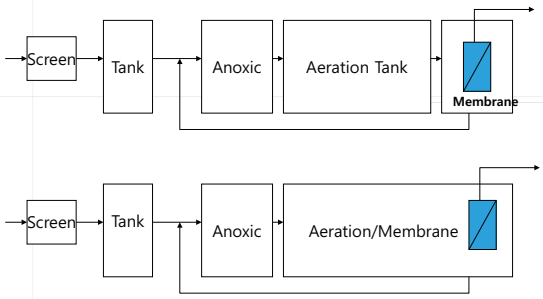


- Small footprint
- Retrofitting
- Low flux
- Low energy consumption

- Additional space required
- Easy maintenance
- High flux
- High energy consumption

02 MBR for N/P Removal

- Advanced Wastewater Treatment Using MBR



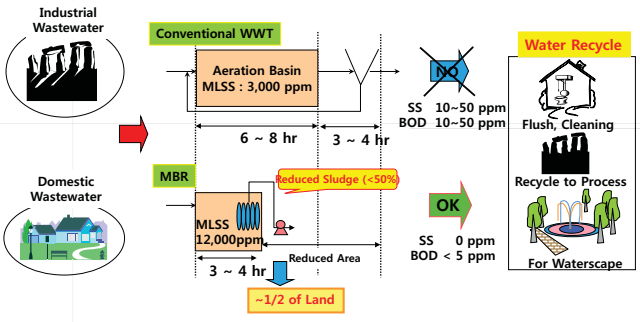
02 Various MBR Systems

	Pore size	Materials
UF and MF submerged	0.02 to 0.5 μm	Polyethylene, polypropylene, polysulphone etc
UF and MF Side-stream	0.02 to 0.5 μm	Ceramics (MF), polyethylene, polypropylene, polysulphone etc

Configurations	Specific fluxes	References
Submerged HF	50 to 65 L/m².h.bar	Gunder & Krauth, 1998
Flat plate	115 L/m².h.bar	Gunder & Krauth, 1998
Tubular side-stream	40 to 60 L/m².h.bar	Le Clech et al., 1999

Source: Ujang," Membrane Bioreactor Technology: Basic engineering design"

02 Advantage of MBR Systems



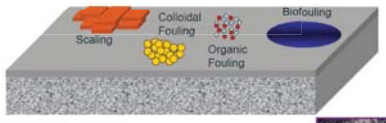
- TP can be controlled down to 0.1 ppm by applying coagulants
- Effluent can be easily recycled for non-potable use
- Cost effective when RO is subsequently used for water recycle

02 Design Parameters

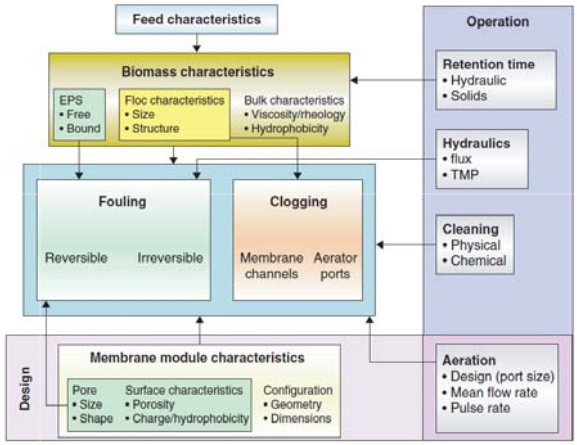
Parameters	Design values
Loading rates (for >90% organic removal)	1.2 to 3.2 kg COD/m³.d 0.05 to 0.66 kg BOD/m³.d
Loading rates for complete nitrification	0.05 to 0.66 kg BOD/m³.d Sludge age 10 to 50 d
Loading rate for complete nitrogen removal	4 kg NH_4-N/m³.d 5 kg NO_3-N/m³.d
MLSS	10,000 to 20,000 mg/l
Flux	5 to 300 L/m².h
Specific flux	20 to 200 L/ m² h bar
Design flux (Kubota, ϕ of 0.4 μm)	0.5 m³/m².d (specific flux 125-175 L/ m² h bar)

02 Disadvantage of MBR: Fouling

- Mechanism



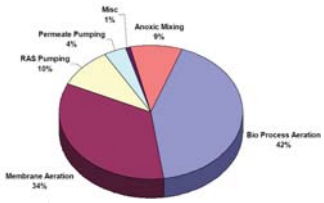
- Real situation



02 Disadvantage of MBR: Energy and Cost

	Power consumption (kWh/m^3)
Activated Sludge	0.2~0.3
MBR	0.3~2.0

MBR Energy Users



Flux / Membrane Price	20 L/m².h	50 L/m².h	100 L/m².h
4500 Yen/m²	4.5	1.8	0.9
7500 Yen/m²	7.5	3	1.5
12 000Yen/m²	12	4.8	2.4

Source: Ben Aim, 2007

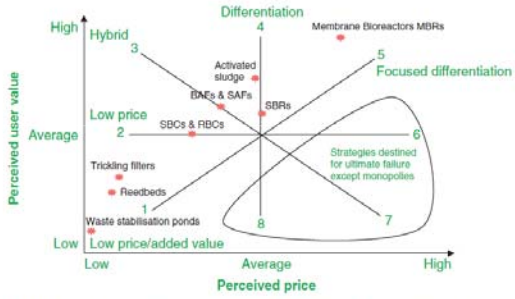


Figure 1.2 Customer perception matrix, wastewater treatment technologies (Reid, 2006)

03 Reverse Osmosis for Wastewater Reuse

03 Why RO?

Increase in industrial water demands

- Cooling Water
  - Once-Through Cooling Water Systems
  - Re-circulating Evaporative Cooling Water Systems
    - . Cooling Tower Systems
    - . Spray Ponds
  - Key Issues : Corrosion / Biological Growth / Scaling
- Boiler Make-up Water
- Industrial Process Water
  - Pulp and Paper Industry
  - Chemical Industry
  - Textile Industry
  - Petroleum and Coal etc.

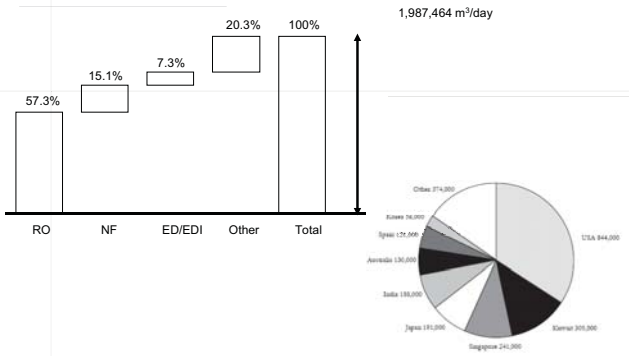
03 Water Quality Guideline

❑ Process Water Quality (WPCF 1989, in EPA Guidelines 2004)

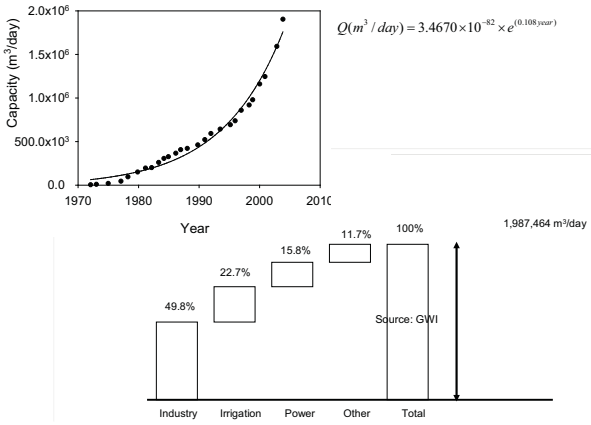
Parameter	Pulp & Paper			Chemical	Petroleum & Coal	Textiles		Cement
	Mechanical Piping	Chemical Unbleached	Bleached			Sizing Suspension	Scouring, Bleach & Dye	
Cu	-	-	-	-	0.05	0.01	-	-
Fe	0.3	1.0	0.1	0.1	1.0	0.3	0.1	2.5
Mn	0.1	0.5	0.05	0.1	-	0.05	0.01	0.5
Ca	-	20	20	68	75	-	-	-
Mg	-	12	12	19	30	-	-	-
Cl	1,000	200	200	500	300	-	-	250
HCO3	-	-	-	128	-	-	-	-
NO3	-	-	-	5	-	-	-	-
SO4	-	-	-	100	-	-	-	250
SiO2	-	50	50	50	-	-	-	35
Hardness	-	100	100	250	350	25	25	-
Alkalinity	-	-	-	125	-	-	-	400
TDS	-	-	-	1,000	1,000	100	100	600
TSS	-	10	10	5	10	5	5	500
Color	30	30	10	20	-	5	5	-
pH	6-10	6-10	6-10	6.2-8.3	6-9	-	-	6.5-8.5
CCE	-	-	-	-	-	-	-	-

03 Market for Wastewater Reuse Using RO

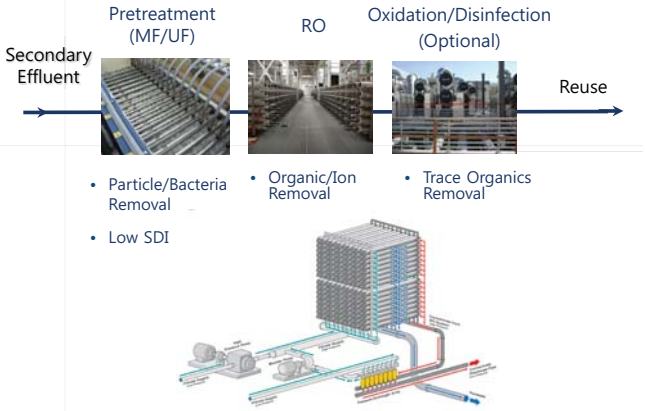
- Quaternary treatment: 20%
- RO/NF: 72% of Quaternary Treatment



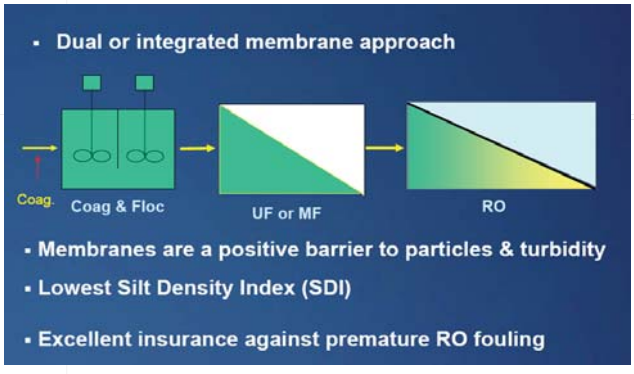
03 Market for Wastewater Reuse Using RO



03 Basic Process



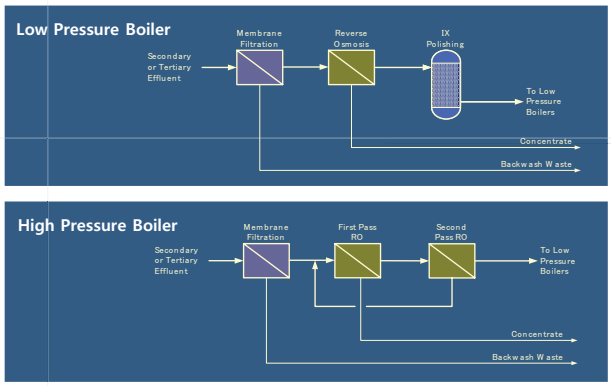
MF/UF as Pretreatment for RO



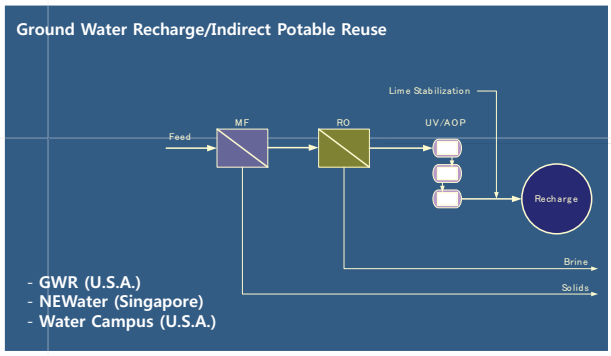
Customized Recycled Water

Process	Uses
Tertiary	*Irrigation, Street Sweeping*
Nitrified	*Cooling Towers*
MF/RO	*Low Pressure Boilers*
MF/RO/RO	*High Pressure Boilers*
Stabilized RO	*Groundwater Injection*
Next ??	*To Customer Specs*

03 Process Configuation by Application



03 Process Configuation by Application



Background: RO Operating Conditions

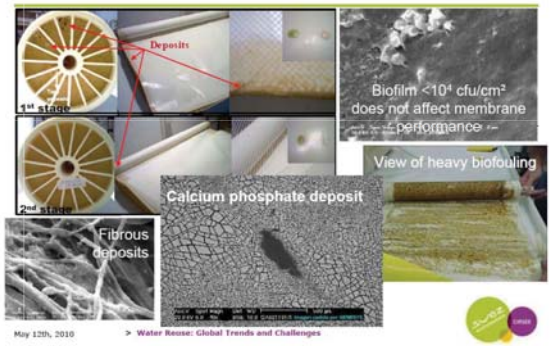
	TDS (mg/L)	Typical Driving Pressure (psi)	Typical Recovery %	Typical Energy Use (kWh/1000 gal)
Conventional Treatment	< 500	NA	95%	0.6 - 0.9
Brackish Water RO	1,000 – 5,000	125 – 600	65 - 85	2.6 - 4.6
Seawater RO	> 35,000	800 - 1200	30 - 50	8.6 - 11

- RO is energy intensive and costly to operate
- Brine disposal issues problematic
- Siting can also be difficult

03 Disadvantage of RO Systems

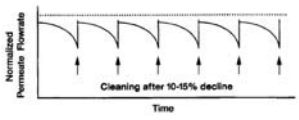
- Fouling Control
  - Stringent pretreatment required
- Removal of Trace Organics
  - Non-charged small organics pass through RO
- High Energy Consumption and Low Recovery
  - Energy intensive
  - Low recovery (~75%) → Concentrate management issues

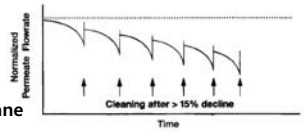
03 Fouling of RO



03 Importance of RO O&M

- **Effect of Cleaning Period**

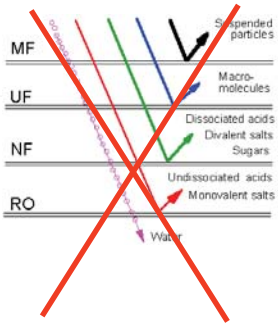




- **When to clean RO membrane**
  - Monitoring normalized permeate flow and pressure drop
  - Changes in 10%-15%
  - Frequent cleaning damage the membrane
  - Without proper cleaning, RO membrane will be permanently fouled.

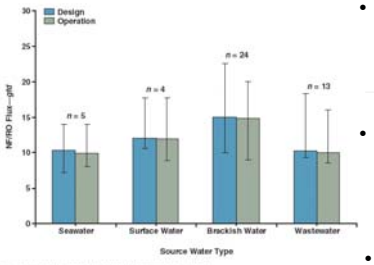
03 Rejection of Organics by RO

- Separation mechanisms
  - Size exclusion
  - Electrostatic interaction
- Non-ionic small MW organics cannot be successfully removed by RO
  - Some EDCs, PhACs
  - NDMA (N-nitrosodimethylamine): 30~40%



03 Energy Usage

High pressure leads to high energy consumption



n—number, NF—nanofiltration, RO—reverse osmosis

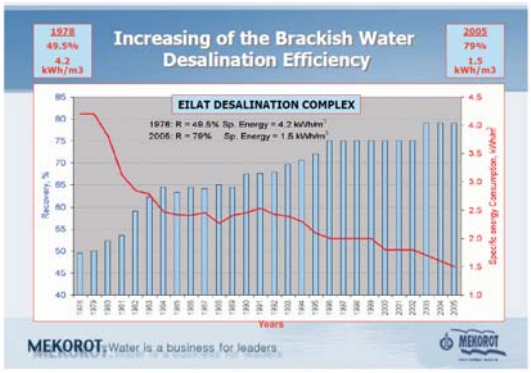
Only 46 of the 62 plants surveyed provided information for this parameter. Color bars indicate median of the reported values. Narrow bars indicate range

1 GFD = 1.698 LMH

Source: Burbano, AWWA, 2007

- Flux
  - Desalination: 13~24 LMH
  - Brackish RO: 14~34 LMH
  - Wastewater: 15~25 LMH
- Pressure
  - Desalination: 50~70 bar
  - Brackish RO: 7~40 bar
  - Wastewater: 7~20 bar
- MF/UF
  - Flux: 40~80 LMH
  - Pressure: 0.2~1.5 bar
  - Permeability 100 times

03 Development of RO Technology



03 Cost

Recycled Water Rates

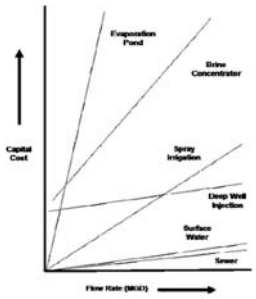
Baseline MWD:	**0.47 $/m³**
1. Tertiary:	~25% - 40% Discount
2. Nitrified:	~20% Discount
3. Softened RO:	~10% Discount
4. Single RO:	2 times
5. Double RO:	2.5 times

High revenues

May 12th, 2010 > Water Reuse: Global Trends and Challenges

03 Treatment of RO Concentrate

- Substantial amount of concentrate is produced
- Concentrate management
  - Ocean Disposal
  - Deep Well Injection
  - Road Spray and Dust Control
  - Landfill Disposal
  - Seawater Reverse Osmosis
  - Evaporation
- Concentrate management is difficult and expensive



04 Case Studies

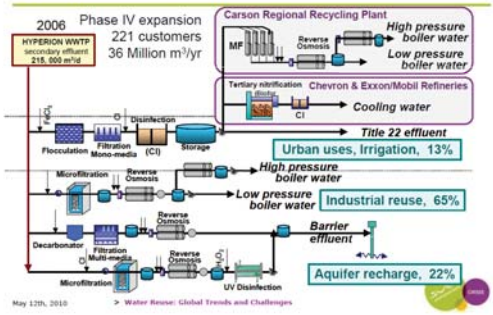
04 Case Study in U.S.A.: West Basin

West Basin Water Recycling Plant, California

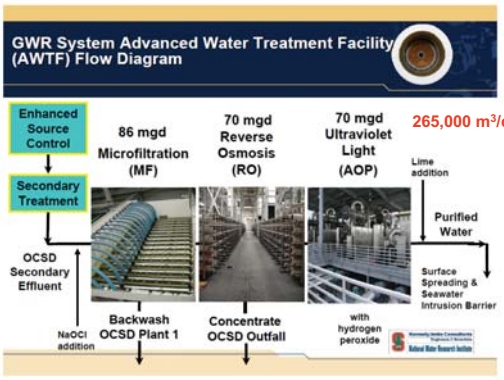
- Industrial
  - ✓ Refineries
  - ✓ Boiler feedwater
  - ✓ Cooling tower water
- Irrigation
  - ✓ Landscape (medians, golf courses, etc.)
- Commercial
  - ✓ Toilets & urinals
  - ✓ Hospital use (i.e. x-ray machines)
- Seawater Barrier

04 Case Study in U.S.A.: West Basin

West Basin Water Recycling Facility
Treatment Trains and Satellite Plants

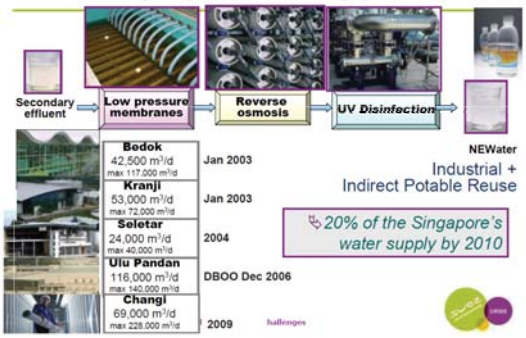


04 Case Study in U.S.A.: GWR



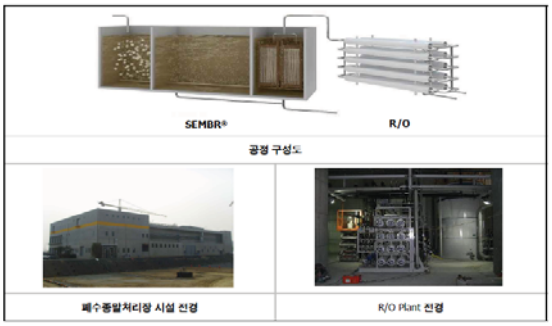
04 Case Study in Singapore: New Water

Advanced Membrane Treatment
NewWater recycling facilities in Singapore

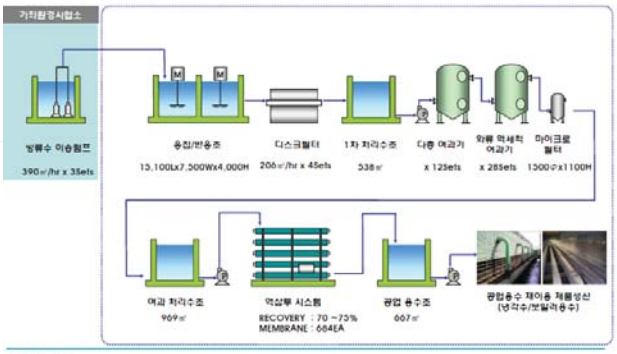


04 Case Study in Korea: Tangjeong

- 탕정 T.C 지방산업단지 폐수종말처리장 심플텐트 사업화 (55,000톤/일 규모, 1,205억원)
- 탕정 T.C 지방산업단지 폐수종말처리장 R/O Plant (2,000톤/일 규모)



04 Case Study in Korea: Incheon Gajoa

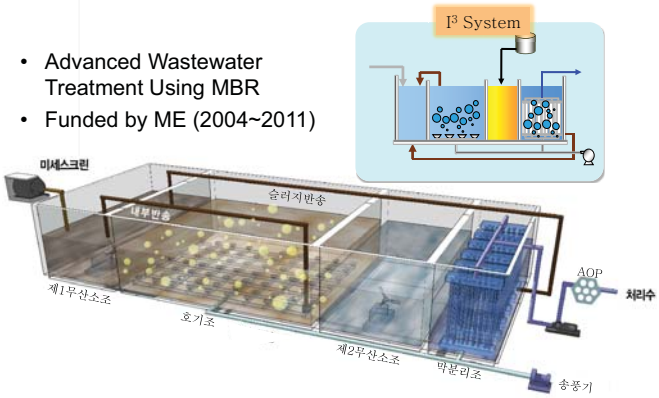


04 Case Study in Korea: Incheon Gajoa

항 목	단 위	Raw water 원수 수질	Product water 생산 수질	Discharge Limit 방류수질	Drinking Water 상수도 수질
Flow rate	톤/일		14,000	-	-
PH	-	6.8	6.5	7.0~7.5	5.8~8.5
COD	ppm	11	<3	50 이하	5
SS	ppm	11	<1	5 이하	1
TDS	ppm	1000	<50	-	<100
경도	ppm	<200	<10	-	<100
Cl	ppm	1,700	3	-	<50
BOD	ppm	10 ~ 20	0	20 ~ 30	-
T/N	ppm	20 ~ 30	<1	20 ~ 40	-
T/P	ppm	0.5 ~ 1.5	0	0.5 ~ 1.0	-

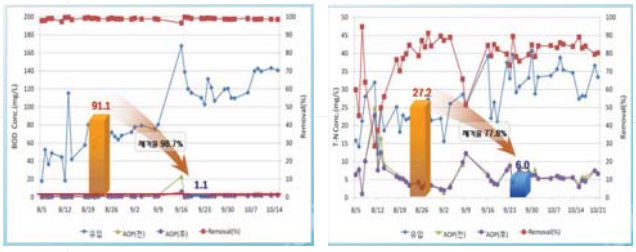
04 Case Study in Korea: I3 System

- Advanced Wastewater Treatment Using MBR
- Funded by ME (2004~2011)



04 Case Study in Korea: I3 System

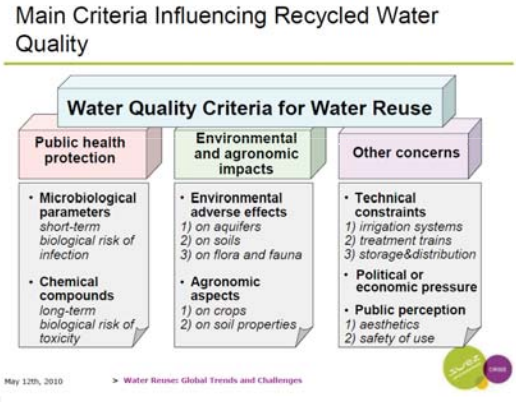
- Water Quality



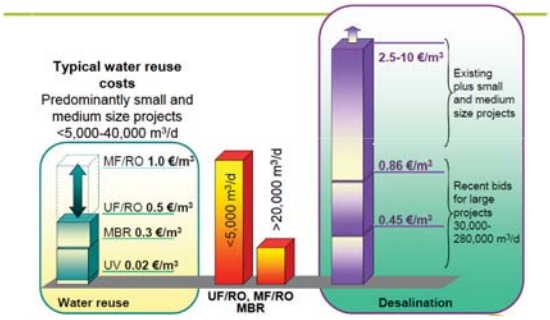
- COD_{Mn} Removal: 96%
- TP Removal: 78 %

05 Issues to Be Addressed

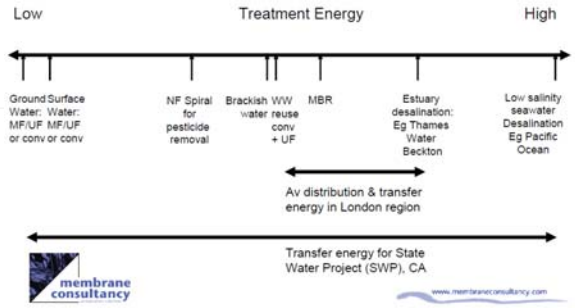
05 Water Quality



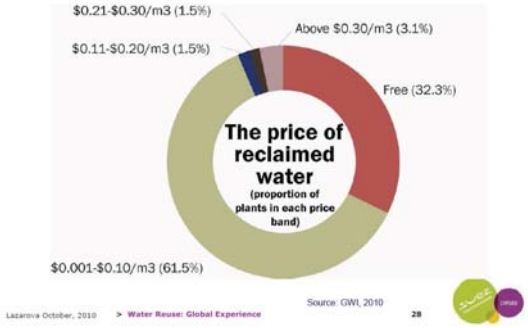
05 Treatment Cost



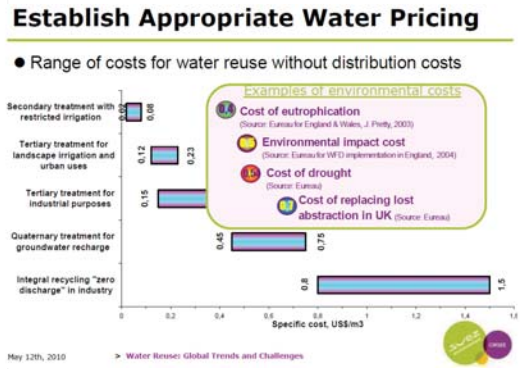
05 Selection of Proper Technology



05 Water Pricing

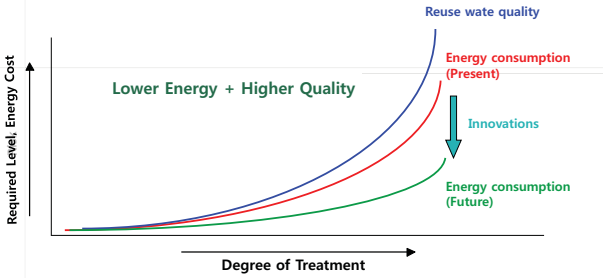


05 Water Pricing



05 Innovations in Technology

IT Convergence + Novel Materials + Optimization = Low Energy, High Efficiency



05 Standardization of Wastewater Reuse

- **What should be standardized?**

- Water Quality Suitability
- Reclaimed Wastewater Tariff
- Wastewater treatment plants: design, construction, operation and maintenance requirements
- Treated wastewater distribution and storage systems: design, construction, operation and maintenance requirements

Thank you very much

sanghlee@kookmin.ac.kr

International Workshop on Reclaimed Water Use in Urban Area -From Water Quality to Water Safety Management for Water Reuse-
held on January 10, 2012 at Kitakyushu International Conference Center

Global Challenge for Reclaimed Wastewater Use –From Water Quality to Water Safety Management for Water Reuse–

Panel Discussion

- Coordinator: Prof. H. TANAKA (Kyoto University)
- Panelist: Prof. H.Y.HU (Tsinghua University)
- Prof. S.H. LEE (KookMin University)
- Mr. E. TAKASHIMA (Director, MLIT)
- Mr. F. TANAKA (Director of International Water Business, City of Kitakyushu)
- Mr. K. SHINODA (Director of Sewerage, City of Fukuoka)
- Dr. O. FUJIKI(Co-chairperson, Japanese Mirror Committee of ISO/TC224)

- Discussion Points 1
- アジアでの水資源管理、水環境管理に再生水の利用は大きな役割を担うと期待されるが、どのような技術や研究を推進すべきか？
- What technologies and research should be developed for promotion of water reclamation and reuse practices in Asia where water reclamation and reuse is really expected important roles in waster resources management and water environmental management?

- Discussion Points 2
- 再生水の利用を推進するために、質的改善を図かり、コスト（エネルギー）を下げることも必要と考えられるが、どのような社会条件や制度の導入が有効か？
- What condition and/or institutions should be introduced for co-solution of water quality improvement and cost(energy)-saving when water reclamation and reuse is promoted extensively?

- Discussion point3
- 日本、中国、韓国の3カ国での下水道、特に再生水利用での技術協力を推進することは、どのような分野で有効で重要と考えるか？
- What technical collaborations among three states, China, Korea and Japan are effective and/or important in the field of wastewater, particularly water reclamation and reuse?

Reclaimed Wastewater Use

International Standardization Activities and Current State in Urban Area in Japan

Eijiro Takashima
Director for Watershed Management
Sewerage and Wastewater Management Department
Water and Disaster Management Bureau
Ministry of Land, Infrastructure, Transport and Tourism

国土交通省
Ministry of Land, Infrastructure, Transport and Tourism

1. International Standardization Activities for Reclaimed Wastewater Use

Significance of Creating International Standards Related to Reclaimed Wastewater Use

Water shortage is a crucial issue in many Asian cities where rapid economic growth and the concentration of population and industries are in progress.

Many of those cities are accelerating sewerage development for the purpose of the protection of public health and water pollution control and now, treated wastewater is getting highlighted as an alternative water resource.

To resolve water problems that occur not only in the Asian region but globally, it is important to promote the creation of international standards for recycled wastewater technology to enable for the stable usage of water, **under the initiative of the three countries of China, Korea and Japan.**

ISO/PC 253 Treated Wastewater Reuse for Irrigation

- Inaugurated as a PC (Project Committee*) in 2010 based on a proposal by Israel
- Standards/guidelines "Utilization of Treated Water for Irrigation" is being formulated

* Temporary committee established for creating certain standards. Will be disbanded after creation of standards.

Scope of Application of "Utilization of Treated Water for Irrigation"

- International standards related to usage of treated wastewater for irrigation that take into consideration health, the environment, agriculture, etc.
- Design of the sewage treatment plant and process are outside of the scope of application
- Objective is to prescribe "performance that is necessary for usage of treated wastewater for irrigation"
- Major items in draft international standards (as of the current stage):
  - Water quality standards for treated wastewater for various intended uses
  - Procedures that should be taken to prevent or minimize the effects of the use of treated wastewater on people's health and the environment, as well on surface stream water, groundwater, air quality, soil quality, and crops

Linkage among China ,Korea and Japan, through the Northeast Asia Standards Cooperation Forum

○ **Northeast Asia Standards Cooperation Forum**
Promotes cooperation in standardization activities among the three countries of China, Korea, and Japan, with the objective of contributing to continued standardization activities in the Asian region, by making shared approaches toward the development of an infrastructure for global standardization, development of standard specifications, joint proposals, and popularization of standard specifications.

⇒ Based on the movements, etc. of ISO/PC 253, it was agreed upon in the 9th Northeast Asia Standards Cooperation Forum held in July 2010 in Japan (Toyama City) to promote global standardization of standards related to usage of treated wastewater in cities based on **linkage with China and Korea**.

Northeast Asia Standards Cooperation Forum (July 20, 2010; Toyama)

Northeast Asia Cooperation Forum Concerning Reclaimed Wastewater Use in Urban Area

○ Based on the agreement made in the Northeast Asia Standards Cooperation Forum, "the meeting of Reclaimed Wastewater Use in Urban Area" (RWUUA) was launched for the purpose of promoting cooperation among the three countries of China ,Korea and Japan in standardization activities

○ Participants included the Director for Watershed Management from the Ministry of Land, Infrastructure, Transport and Tourism representing Japan; the China Ultraviolet Disinfection Association representing China; and Korea Water and Wastewater Works Association representing Korea.

○ The first meeting was held in March 2011 (Tokyo) and the second meeting was held in June (Busan). Information was exchanged regarding water quality standards and the state of reclaimed wastewater use in each country, response to ISO/PC 253, and future approaches toward standardization

January 11, 2012 3rd meeting (Kitakyushu City)

2nd meeting of Reclaimed Wastewater Use in Urban Area, Northeast Asia Standards Cooperation Forum (June 2011, Pusan)

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2. Current State of Reclaimed Wastewater Use in Urban Area in Japan

Background ～Water Resources in Japan～

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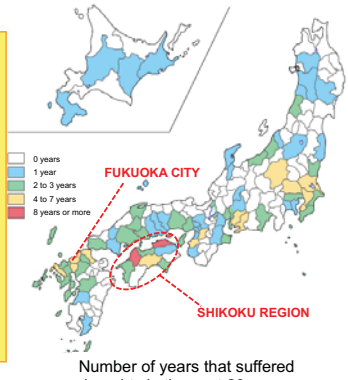
In Japan, the importance of wastewater reclamation was acknowledged through our experience of serious droughts.

- In Fukuoka City, which suffered large-scale damages from drought in 1978, and in various cities in the Shikoku region, which is plagued by chronic water shortage, there is active use of treated wastewater.

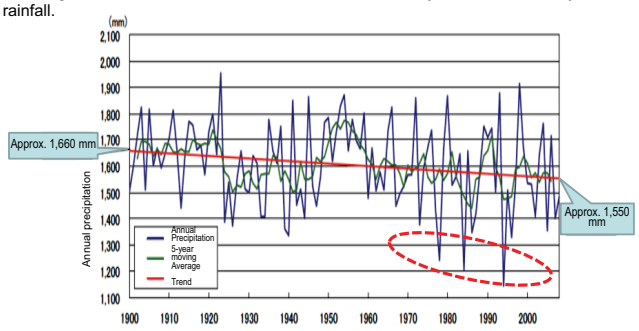
Low rain in recent years, increase in fluctuation width of annual precipitation, decrease in snow, etc. are causes for worry in relation to stable water supply



Number of years that suffered droughts in the past 20 years

Increased risk of Droughts due to Climate Changes

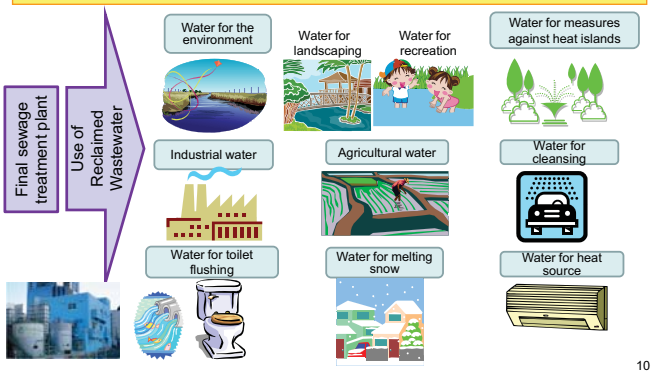
Due to climate changes, there is an increased risk of droughts in addition to an increased risk of flooding. Over the past 100 years, annual precipitation has been on a declining trend. There is also an increase in the number of years with extremely small rainfall.



(Note) Created by the Water Resources Department in the Ministry of Land, Infrastructure, Transport and Tourism based on materials from the Japan Meteorological Agency

Multitude of Potentials and Effects of Reclaimed Wastewater

- "Reclaimed Wastewater" has a great deal of potential, such as the creation of sound water cycles and favorable water environments, sustainable water source functions, contribution to enriched town development, etc.
- In continuous town management, promoting the use of reclaimed wastewater is important.



Use of Reclaimed Wastewater in Japan

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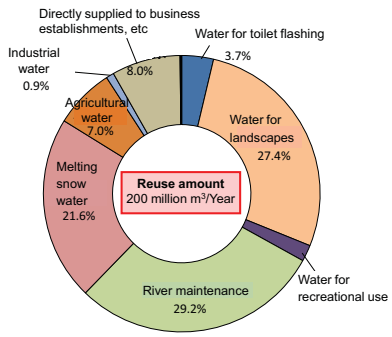
- In Japan, about 200 million m^3 of the annual treated wastewater (14.4 billion m^3) is recycled.
- Of the reclaimed wastewater, about 60% is used as enviroment water (i.e. for landscape, river flow, recreational use, etc.)

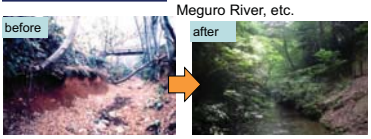


Breakdown of use of treated wastewater (FY 2009)

Applications of Reclaimed Wastewater in Large Cities (Tokyo)

River maintenance

Water source for revival of Meguro River, etc.



Miscellaneous waters

Water for toilet flushing in West-Shinjuku and Nakano Sakaue areas, etc.

Conventional activated sludge process plus advanced wastewater treatment process

Miscellaneous waters

Cleansing water for train systems, YURIKAMOME

Recreational Use

Ochiai Water Reclamation Center SESERAGI NO SATO

Tokyo Metropolis
[Population:8.45 million]

Applications of Reclaimed Wastewater in Medium-Scale Communities

(Tadotsu Town)

Agricultural Use

Discharge into agricultural farm ponds：2000m³/day
(During June – September)

Conventional activated sludge process plus advanced wastewater treatment process

Recreational Use

recreational water ：20m³/day

Groundwater Recharge

Recharge to groundwater, the principal water source of Tadotsu Town：2000m³/day

Industrial Use of Reclaimed Wastewater (Sakai City)

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➢ Reclaimed wastewater from sewage treatment plant (advanced treatment) is used for a diverse array of intended purposes such as water for extinguishing fires, in addition to being supplied to groups of industrial companies

○Supply area: Sakaihama area, Sakai City; Approx. 300ha
○Supply target: All buildings and green space, etc. within the supply area
○Supply capacity: Daily maximum 34,000 m3

water line ← Membrane treated water
→ ozonated water

Water Quality Standard for Reclaimed Wastewater in Japan

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➢ "Manual for Water Quality Standard for Reuse of Treated Wastewater" (Ministry of Land, Infrastructure and Transport)
- This manual presents the water quality and facilities standards to secure sanitary safety and aesthetic appearance/amenity as well as to prevent trouble in facility functions. Also presents factors to consider when reusing treated wastewater.

Basic parameters	Standard application point	Flush toilet water	Spray water	Water for landscape	Water for recreational use
E. Coli	Reclamation facilities outlet	Not detected	Not detected	See the remark (Note 1)	Not detected
Turbidity		[Control target] 2 degrees or less	[Control target] 2 degrees or less	[Control target] 2 degrees or less	2 degrees or less
pH		5.8 to 8.6	5.8 to 8.6	5.8 - 8.6	5.8 - 8.6
Appearance		Not offensive	Not offensive	Not offensive	Not offensive
Chromaticity		－ (Note 2)	－ (Note 2)	40 degrees or less	10 degrees or less
Odor		Not offensive	Not offensive	Not offensive	Not offensive
Residual chlorine	Boundary of responsibility	[Control target] Free residual chlorine 0.1mg/L or combined residual chlorine 0.4mg/L or more	[Chlorine target] Free residual chlorine 0.1mg/L or combined residual chlorine 0.4mg/L or more	See the remarks (Note 3)	[Control target] Free residual chlorine 0.1mg/L or combined residual chlorine 0.4mg/L or more
Facility standard		Facilities equivalent to or more than the sand filtration facilities to be provided	Facilities equivalent to or more than the sand filtration facilities to be provided	Facilities equivalent to or more than the sand filtration facilities to be provided	Facilities equivalent to or more than the chemical precipitation +sand filtration facilities to be provided

[Remarks] (Note 1) Coliform counts of 1000CFU/100mL employed tentatively
(Note 2) Standard value to be set as required on the basis of request of users
(Note 3) Not specified because treatment other than chlorination may be done from a viewpoint of preserving the eco-system and the use of reclaimed water is based on requirement that no process will involve use of water that in contact with human beings.

Required Treatment Process for Achieving Water Quality Standards

In order to achieve water quality standards, additional treatment that corresponds to the usage purpose with respect to treated water is being implemented

Sand filtration + Ozonation
Sand filtration + Ultraviolet disinfection
Biofilm filtration + Ozonation
Chemical precipitation + Sand filtration + Ultraviolet treatment
MBR (Membrane bioreactor) etc.

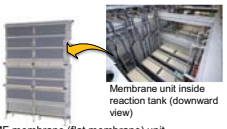
A-JUMP
(Advance of Japan Ultimate Membrane Bioreactor Technology Project)
The government-initiated project to demonstrate the validity of MBR to an actual system with model municipalities.(FY2009～2010)
model cases
①Introducing MBR to an existing treatment plant coordinating with reconstruction
②Satellite treatment using MBR※

※It is a process to treat wastewater from the pipe before reaching a sewage treatment plant for the purpose of reclaimed wastewater use.

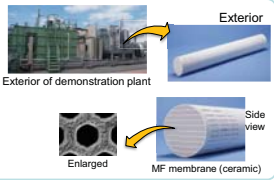
Diffusion and Promotion of Membrane Treatment Technology Oriented Towards Advanced Use of Reclaimed wastewater

Overview of A-JUMP

(1) Overview of renovated MBR demonstration project
○ Immersed MBR combined with biological phosphorous removal
○ Demonstration of the applicability of MBR based on remodeling and utilization of existing facilities
○ Review efficiency based on use of air-lift pumps, etc.
○ Advanced treatment using existing facilities is possible, without having to expand facilities
○ Significant reduction of power consumption is possible
○Treatment capacity: 5,000 m³/day
○Treatment method: Anaerobic-Anoxic-Oxic MBR



(2) Overview of satellite MBR demonstration project
○MBR using ceramic MF membrane
○Demonstration of applicability of MBR in satellite sewerage treatment
○Review operating efficiency such as of the establishment of high permeation flux that makes use of the characteristics of ceramic
○ Possible to ensure favorable treatment water quality that is adapted to reuse
○ Stable treatment even at pump locations, etc. is possible
○Treatment capacity: 360 m³/day
○Treatment method: Circulating nitrification-denitrification MBR



Results of A-JUMP
Are published as "Guidelines for Introducing Membrane Treatment Technology into Sewerage [2nd edition]"

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In order to supply reclaimed wastewater of the desired quality in a stable manner, it is important to
- evaluate the stability of sewage and reclaimed water quality
- evaluate the treatment process
- carry out appropriate safety management

From Water Quality to Water Safety Management

MLIT
Ministry of Land, Infrastructure, Transport and Tourism

Thank you
for your attention!!

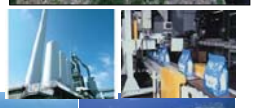

Potential of Membrane Treatment for Reclaimed Water

～A Project by Water Plaza Kitakyushu～


January 10, 2012
Fumihiko Tanaka, Manager
Overseas Water Business, Construction Bureau, Kitakyushu City

Introduction to Kitakyushu City

- Located at the northern tip of Kyushu at the western end of the Japanese Archipelago
  ⇒ Gateway to Asia
- Manufacturing city with a concentration of industries and technologies
  ⇒ Iron, chemicals, machinery, ceramics, ICs, etc.
- Rich natural surroundings ⇒ 210 km of coastline, 40% of city area is forested



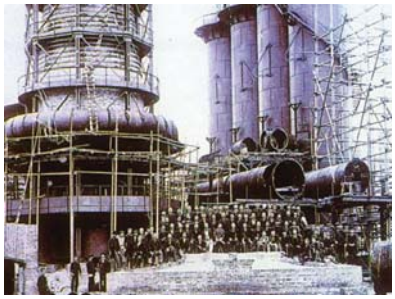
History of Industrial Development in Kitakyushu City (1)

◆ Japan's first modern steel mill constructed in 1901

Developed based on heavy industry and chemical industry, particularly steel and chemicals

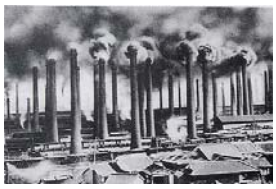
- Concentration of population
- Accumulation of companies

Driving force behind Japan's rapid economic growth



Pollution caused by industrial growth (1960s)

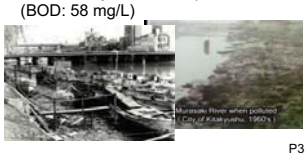
◆ Forest of chimneys and Japan's worst ash (108 t/km²)




◆ Sea of Death, Dokai Bay, where even Bacillus coli disappeared (DO: 0.6 mg/L, COD: 48.4 mg/L)


Dissolved propeller

◆ Turbid, filthy black river (Murasaki River) (BOD: 58 mg/L)



Initiatives to Defeat Pollution

Triggered by activities of the Women's Association, citizens, corporations, and officials worked together to take action to defeat pollution.

Citizens on a company tour

Movie produced by citizens

Citizens attending a lecture by a university professor

Citizens

Partnership

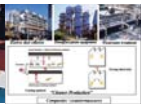
Officials

Corporations

Improving a sewage treatment plant

Strengthening regulations and monitoring

Signing a pollution prevention agreement



Development of CP technology

Kitakyushu after Restoration of the Environment

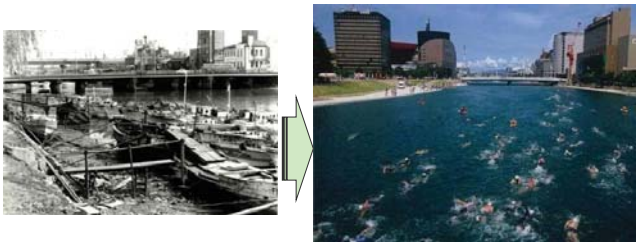
1960s

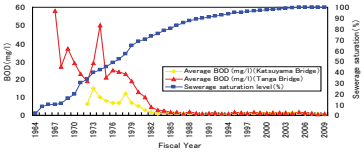
Today

Clear sky

110 species living in the ocean

Successful Improvement of Water Quality (Murasaki River)





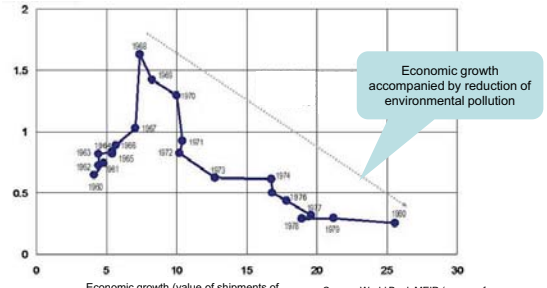
The spread of sewage treatment systems led to a sharp improvement in the water quality of the Murasaki River.

Sweetfish living in the restored clear flowing water

Simultaneous Environmental Measures and Economic Policies (Win-Win)

◆ Environmental load was reduced, yet economic growth continued.

Environmental pollution (sulfur oxides)
mgSO_3/100cm^2/day



Economic growth (value of shipments of manufactured products: 100 billion yen)

Source: World Bank MEIP (survey of experience in Japan)

Technologies which benefit the environment and the economy are useful for Asia

Examples of International Cooperation by Kitakyushu City, Taking Advantage of its Experience of Environmental Restoration

Environment Bureau:

◆ Dalian City in China

Environmental Model District Improvement Plan

Improvement of the atmosphere in Dalian City (1994 to 2000)

◆ Surabaya City in Indonesia

Composting kitchen garbage

Training on composting in Surabaya City

◆ Cities of Qingdao and Tianjin in China

Japan-China Recycling City Cooperation Project

Signing by the mayors of Kitakyushu and Tianjin (at the Prime Minister's Residence)

River cleaning in Cebu City

◆ Cebu City in the Philippines

Environmental education

Water Bureau:

◆ Phnom Penh City in Cambodia

Leakage control

Technical guidance in Phnom Penh

International Technological Cooperation by Kitakyushu City on Sewage Treatment Systems

■ Achievements in sewage treatment systems (1990 to 2010)

(1) Technological guidance (dispatching employees overseas)

[1] Advice on introducing sewage treatment system policies
[2] Guidance on controlling the operation of treatment plants and pumping stations
[3] Holding seminars

・**Long-term** (1 year or longer): 4 times (4 people), 3 countries
・**Short-term** (less than 1 year): 31 times (total of 48 people), 6 countries

(2) Training personnel (accepting overseas trainees)

[1] Lectures (city's independent curriculum) (Planning, design, maintenance, management, PR, etc.)
[2] Tours of treatment systems

・Frequency: 156 times (total of 1,612 people)
・Number of countries: 96

Seminar for citizens of Kunming City (2006)

Study and training in Kitakyushu City (lectures and visits to treatment plant)

■ Major cases in recent years

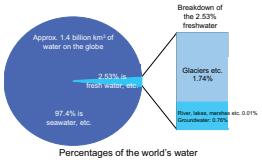
・Kunming City, Yunnan Province, China (from 2006, in cooperation with JICA)
・Saudi Arabia (from 2007, in cooperation with JICA and CGUS)
・Surabaya City in Indonesia (2007 to 2008, in cooperation with JICA and CLAIR)

State of Water around the World

◆ Absolute shortages: 0.01% of the world's fresh water is usable

◆ Increasingly severe pollution of water sources: rapid urbanization

◆ Rising water demand: 30% increase from 2000 to 2025 (In Asia, accounts for 30% of water drawn)



Percentages of the world's water

Expansion of the water business market (estimated by METI, approx. 87 trillion yen in 2025)

Project \ Business	Design, component supply, construction, consulting	Management/operating services	Total
Water supply	19.0 trillion yen	19.8 trillion yen	38.8 trillion yen
Desalinization of seawater, etc.	8.4 trillion yen	3.8 trillion yen	12.2 trillion yen
Sewage treatment	21.1 trillion yen	14.4 trillion yen	35.5 trillion yen
Totals	48.5 trillion yen	38.0 trillion yen	86.5 trillion yen (2007: 36.2 trillion yen)

Approx. 2.5 increase

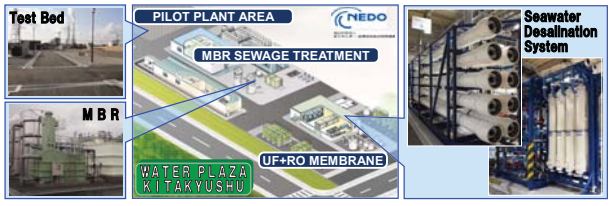
Water Plaza Kitakyushu

What is the Water Plaza?

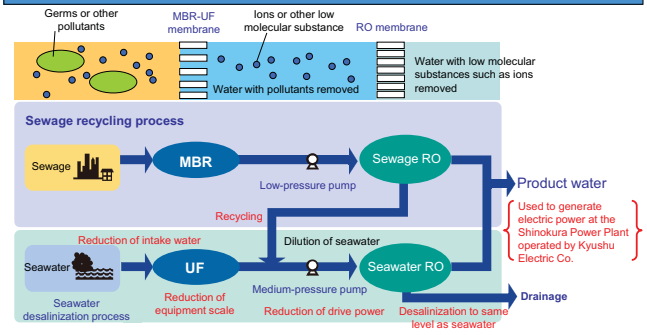
First in Japan

Facility designed to develop technologies, verify operations, and produce information on advanced water recycling systems.

- Consists of a pilot plant and a test-bed for full-scale testing.
  ＊Pilot plant: A new energy-efficient desalinization plant combining membrane treatment of sewage with desalinization of seawater
  - Desalinization capacity: approx. 1,400 m^3/day
  - Goal is energy-saving of 30% to 40% (from past level)
  ＊Test-bed: Corporations, etc. can install their machinery to simultaneously perform multiple tests.



Characteristics of the Water Plaza System



Various options to suit users' needs:

- Responds flexibly to required water quality and cost
- Modular equipment can be installed anywhere

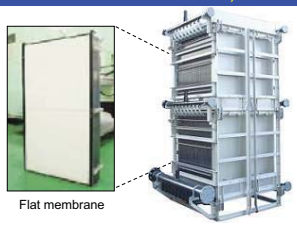
Irrigation water → Industrial water → Potable water
(quality/cost: low → high)

Membrane separation activated sludge method [MBR (Membrane Bioreactor)]

◆Characteristics

- Processing in a small space because no settling tank is needed
- Shorter processing time (standard activated sludge method: approx. 10 hours ⇒ MBR: approx. 6 hours)
- Can remove phosphorus and nitrogen, achieving advanced treatment
- Requires periodic chemical cleaning or replacement of the membrane (once every 8 to 10 years)

At the Water Plaza, two types of membrane (flat membrane, hollow fiber membrane) are used for testing.



Flat membrane

Hollow fiber membrane

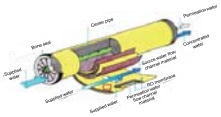
Reverse Osmosis (RO) Membrane

◆Characteristics

- Much energy is needed to pass water through a permeation membrane (pressure of about 5 MPa) ⇒ lowering the salinity saves energy (corroborative research by the Water Plaza)
- Bacteria, salt, dioxins, and other substances dissolved in water can be filtered ⇒ potable water quality

The Water Plaza uses world-leading 16-inch modules

Left: 16-inch module (diameter: 400 mm)
Right: 8-inch module (diameter: 200 mm)

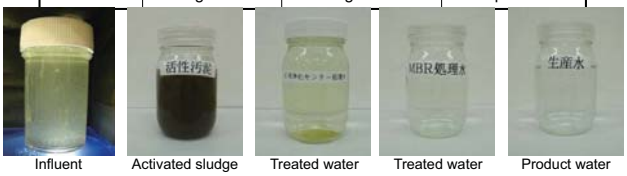


RO membrane module structure
(hole diameter: approx. 0.001μm)

Comparison of Treated Water Quality

Unit: mg/L

Type	Inflow water quality (sewage)	Treated water quality	
		Hiakari Sewage Treatment Plant	MBR
BOD	150	2.3	0.6
SS	164	2	ND
TN	27	14	***3.9***
TP	3.1	0.96	0.8
Remarks	Average in 2009	Average in 2009	Sept. 2011



Influent (sewage) | Activated sludge (MBR) | Treated water (Hiakari STP) | Treated water (MBR) | Product water

Concept of the Kitakyushu Water Hub

International business center for advanced water technologies centered on Water Plaza Kitakyushu

Adding the flavor of Kitakyushu:
Industrial tourism: Using the assets of a manufacturing city
Environmental education: Showing children the importance of conserving the environment and life

Range of Initiatives

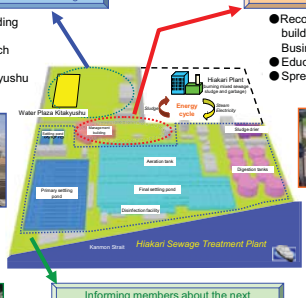
Promoting research, development and commercialization of advanced technologies

- Upgrading and expanding the test-bed
- Expanding the research fields
- Establishing the Kitakyushu brand

Supporting research and development by corporations

International development of the water business

- Reconstructing the management building and creating the Water Business Center (tentative name)
- Educating water experts
- Spreading information around the world



Opening showrooms

Conducting OJT study and training

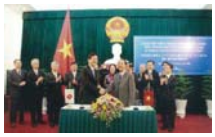
Informing members about the next generation of environmental technologies

- Providing places for relaxation amid abundant water and greenery
- Training environmental experts
- Linking with nearby facilities to publicize the treasures of the city

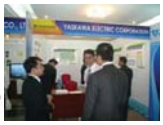
Creating a stream habitat for fireflies

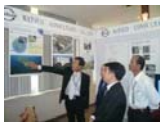
Installing an eco-house

Technologies from Kitakyushu City to the World







Kitakyushu City is the driving force of the water business in Japan

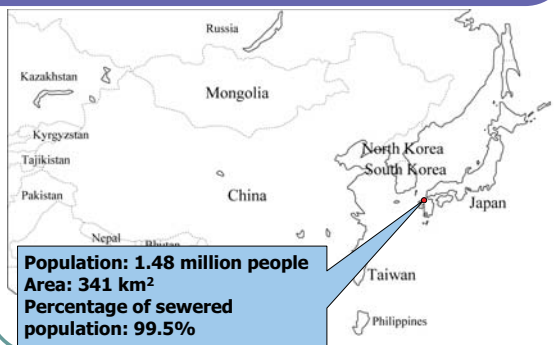
Reclaimed Water in Fukuoka City

Reclaimed Water Symbol

Road & Wastewater Bureau FUKUOKA City

Overview of Fukuoka City

1



Population: 1.48 million people
Area: 341 km²
Percentage of sewered population: 99.5%

1889: Fukuoka city is born (50,847 people)

Fukuoka City, Not Blessed with Water Resources

2

There are no large rivers in Fukuoka city

River in the city where the bottom is visible

	Annual precipitation (mm)	Gross annual precipitation per capita (m^3/year/person)
Japan	1,690	5,000
Fukuoka City	1,612	375

Heavy Drought in Fukuoka

3

	Annual precipitation (mm)	Number of days with water rationing	Number of water trucks sent out
1978	1,138	287	13,433
1994	891	295	0

Water trucks being sent out

Dam that became dried up due to drought

Development of the Water-Saving City

4

Outline of Measures Related to Water-Saving Water Use in Fukuoka City (Enforced in 1979)

4 pillars for "development of the water-saving city"

Raising awareness of water-saving

★ Average daily water supply per person 276 L/person/day (2010)

Large city in Japan Average 340 L/person/day (2010)

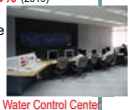
★ Citizens that possess awareness of water-saving 85.9% (2009 municipal government questionnaire)

Efficient supply of tap water

★ Water revenue ratio 95.8% (2010)

Large city in Japan Average 91.8% (2010))

Concentrated remote control of water pressure/flow rate based on motorized valves



Water Control Center

Popularization of water-saving devices

★ Popularization of water-saving faucets 95.9% (2010)

★ Popularization of water-saving toilet bowls

Popularization of general service water

☆ Use of reclaimed water (treated wastewater)

★Use of rainwater

Effective Use of Reclaimed Water (Treated Wastewater)

5

Treated wastewater is a valuable water resource within the city

"Utilization of Recycled Water Model Project"

Ministry Of Construction (Currently the Ministry of Land, Infrastructure, Transport and Tourism)

(1979)

First in the country to commercialize reuse of treated wastewater

June 1, 1980

Start of water supply

Background behind Recycled Water Project

6

1978 ・Major drought (287 days of water rationing)

1979 ・"Outline of Measures Related to Water-Saving Water Use in Fukuoka City"

・Started on "Utilization of Recycled Water Model Project"

Recycled water supplied to buildings with a total floor area of more than 5,000 m²

1994 ・Major drought (295 days of water rationing)

1998 ・Applicable buildings were expanded from at least 5,000 m² to at least 3,000 m²

December 2003 Enforcement of "Ordinance to Promote Water-Saving in Fukuoka City"

First in the nation to make usage of general service water mandatory

Recycled water supplied to buildings with a total floor area of more than 3,000 m²

Enforcement of "Ordinance Concerning "Utilization of Recycled Water Model Project"

Specifications regarding the usage method of recycled water (fees, etc.)

福岡市 FUKUOKA CITY

Ordinance to Promote Water-Saving in Fukuoka City (Enforced in December 2003)

7

Responsibility of citizens/business operators

Strive to effectively use water and save water

Responsibility of the city

Strive to prevent leakages, adjust water distribution, raise awareness regarding water saving, provide information on water-saving methods and water resources, stable supply of water

Approaches by the city

Necessary measures such as improving watershed conservation functions and linkages with water source regions and watershed areas

Promotion of general service water

Within districts where the installation of general service water is promoted, it is mandatory for business buildings with a total floor area of at least 3,000 m² (5,000 m² outside of the district) to use general service water for flush water for toilets

When applying for building certification, cities provide advice/guidance/orders for corrections

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Methods for General Service Water

8

(1) Wide-area circulation type (reclaimed water)

Treated wastewater is further treated and effectively used in the region

(2) Individual circulation type (circulation in the building)

Sewage water from within the building is treated and used as general service water

(3) Non-circulating type (use of storm water, etc.)

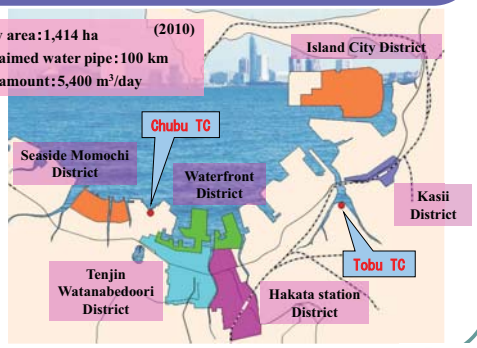
Storm water is stored within each building and used as general service water

福岡市 FUKUOKA CITY

The Service Area

9

Area of supply area：1,414 ha (2010)
Length of reclaimed water pipe：100 km
Water supply amount：5,400 m³/day



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Water Quality and Treatment Flow of Reclaimed Water

10

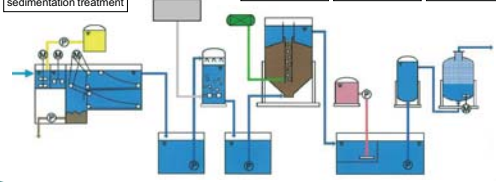
Water quality standards ("Manual on the Reclaimed Wastewater Quality Criteria" April 2005, Ministry of Land, Infrastructure, Transport and Tourism)

Reclaimed water (flush water for toilets)

E. coli	Turbidity	pH	External appearance	Odor	Residual chlorine
Not detected	2 degrees or less	5.8 to 8.6	Not offensive	Not offensive	0.1 free or 0.4 mg/l combined

Treatment flow

Coagulation sedimentation treatment → Ozone treatment → Sand filtration → Chlorination → Fiber filtration

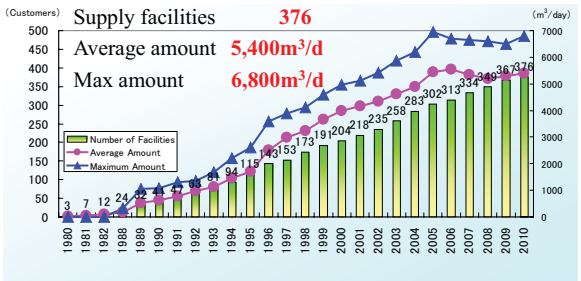


福岡市 FUKUOKA CITY

Number of Reclaimed Water Supply Facilities and Water Volume

11

2010
Supply facilities 376
Average amount 5,400m³/d
Max amount 6,800m³/d



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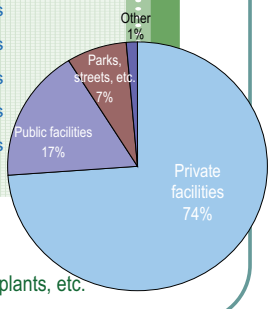
Supply Facilities

12

Private facilities	278 locations
Public facilities	65 locations
Parks, streets, etc.	28 locations
Housing complexes	5 locations
Total	376 locations

(2010)



Intended uses

Flush water for toilets, watering plants, etc.

福岡市 FUKUOKA CITY

Fee Comparison

13

Approx. 20% cheaper than using only clean water

(in the case of general office buildings)

When amount of water used is 4,000 to 9,000 m³/month

Annual difference is approx. 10 to 20 million yen (0.15～0.20 million USD)

(Comparative estimation where clean water: reclaimed water = 40:60 and 100% clean water)

Increase in capital investment for double piping, etc. and maintenance and operation costs, etc. can be sufficiently recovered through difference in fees

Unit price of water supply (FY2010)

Tap water (for business use)	456 yen/m³ (6 USD/m³)
Recycled water	307 yen/m³ (4 USD/m³)

福岡市 FUKUOKA CITY

Future Approaches for the Recycled Water Project

14

Increase the amount of reclaimed water

Currently, still at a usage of **approximately 1% of treated wastewater**

☆ Expansion of supply facilities/districts

Promote expansion of supply destinations and supply districts, and **supply recycled water to even more people**

☆ Expansion of intended uses

Currently, intended use is mostly flush water for toilets (more than 99%)

By developing new intended uses, an increase in the usage amount can be promoted

For example, linkage with greenery business such as rooftop gardening (environmental measures) and usage towards landscaping facilities such as Seseragi (natural, therapeutic water environments) (activities to raise awareness, etc.)

福岡市 FUKUOKA CITY

都市における再生水利用に関する国際ワークショップ
International Workshop on Reclaimed Wastewater Use in Urban Area

マネジメントシステム規格の潮流と再生水利用

Growing tide of management system standards and their potential for reclaimed wastewater use

10 January 2012

藤 木 修
Osamu Fujiki
ISO／TC224国内対策委員会共同議長
Co-chair, Japanese Mirror Committee for ISO/TC224

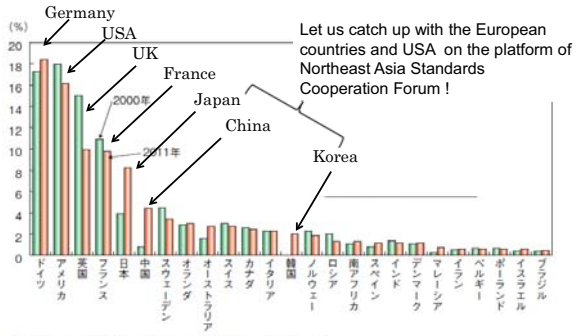
話題提供 Topics

1. 何故北東アジア標準協力フォーラムで協力するのか？
2. マネジメントシステム規格の潮流 － 世界市場で成長するための鍵
3. 何故マネジメントシステム規格に関与するのか？
4. マネジメントシステム規格の可能性 － 「水質から水安全マネジメントへ」の再生水利用マネジメントの範囲拡大

1. Why should we collaborate on the platform of Northeast Asia Standards Cooperation Forum?
2. Growing tide of management system standards – the key to thrive on the world market
3. Why should we commit ourselves to the management system standards?
4. Potential of management system standards to expand the scope of the management of the reclaimed wastewater use “from water quality to water safety management”

ISO 幹事国の配分状況

Distribution of ISO secretariats of TC and SC among countries



Let us catch up with the European countries and USA on the platform of Northeast Asia Standards Cooperation Forum !

（備考）1．財団法人日本規格協会「ISO/IEC事業概要」により作成。
2．ISO専門委員会（TC）及び分科委員会（SC）における幹事数を用いた。

平成23年度年次経済財政報告（2011年7月内閣府）

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ISO 専門委員会

ISO Technical Committee (TC)

○	1	ねじ	TC 1 Screw threads
○	2	締結用部品	TC 2 Fasteners
○	4	転がり軸受	TC 4 Rolling bearings
○	5	金属管及び管継手	TC 5 Ferrous metal pipes and metallic fittings
○	6	紙、板紙及びパルプ	TC 6 Paper, board and pulps
○	8	船舶及び海洋技術	TC 8 Ships and marine technology
○	10	製品技術文書情報	TC 10 Technical product documentation
○	11	ボイラ及び圧力容器	TC 11 Boilers and pressure vessels
○	12	量及び単位	TC 12 Quantities and units
	14	機械の軸及び附属品	TC 14 Shafts for machinery and accessories
●	17	鋼	TC 17 Steel

マネジメントシステム規格の増加 Emerging Management System Standards

○ 223 社会セキュリティ
○ 224 飲料水及び下水サービスに関する活動－サービス品質基準及び業務指標
○ 225 市場調査
226 一次アルミニウム製造用材料
● 227 ばね
228 観光及び関連サービス
○ 229 ナノテクノロジー
230 (PC)心理分析サービス
○ 231 (PC)ブランド価値評価
○ 232 人材育成と非公式教育サービス
234 漁業・水産・養殖
235 (PC)信用評価
○ 236 (PC)プロジェクトマネジメント
○ 237 (PC)展示会用語
238 固体バイオ燃料
239 (PC)公共料金の課金方法
○ 240 (PC)製品リコール
○ 241 (PC)道路安全マネジメント
○ 242 (PC)エネルギーマネジメント
○ 243 (PC)消費生活用製品安全
● 244 工業炉及びそれに関連する熱プロセ
245 (PC)中古品の越境貿易
246 (PC)偽装防止ツール
○ 247 (PC)不正防止対策及び管理
248 (PC)バイオエネルギーの持続可能な
○ 249 伝統的中国医療
○ 250 (PC)イベントマネジメントの持続可能性
○ *251* (PC)資産マネジメント
○ 252 (PC)自動車用天然ガス供給スタンド

○ **176** 品質管理及び品質保証
Quality management and quality assurance
○ **207** 環境管理
Environmental management
○ **223** 社会セキュリティ
Societal security
○ **224** 飲料水及び下水サービスに関する活動－サービス品質基準及び業務指標
Service activities relating to drinking water supply systems and wastewater systems - Quality criteria of the service and performance indicators
○ **236** (PC)プロジェクトマネジメント
Project Management
○ **242** (PC)エネルギーマネジメント
Energy Management
○ ***251*** (PC)資産マネジメント
Asset management

マネジメントシステム規格とは何か？
What is management system standards?

management system
system to establish policy and objectives and to achieve those objectives

Management system standards

Type A: management system requirements standard
standard that is intended to provide the market place with relevant specifications for the management system of an organization to demonstrate its capability to meet internal and external requirements
マネジメントシステム要求事項規格
組織が内部及び外部の要求事項を満たす能力を有することを実証するための組織のマネジメントシステムに関する規定要求事項を市場に提示することを意図した規格　⇒　**第三者認証の目的で使うことが可能**

Type B: management system guidelines standard
standard that is intended to assist an organization to implement and/or enhance its management system by providing additional guidance to the elements of a management system requirements standard, or stand-alone guidance with no equivalence to a management system requirements standard

Type C: management system related standard
standard that is intended to provide further information on specific parts of the management system or guidance on
related supporting techniques, in addition to management system standards

話題提供　Topics

1. **何故北東アジア標準協力フォーラムで協力するのか？**
2. **マネジメントシステム規格の潮流　－　世界市場で成長するための鍵**
3. **何故マネジメントシステム規格に関与するのか？**
4. **マネジメントシステム規格の可能性　－　「水質から水安全マネジメントへ」の再生水利用マネジメントの範囲拡大**

1. Why should we collaborate on the platform of Northeast Asia Standards Cooperation Forum?
2. Growing tide of management system standards – the key to thrive on the world market
3. Why should we commit ourselves to the management system standards?
4. Potential of management system standards to expand the scope of the management of the reclaimed wastewater use “from water quality to water safety management”

WTO/TBT協定のポイント

第2条
中央政府機関(Central Government Bodies)の強制規格（Technical Regulation）に関連する条項では、2.4において、国際規格を基礎として強制規格を実施することを義務づけ。
With respect to the Central Government Bodies, Members shall use relevant international standards as a basis for their Technical Regulations.

第4条
任意規格(Standards)の制定に関する条項では、4.1において、加盟国に対し、中央標準化機関(Central Standards Bodies)の規格制定等に関する適正実施規準(Code of Good Practice)の受入れ確保を義務づけ。
Members shall ensure that their Central Government Standardizing Bodies accept and comply with the Code of Good Practice (referred to as "CGP") for the Preparation, Adoption and Application of Standards

附属書3
任意規格の制定等に関する「適正実施規準(CGP)」では、標準化機関が規格制定の際に満たすべき手続等を規定
貿易の障害となるような規格制定を回避
国際規格を基礎とした任意規格の制定
国際規格制定への積極的参画

政府調達に関する協定

第六条 技術仕様
1　機関の定める技術仕様であって、品質、性能、安全、寸法等の調達される産品若しくはサービスの特性、記号、専門用語、包装、証票及びラベル等又は生産工程及び生産方法について規定したもの並びに機関の定める適合性評価手続に係る要件は、国際貿易に対する不必要な障害をもたらすことを目的として又はこれをもたらす効果を有するものとして、立案され、制定され又は適用されてはならない。
2　機関は、技術仕様については、*適当な場合には*、
(a) デザイン又は記述的に示された特性よりも性能に着目して、また、
(b) 国際規格が存在するときは当該国際規格、国際規格が存在しないときは国内強制規格、認められた国内任意規格又は建築規準に基づいて定める。

Agreement on Government Procurement

Article VI: Technical Specifications
1. Technical specifications laying down the characteristics of the products or services to be procured, such as quality, performance, safety and dimensions, symbols, terminology, packaging, marking and labeling, or the processes and methods for their production and requirements relating to conformity assessment procedures prescribed by procuring entities, shall not be prepared, adopted or applied with a view to, or with the effect of, creating unnecessary obstacles to international trade.
2. Technical specifications prescribed by procuring entities shall, ***where appropriate***:
(a) be in terms of performance rather than design or descriptive characteristics; and
(b) be based on international standards, where such exist; otherwise, on national technical regulations, recognized

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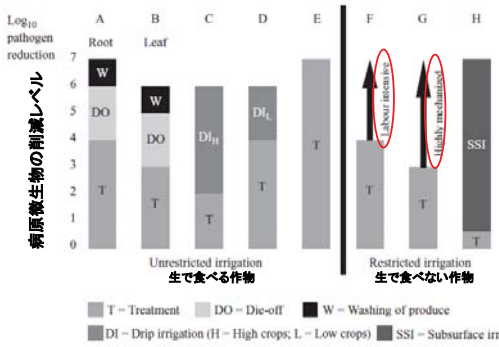
水不足、健康リスク、経済性等を総合的に勘案した排水・し尿の有効利用

WHO GUIDELINES FOR THE SAFE USE OF WASTEWATER, EXCRETA AND GREYWATER Volume 2
Wastewater use in agriculture



水源から使用までの水のチェーンとそのマネジメント
Management of water chain from water sources through use

水源（下水・雑排水・雨水等） ⟸ Management of water source portfolio
Water sources
(black water, grey water, rainwater, etc.)

⇩

排水の再生処理 ⟸ Management of water reclamation and effluent water quality
Wastewater reclamation

⇩

配水システム ⟸ Management of distributed water quality
Distribution system

⇩

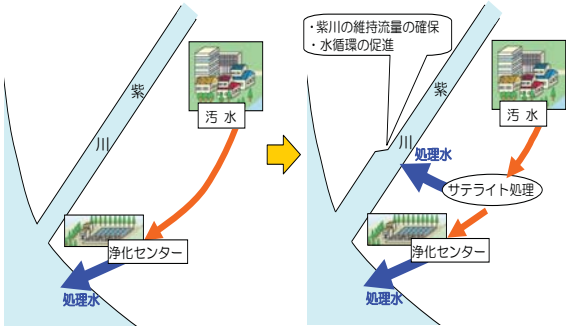
使用・消費 ⟸ Management of reclaimed water use
Application, use and consumption

ご清聴ありがとうございました。
Thank you for your attention!

Plenary meeting of ISO/TC224 in Vienna, May 2011

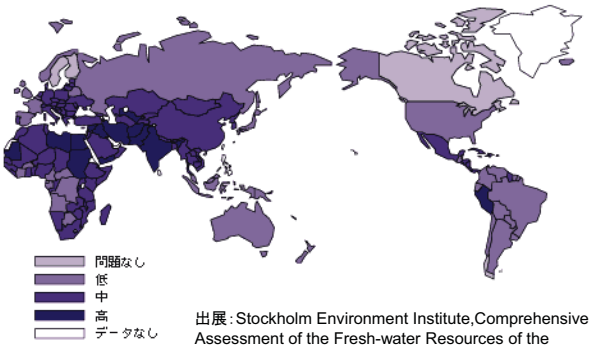
Application of MBR（Reconstruction of Hiagari STP）

Application of MB（Satellite STP）



Reclamation of Water Circulation in Murasaki River

Risk of Water Resource Shortage



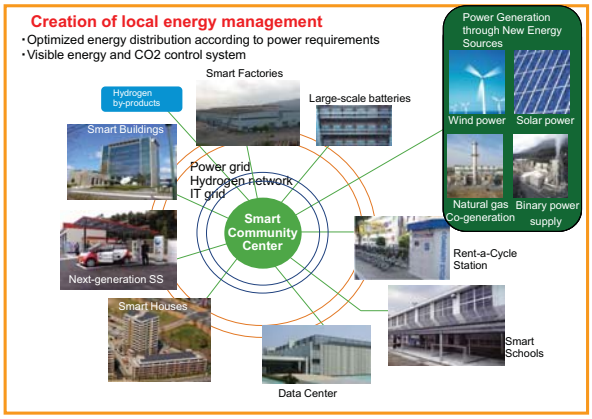
出展：Stockholm Environment Institute,Comprehensive Assessment of the Fresh-water Resources of the World,1997

Development of Eco-Business in Asia

Establishment of “Kitakyushu Asian Center for Low Carbon Society” (Asia Green Camp), the country’s first, with an objective to promote low-carbon societies and create environmental business in Asia

Hiroshi Komiyama, President
(Former President, Tokyo University)

Energy Business



Kyoto University HSE Technical Report Series 194

International Workshop on Urban Water Reuse

都市における再生水利用に関する国際ワークショップ

Date: January 10th, 2012

Location: International Conference Room , Kitakyushu International Conference Center

Hosted by: Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
City of Kitakyushu
Kyoto University Global COE Program - Global Center for Education and Research on Human Security Engineering for Asian Megacities
Kyoto University CREST Program - Development and Evaluation of Water Reuse Technologies for the Establishment of 21st century type Water Circulation System

Office Address: C1-3-182, Katsura Campus, Kyoto University, Nishikyo-ku, Kyoto, 615-8540, Japan

Kyoto University Global COE Program
Global Center for Education and Research on
Human Security Engineering for Asian Megacities

京都大学グローバル COE プログラム
アジア・メガシティの人間安全保障工学拠点