

資料 6

資料 6 アラブ首長国連邦水インフラセミナー配付資料

# Sewerage System Solutions in Osaka City

— Contribution to Global Water and Environment Management —

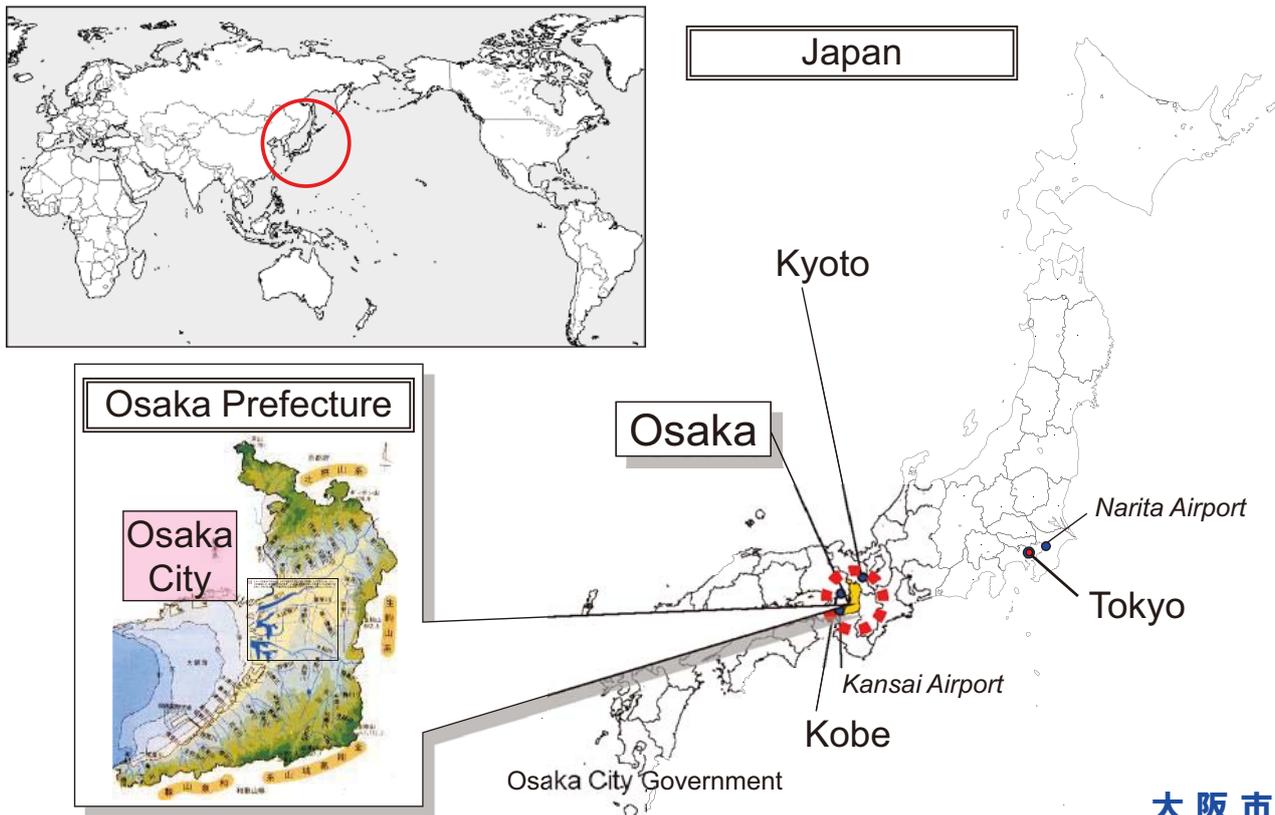
Hiroshi SHIROI  
Director for Water and Environment  
Public Works Bureau, City of Osaka

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  - 3.3. Osaka Water & Environment Solutions Association (OWESA)

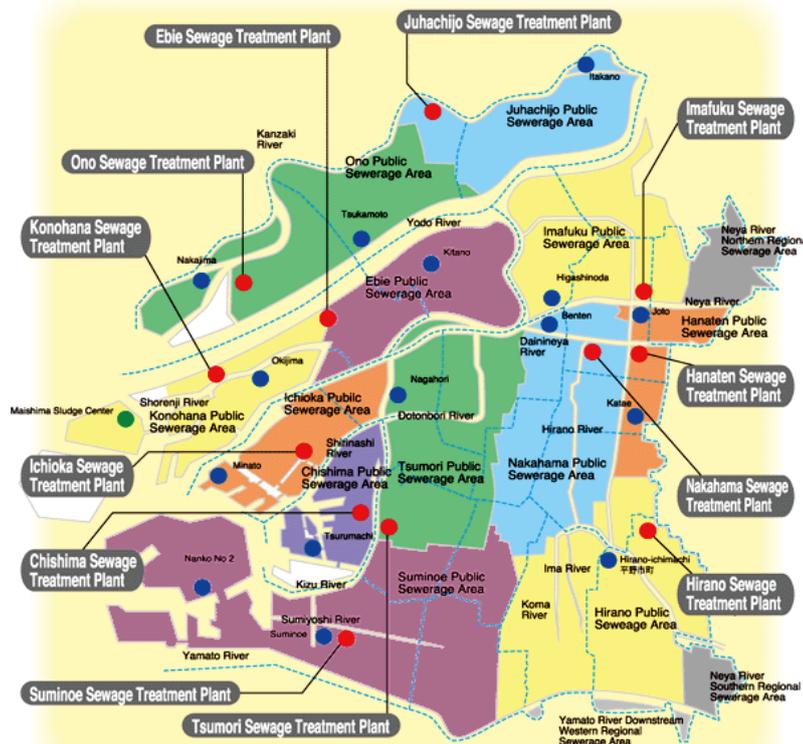
# 1. Brief Outline of Sewerage System in Osaka City

## Location of Osaka City



- Regional sewerage area unit
- Sewage Treatment Plant
- Main Pumping station
- Maishima Sludge Center
- Administrative boundaries

## Sewage Treatment Plant in Osaka City



## Statistics of Osaka City Sewerage System

(As of March 31,2011)

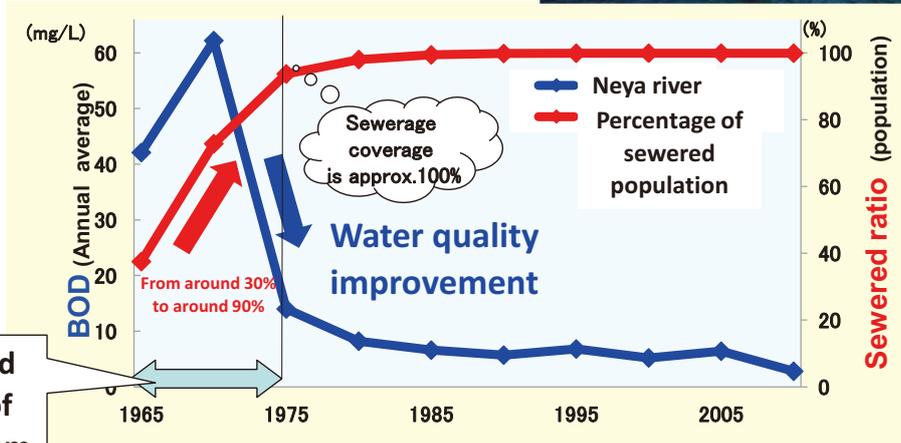
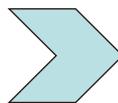
Total population (persons)	2,666,371
Total daytime population (persons)	3,581,675
Served Area (km <sup>2</sup> )	190.5
Proportion of population served by sewerage (%)	99.9
Total sewer length (km)	4,877
Number of sewage treatment plants (stations)	12
Sewage treatment capacity (m <sup>3</sup> /day)	2,844,000
Average volume of wastewater treated(m <sup>3</sup> /day)	1,761,027
Number of pumping stations (stations)	57
Drainage capacity (m <sup>3</sup> /sec.)	1,330

## 2. Development and Upgrade of Sewerage System

to cope with

Rapid Economic Growth and Urbanization

## Environmental Restoration by Sewerage System



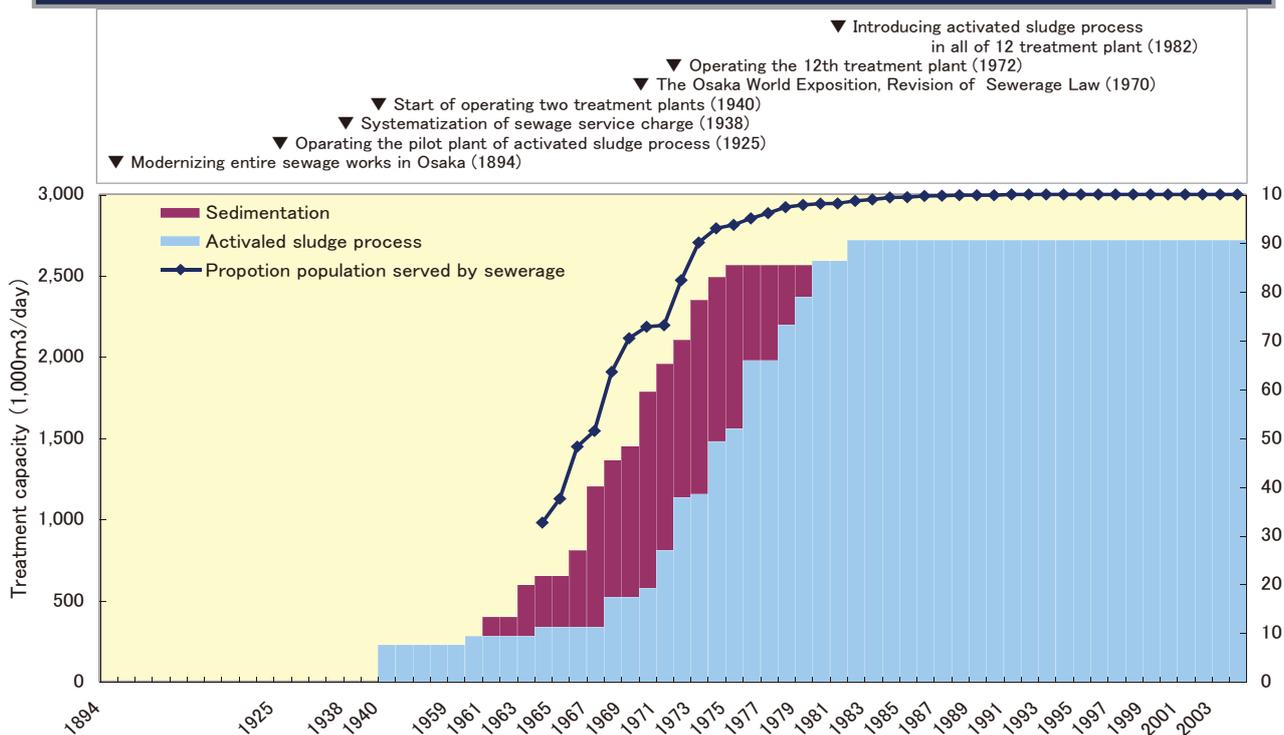
10years of rapid development of Sewerage system

# Osaka's Basic Policy of Sewerage Development

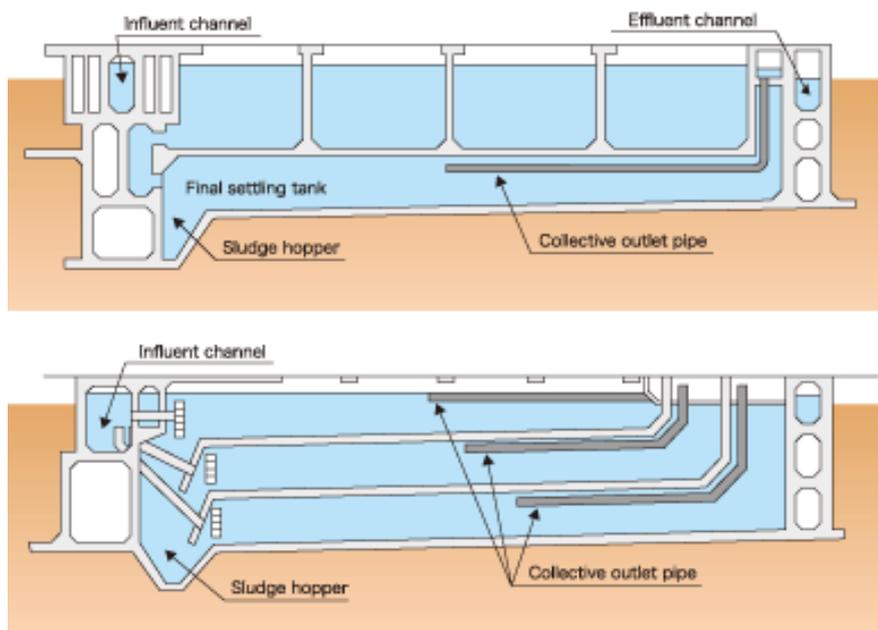
Stepwise upgrading of treatment in accord with the economic development and the budget constraints



## Development Process of Sewerage System in Osaka City



## Examples of Multi-story Wastewater Treatment Facilities



Area required for wastewater treatment ( $\text{m}^2/\text{m}^3$ )

Japanese Average :  $0.8 (\text{m}^2/\text{m}^3)$       Osaka City :  $0.27 (\text{m}^2/\text{m}^3)$

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### 3. Current and Future Activities to offer Solutions

- 3.1. Cooperation for Capacity Development
- 3.2. Promotion of “Technology Showcase”
- 3.3. Osaka Water & Environment Solutions Association (OWESA)

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## 3.1. Cooperation for Capacity Development



- Sewerage O&M and Urban Drainage (FY1991~)  
(selected 10-14 countries)
- Sewerage Management for Vietnam
- Counterpart Training for “Capacity Development on  
Sewerage Management (Phase 2) for Ho Chi Minh City

<Training Items>

Finance, Planning, Design, O&M, Asset Management,  
Public Relations, etc

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## 3.2. Promotion of “Technology Showcase”

R&D and PR activity  
by cooperation between the public and private sectors

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# Research and Development for Technologies Portfolio

## ● Energy / Resource Recovery

◆ Digestion Gas power generation



Tsumori STP

◆ Sewage sludge fuel production



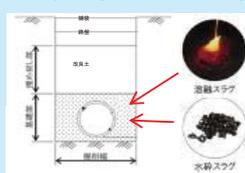
Hirano STP

◆ Photovoltaic Power generation



Jyuhachizyo STP

◆ Recycling of molten slug



Maishima Sludge center / Hirano STP

◆ Phosphorous recovery



Ono STP

## ● Variety of Sewerage Technologies

◆ Flood Control



Stormwater Reservoir



Rainfall radar (X-MP)

◆ Sludge Treatment



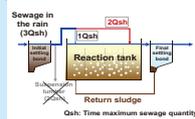
Centralized Sludge melting treatment

◆ Sludge digestion

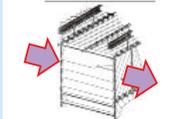


High Concentration thermophilic digestion

◆ CSO Control



3W treatment Process



Inclined Plate Settler

◆ Management system



Sewage Pipe management information system

◆ Pipe Rehabilitation



Pipe Renovation

# OSSH (Osaka Sewerage Solutions Hub) as the Center for PR

## ■ Information and dissemination

<Sewerage Science Museum>



Heat exchange system using raw sewage



Exhibition for dissemination



Seminar Room

In 1995, Sewerage Science Museum was established in commemoration of the 100<sup>th</sup> anniversary of the modern sewerage system in Osaka city. It offers lots of touchable exhibits, mini theaters, games, and ride, etc. They provide visitors with an in-depth look at how sewage is treated, the history of sewerage system in the city, as well as information on Global environment conservation.

## ■ R & D of sewerage technology

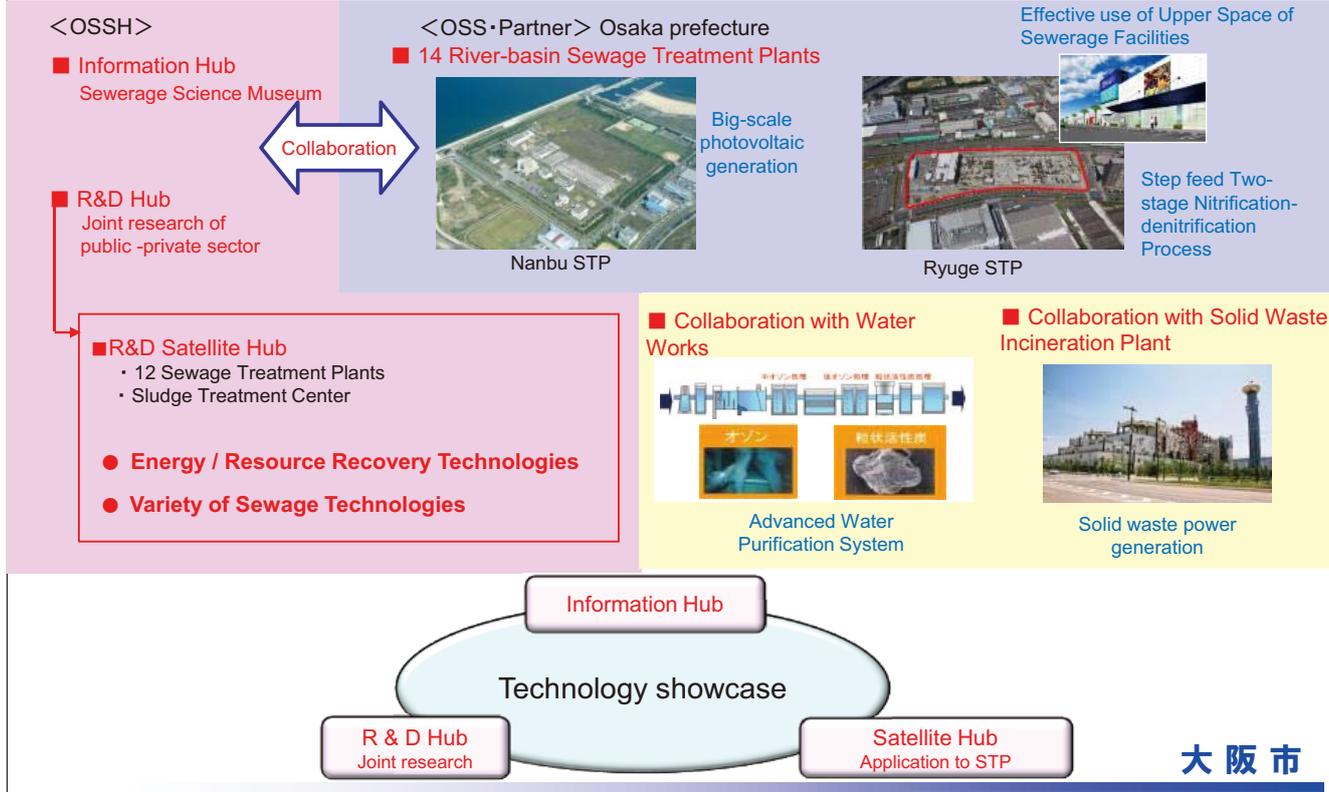
<Technology development Center>



Nakahama STP

Technology Development Center aims to put emerging sewerage technologies into practice as well as human resource development. It provide available space and resource for research group comprising academic, business and government

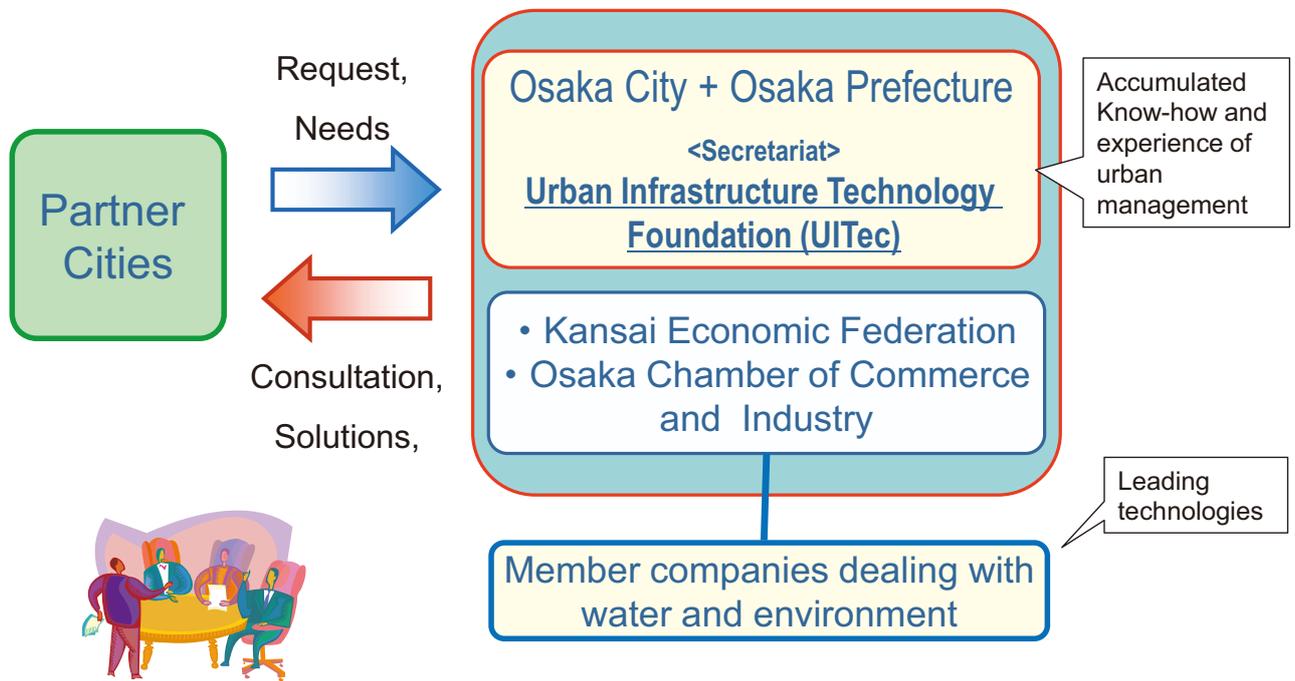
## Cooperative Framework of OSSH (Osaka Sewerage Solution Partners)



## 3.3. Osaka Water & Environment Solutions Association (OWESA)

# Osaka Water & Environment Solutions Association

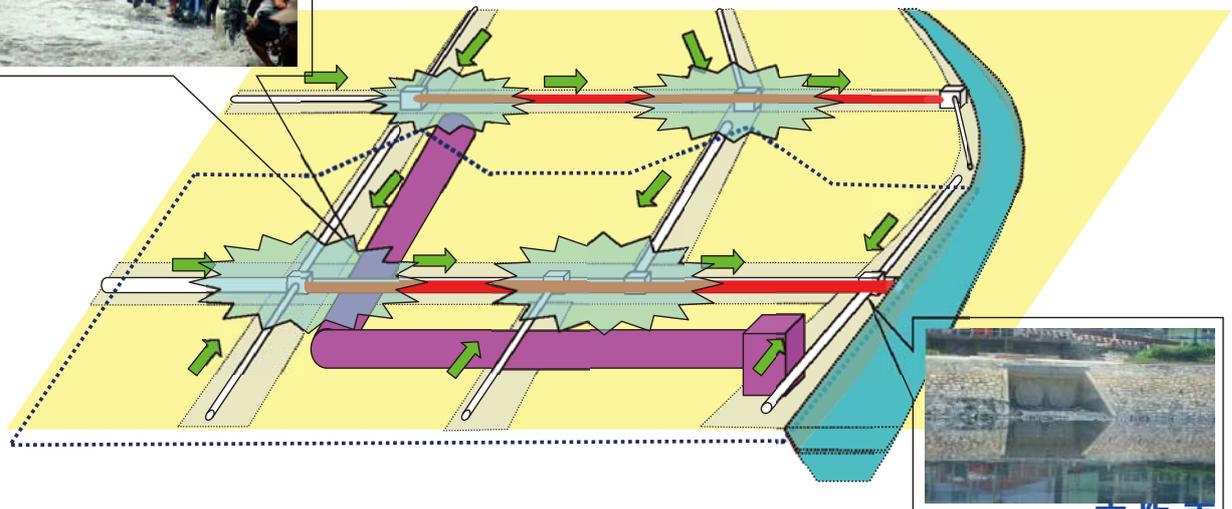
**OWESA** Established in April 2011



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## Project Study of Flood Control (Ho Chi Minh City)

0. Confirmation of Flood Damages / Selection of Countermeasure Sites
1. Confirmation and Evaluation of Existing Facility's Capacity by Basic Research
2. Study of Allocation of Supplemental Facilities
3. Verification of the Advantage of Supplemental Facilities by Simulation (focusing on the effect of tide level)



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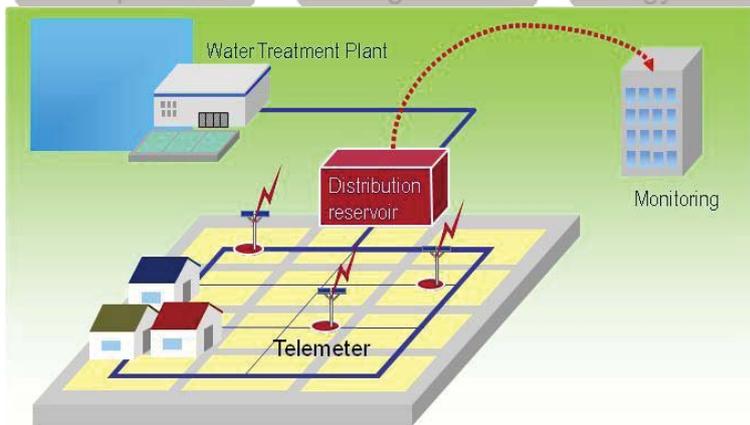
# Project Study of Water Supply (Ho Chi Minh City)

Proposal of water distribution control system including the construction of water distribution reservoir

Improvement of water pressure

Promotion of leakage control

Improvement of energy efficiency



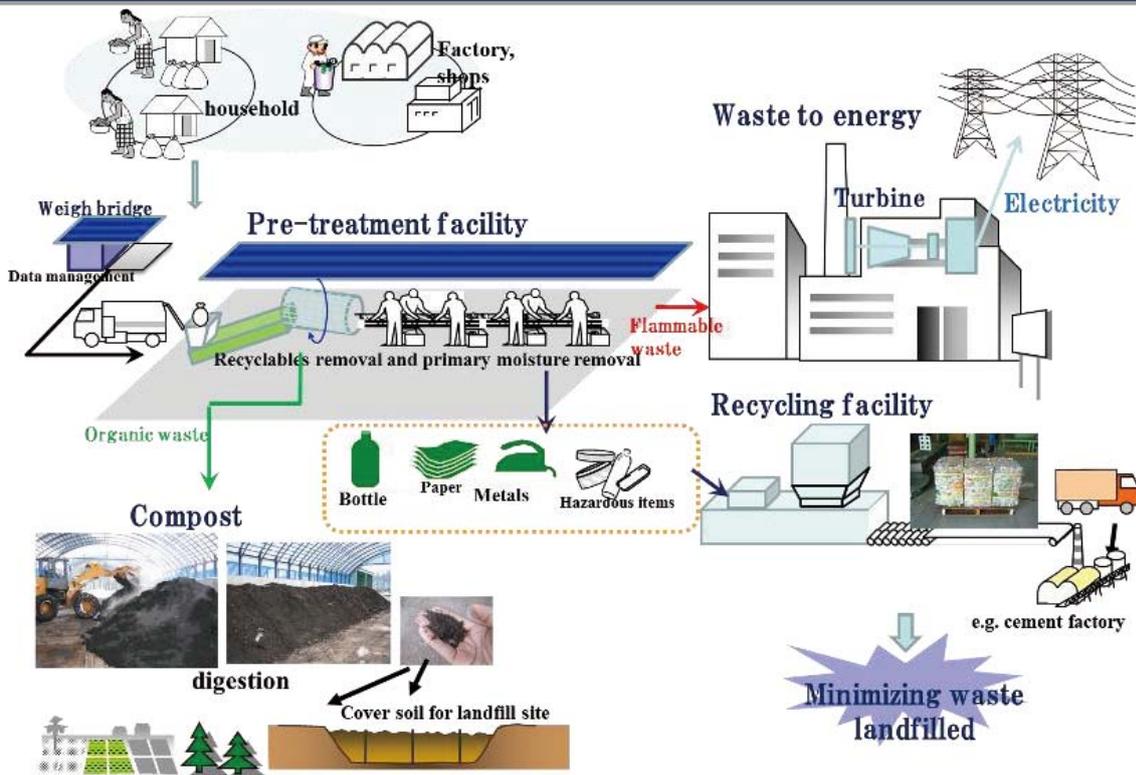
Water pressure check



Meeting with SAWACO

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# Project Study of Waste Power Generation (Ho Chi Minh City)



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## Study on Sewerage and Drainage System (Yangon City)

Meeting between Mayor of Yangon City and the Governor of Osaka Prefecture



Meeting between Water and Sanitation Dept. of YCDC and OWESA Team



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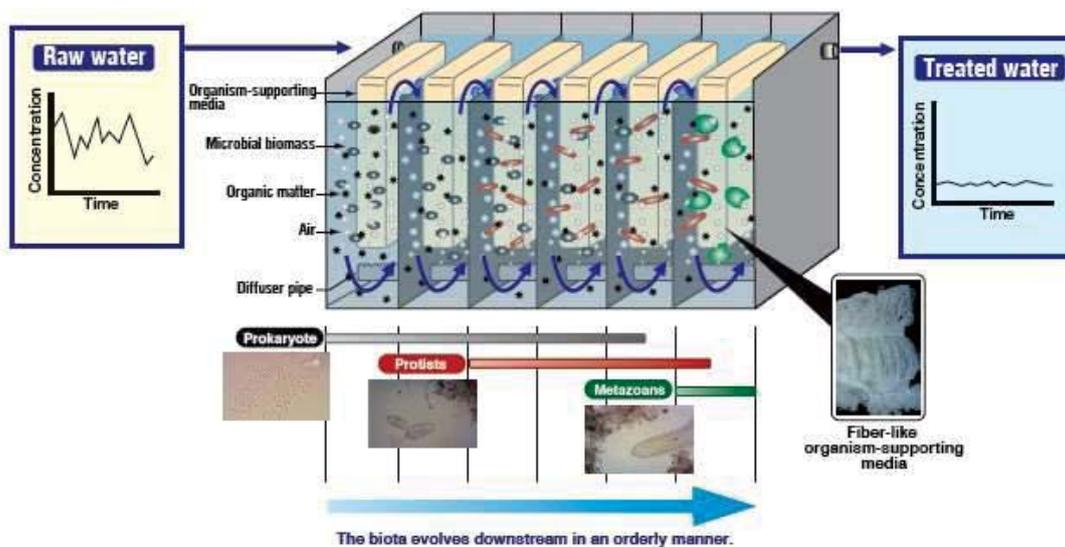
OWESA will surely provide the total solution for your challenges



# Skid-packaged wastewater treatment plant using sludge reducing bioreactor: Multi-Stage Activated Biological Process (MSABP)

WPT Project  
Teijin Limited

## MSABP™; An Innovative Bioreactor (Multi-Stage Activated Biological Process)



**Features;** ① High density microbial proliferation, ② Spontaneous food chain formation

**Benefits ;**

**1) High Performance**

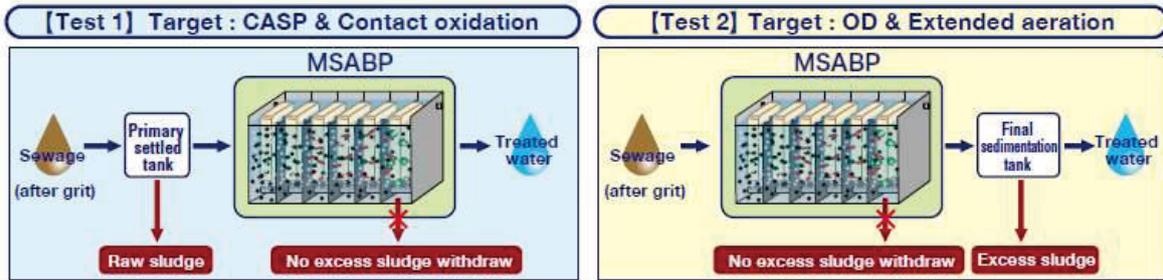
- Degradation of high concentration (COD < 50,000 mg/L) and persistent (BOD/COD ≥ 0.15) organics
- Total Nitrogen Removal

**2) Substantial excess sludge reduction**

- Energy saving, Easy operation

# Comparison with conventional technologies

## ●Joint Research with the Japan Sewage Works Agency



Items		Test 1 [vs CASP]	Test 2 [vs OD]
Fundamental performance	Target	BOD5 ≤ 15 mg/L, T-N 50% removal	BOD5 ≤ 15 mg/L, T-N 50% removal
	Result	Achieved	Achieved
Sludge reduction	Target	Excess sludge reduction; 70% or more	Excess sludge reduction; 70% or more
	Result	△87% reduction (Total; △43%)	△77% reduction (Total; △77%)
Energy saving	Target	Energy saving; 10%	Energy saving; 10%
	Result	~ 8% energy saving	~ 12% energy saving
Easy operation	Target	Easy O&M	Easy O&M
	Result	Pilot test was conducted without using any MLSS control or sludge removal procedure	

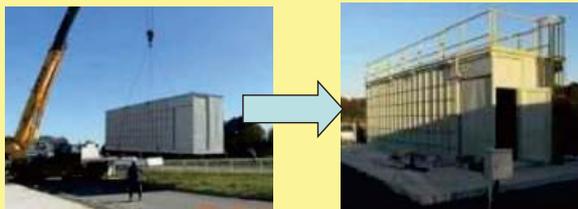
### When compared to conventional technologies:

- Equivalent Performance (BOD and T-N removal)
- Significant Sludge Reduction
- Energy (Electricity) Saving & Reduction of Greenhouse Gas Emission
- Easier O&M (Operation and Maintenance)

# Variation of MSABP

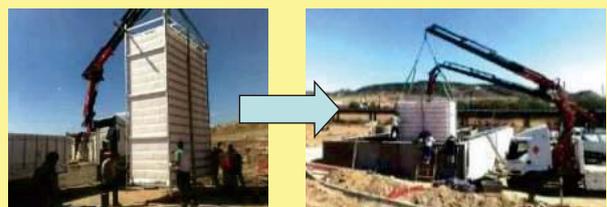
## Transportable Type

1. Flow rate: 150-170 Ton/day/unit
2. Applicable range: 750-850 people
3. Characteristics
  - Reduce construction period
  - Need only foundation work and utility at the installation site.
  - Treatment sites are able to be de-centralized and/or relocated



## Fixed Type

1. Flow rate: 5,000 Ton/day/unit
2. Applicable range: 25,000 people
3. Characteristics
  - Converged sewage treatment plant
  - Energy-saving/Reduction of CO2 emission when compare to the OD process
  - Carrier units are able to be relocated



**Customers can choose preferable Type, depending on customer's needs**

# 『WPT SKID PACKAGE PLANT』

(using transportable MSABP)

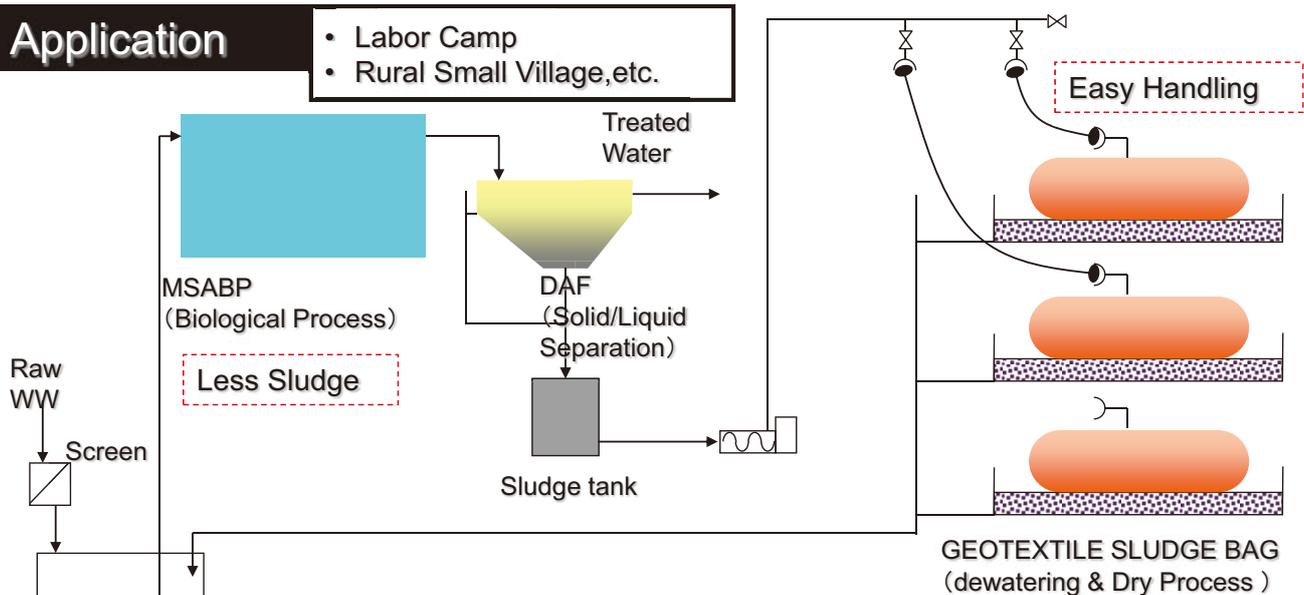
## WPT SKID PACKAGE PLANT

### Advantages

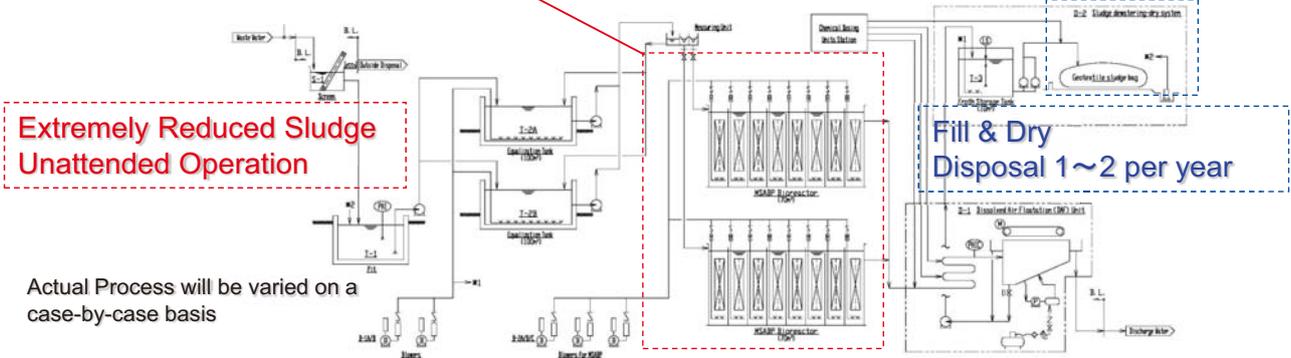
- Extremely simple Process – Less Maintenance Work
- Extremely reduced Sludge – Less Labor Work
- Easily Operational Bio Process – No control on MLSS, DO, etc.
- Quick installation/relocation – Skid design
- Lower Operational cost - 50 % lower than conventional\*

### Application

- Labor Camp
- Rural Small Village, etc.



\* Actual Operational cost & Process will be varied on a case-by-case basis

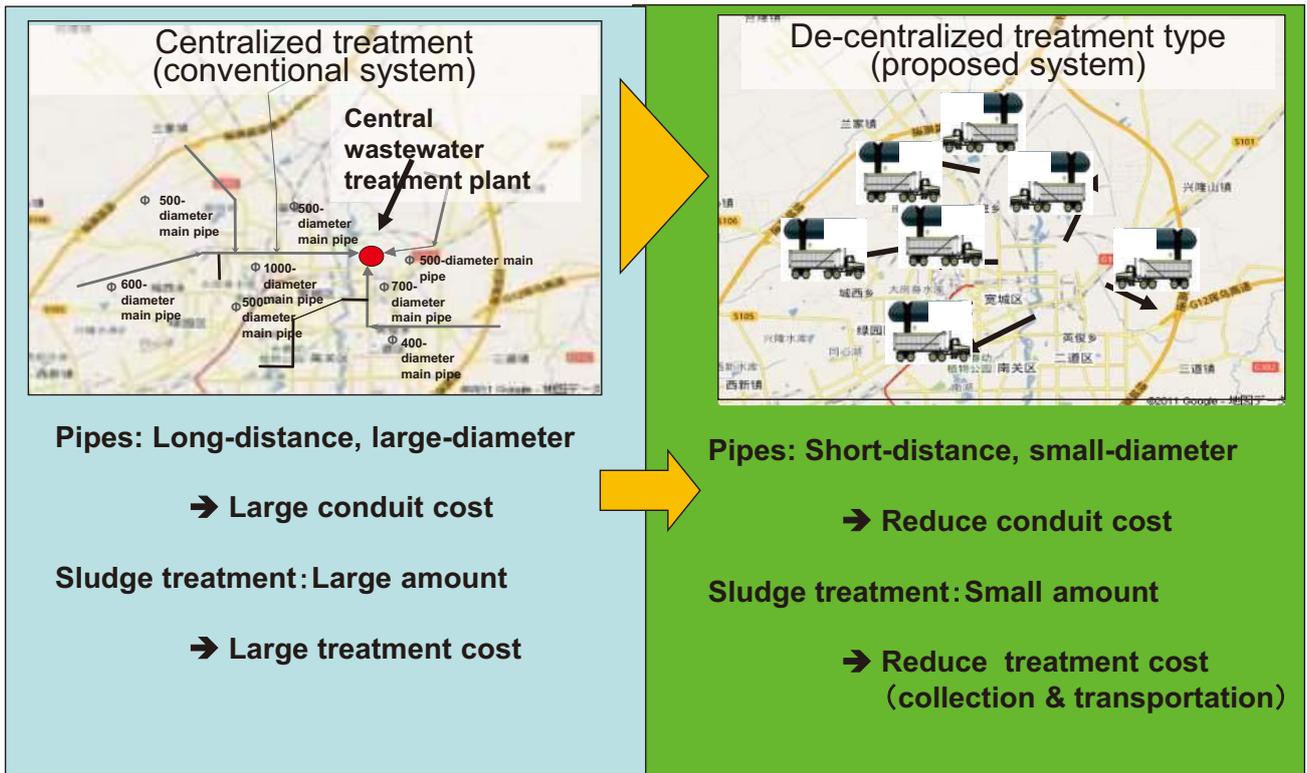


Actual Process will be varied on a case-by-case basis

	Conventional Plant	WPT Skid Plant Package
① Installation	<ul style="list-style-type: none"> <li>Volume civil work → Long installation</li> <li>Expensive Concrete Basin &amp; Equipment Base</li> </ul>	<ul style="list-style-type: none"> <li>Less Civil Work → Quick installation</li> <li>Low cost &amp; simple flat base</li> </ul>
② Operation & Maintenance	<ul style="list-style-type: none"> <li>Complicated Process → Exhaustive O&amp;M</li> </ul> <pre>                     Raw WW → Bio Process → Settler → Treated Water  → Condens → Dehydration → Dry → Volume Sludge  → DAF → Less Sludge                     </pre>	<ul style="list-style-type: none"> <li>Simple Process → Simple O&amp;M</li> </ul>
③ Grade up	<ul style="list-style-type: none"> <li>Size up of Concrete basin → Not Easy</li> </ul>	<ul style="list-style-type: none"> <li>Additional MSABP unit → Very Easy</li> </ul>
④ Running cost	<p>Teijin Ltd., All rights reserved</p>	<p>Approx. 50% *Teijin Performance</p>

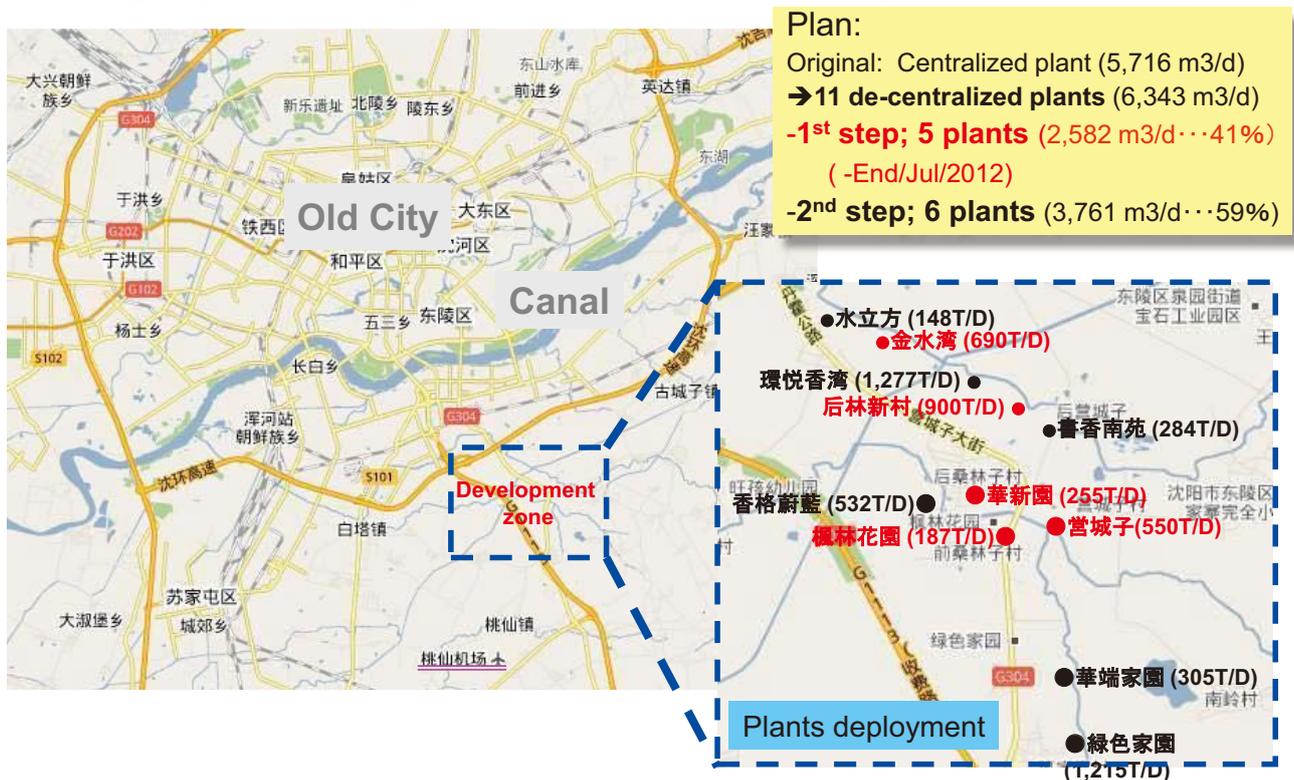
References

## Decentralized sewage treatment using MSABP



## Sewage treatment project in Shenyang, China

Shenyang City is developing south side of its canal, including sewage treatment plants



# Advanced Desalination Technology

Presented by Hitachi Zosen Corporation

JAPAN's Water Technologies & Solutions  
to Respond to the Challenges that GCC  
Countries Face

2013/02/01 at the 4th PPP Council  
for Overseas Water Infrastructure

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