資料５

日本の上下水道技術

Japanese water and sewerage technology

メタウォーターの水処理技術

メタウォーター株式会社
国際事業推進センター

事業ターゲット

水環境分野の トータルソリューション

○ エンジニアリング から O&M
○ 官民連携事業

オンリーワン テクノロジー

○セラミック膜ろ過システム
○オゾナイザ

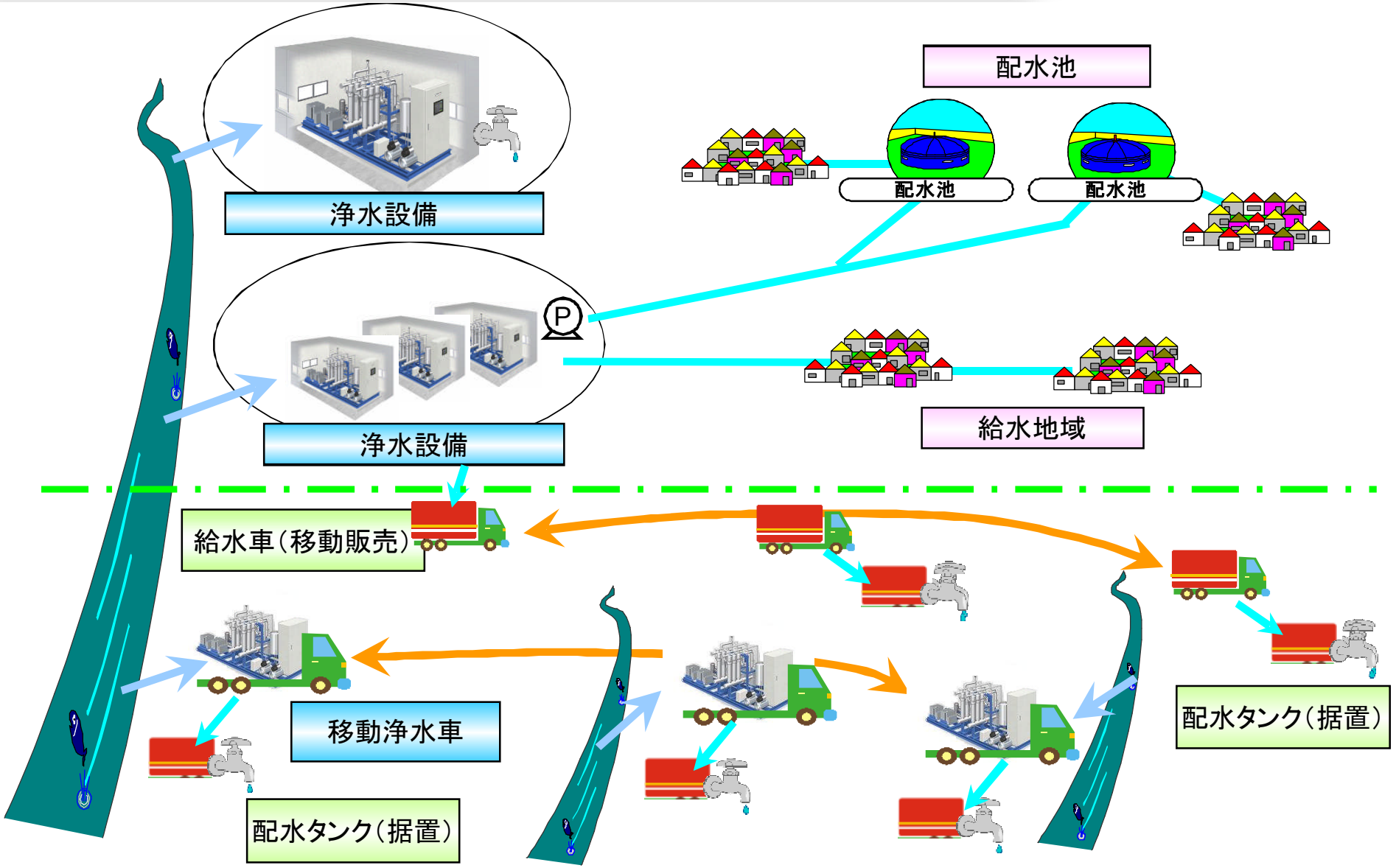
独自技術・製品 による水資源の確保

○再生水
○海水淡水化

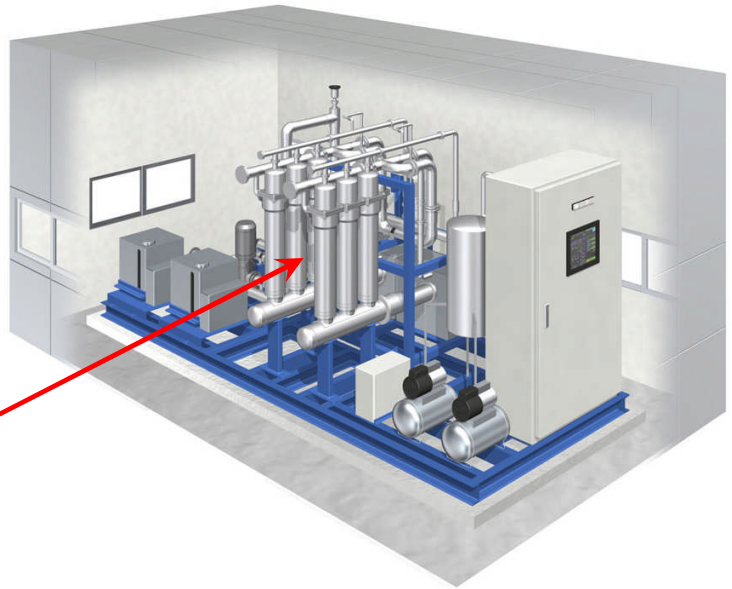
最近の実績

COUNTRY	PROJECT NAME	YEAR
カンボジア	カンボジア水道人材育成プロジェクト	2008-2010
カンボジア	プルサット浄水場電気設備改修工事	2009
ベトナム	Yen So ポンプ場向け電気設備	2009-2010
ベトナム	東南アジア地域での高濁度河川水利用型浄水供給システムによる水循環事業	2009-2010
ベトナム	ハノイ都市圏水道PPPドン河事業FS 調査	2010-2011
インドネシア	南バリ再生水利用事業準備調査(PPPインフラ事業)	2010-2011

セラミック膜ろ過設備の展開例



小規模セラミック膜システムのイメージ



セラミック膜

処理能力: ～ 650 m^3/d

ベトナム/ドンタップ省における実証試験

パイロットプラント

取水点

処理後　　処理前

ご清聴ありがとうございます。

Beyond engineering

問合せ先: www.metawater.co.jp/eng/index.html
info-kaigai@metawater.co.jp

METAWATER Water Treatment Technologies

International Business Center

METAWATER Co., Ltd.

Business Target

Total Solution in Water Sector

> From Engineering to O&M

> Public Private Partnership

Differentiated Component

> Ceramic Membrane Filtration System

> Ozone Generation System

New Water Resource Creation

> Reclaimed Water

> Seawater Desalination

Recently Results

COUNTRY	PROJECT NAME	YEAR
Cambodia	**Project on capacity building for water supply system in Cambodia**	2008-2010
Cambodia	**Purchasing equipment (power distribution panel for Pursat) for the project on capacity building for water supply system**	2009
Vietnam	**The second Hanoi drainage project for environmental improvement**	2009-2010
Vietnam	**NEDO Project 'Water-saving and environment-conscious Water recycle technology'- Drinking water supply from highly turbid surface water in Southeast Asia -**	2009-2010
Vietnam	**The PPP project study for The Great Hanoi water supply system in The socialist Republic of Vietnam**	2010-2011
Indonesia	**The preparatory survey in application of wastewater reclaiming in southern Bali water supply system in The Republic of Indonesia**	2010-2011

Example of Water Supply Network with Ceramic Membrane Systems

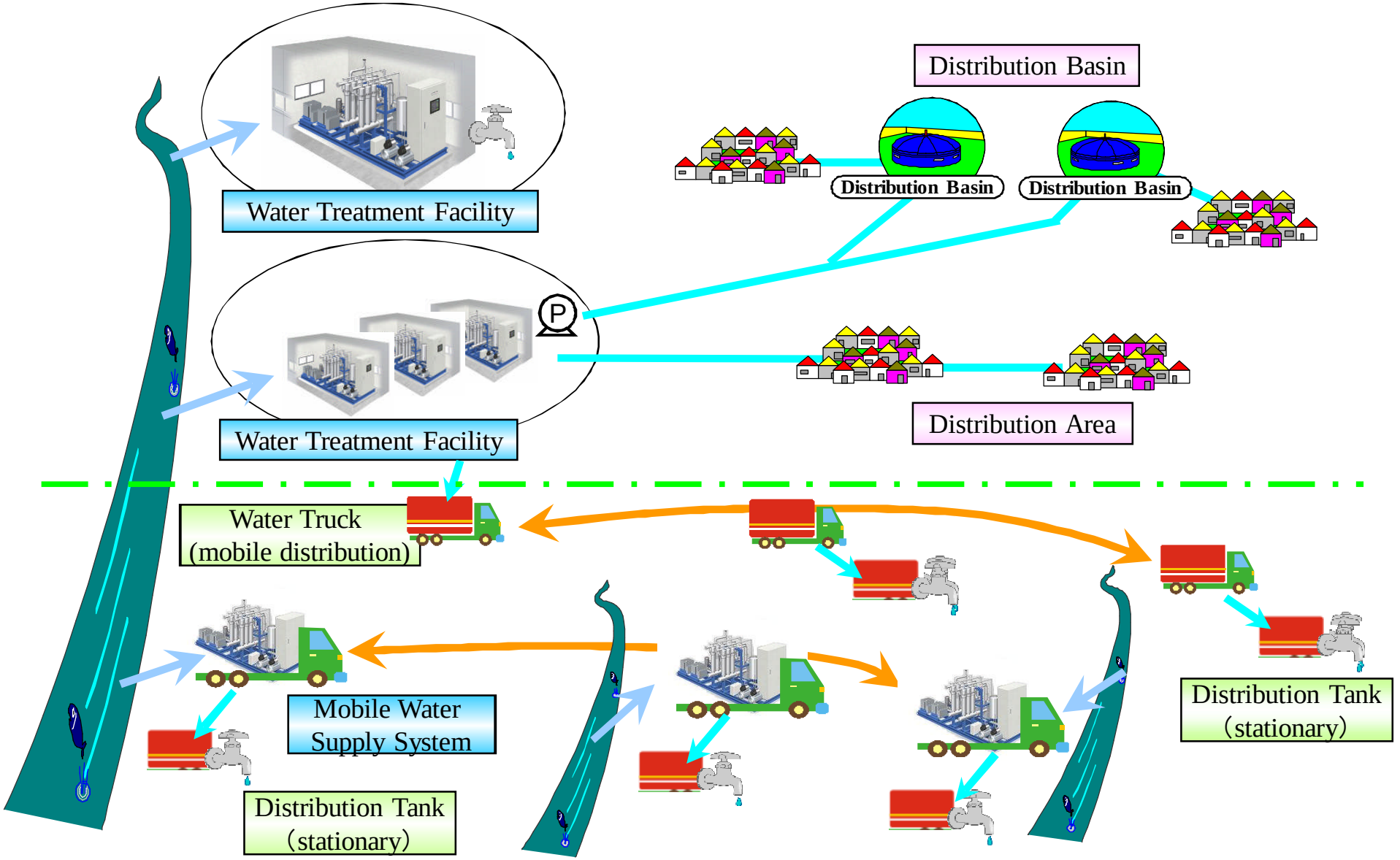
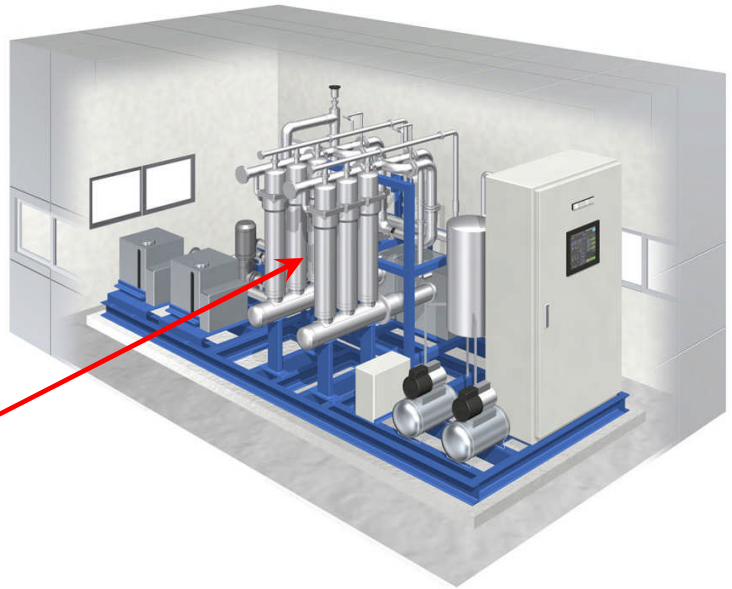


Image of Small-scale CMF system



Ceramic Membrane

Capacity: ~ 650 m^3/d

Pilot Testing in Dong Thap

Ceramic Membrane Pilot Test Equipment

River (Water Source)

Filtrate

Raw Water

Thank you for your attention.

Beyond engineering

Contact: www.metawater.co.jp/eng/index.html
info-kaigai@metawater.co.jp

上下水道管路アセットの
包括的マネジメント事業のご提案

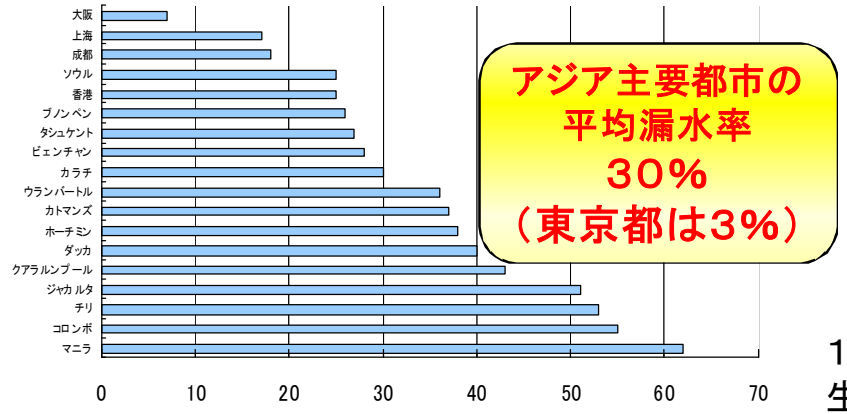
積水化学工業株式会社

2010.2.14

上水道管路に係る問題

◇漏水による貴重な水資源の損失

アジア主要都市の漏水率



出典：ADB"Water in Asia Cities, Utilities Performance and Civil Social View"から作成

損失金額の考え方

漏水に対してもその生産には一定のコストが
発生しており、漏水によって回収不能となっている
⇒漏水量に対する生産コスト分が損失金額と
考えられる

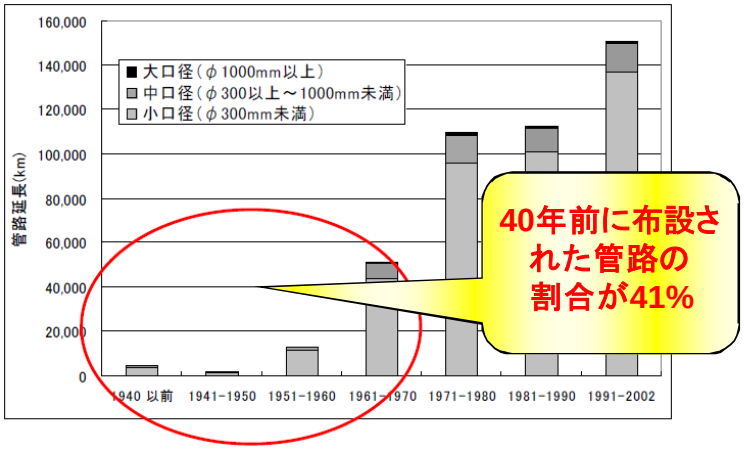
損失額＝漏水量（総給水量×漏水率）×生産原価

1都市で年間の総給水量500,000,000㎥、漏水率20%、
生産原価を150円／㎥とすると…

損失金額　約150億円！

◇管路の老朽化による破裂事故の発生

日本の水道管路の布設年度別延長



管路破裂事故の発生事例

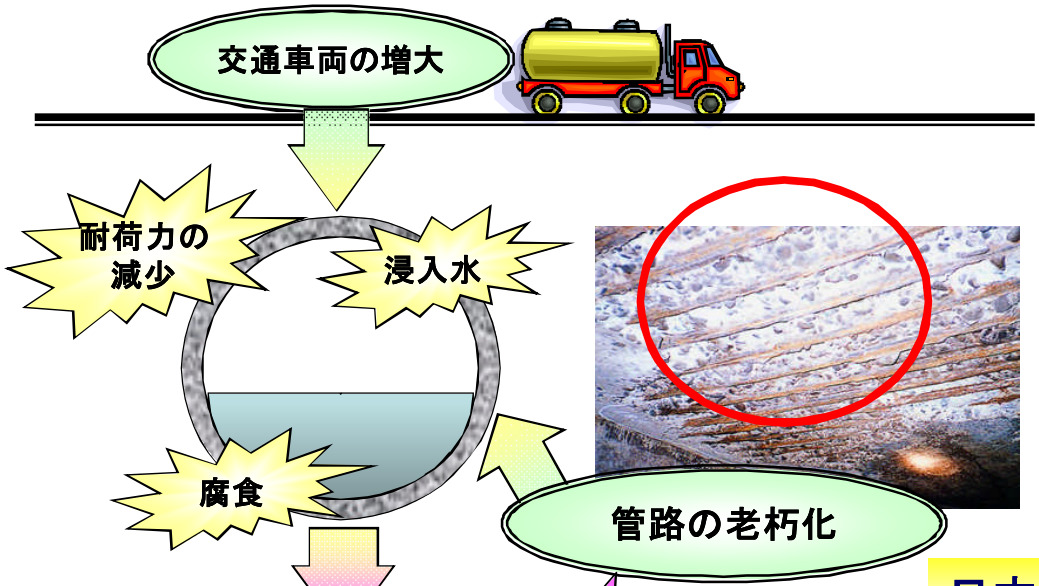
**水道管路の老朽化、漏水は
世界共通の問題**

下水道管路に係る問題

SEKISUI

◇老朽化による道路陥没

道路陥没のメカニズム



道路陥没事故の発生事例

日本全国で年間約6,000件の道路陥没が発生！
世界各都市でも同じく道路陥没が発生！

下水道管路の老朽化、下水の地下水への混入は世界共通の問題

上下水道管路に係る課題

新興国の課題

新興国を中心にインフラ整備が活性化
（現地パイプメーカーの台頭による
製造、敷設）

主要都市の水道漏水率は軒並み２０％
を超えており、その改善が急務
（製品、配管設計、施工品質等の改善）

管路老朽化対策における課題

布設後３０年以上を超える
上下水道施設が老朽化

①漏水による費用損失（上水）
②漏水による地下水汚染
　不明浸入水による処理場機能過負荷
　（下水）
③陥没による機能停止（上下水）

共通課題

①　現状は管路に比べ、浄水場、処理場の維持・管理に視点が集中

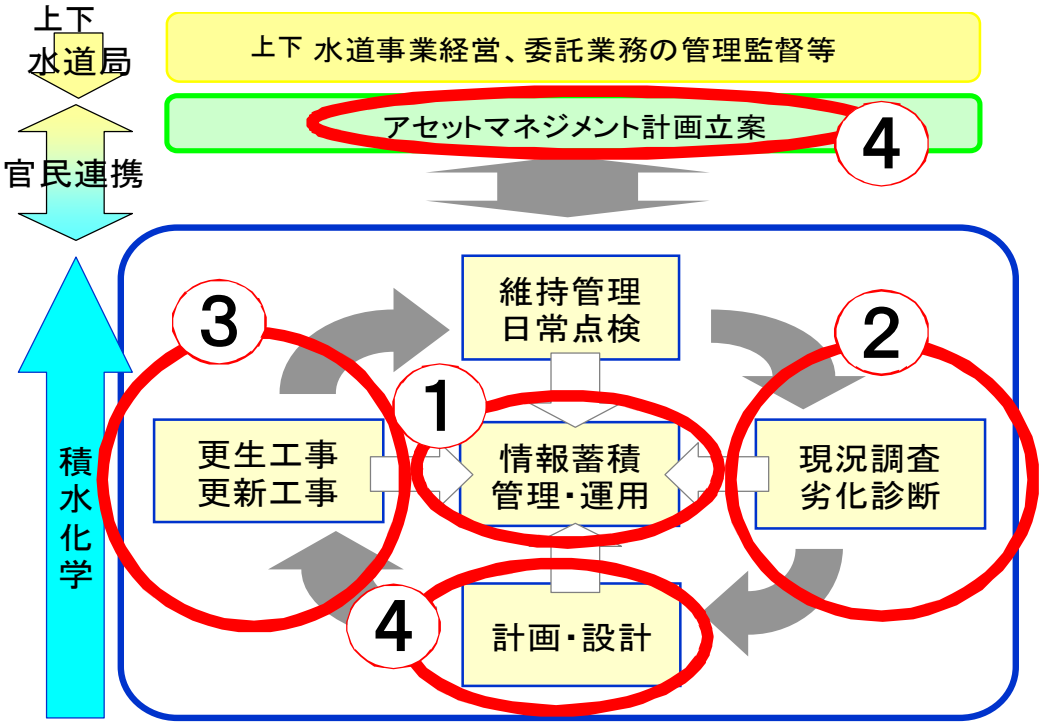
②　管路システムの品質管理、老朽化調査・診断、管路の更新・更生等、
　　管路の維持・管理に関しては膨大な費用がかかる
　　（浄水場／処理場と管路にかかる維持・管理費用の割合は２：８（推定））

管路トータルのマネジメントが不可欠

管路の包括的ﾏﾈｼﾞﾒﾝﾄの導入提案

SEKISUI

【戦略的維持管理のためのアセットマネジメントの導入】



【期待効果】

1）最適手法の選定・提供

・保有する様々な技術・ﾉｳﾊｳから最適なものを官民連携で選定

→ 民間の創意工夫活用

2）包括化によるコストダウン

・分割発注により発生していた業務経費等の削減

・長期的計画に基づく予算平準化

→ 歳出抑制と財政安定化

3）地域への安全・安心の提供

・予防保全型のﾏﾈｼﾞﾒﾝﾄにより、安全・安心な下水道ｻｰﾋﾞｽを実現

積水化学が提供する工法・システムの概要

①情報管理（ﾏｯﾋﾟﾝｸﾞｼｽﾃﾑ）：施設情報（調査診断・工事・点検情報等）の一元管理

②調査診断：定期的な劣化、漏水調査・健全性診断の実施

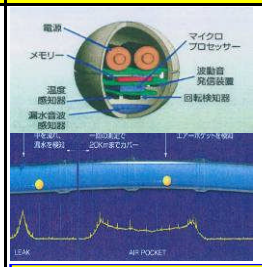
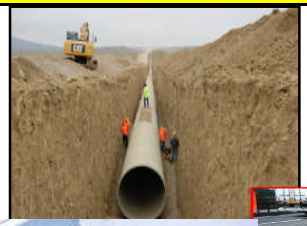
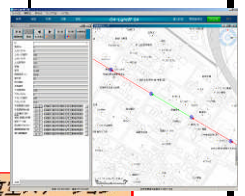
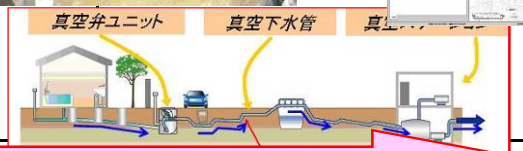
③更生・更新工事：複数の更生工法から最適な手法を選定（２０年超の更生実績）

④計画・設計：官民連携による中長期的アセットマネジメント計画の策定

管路情報、周辺環境、コストの側面から、最適な修繕手法を選定＆設計

当社が提供する管路ソリューション技術

SEKISUI

	管路全般					
	調査診断	計画策定	最適設計	配管材料・継手群	配管技術・工法	維持管理
上水道（圧力管）		維持管理計画	基本設計 実施設計 各種解析	    		管路情報管理システム
下水道	漏水調査手法 劣化診断手法	長寿命化計画		 		
						
	上下水道管路分野での包括受注が可能					
	SEKISUI（積水化学グループ）					

管路ｱｾｯﾄﾏﾈｼﾞﾒﾝﾄの**全事業サイクル**で計画に基づく**一貫した価値提供**が可能

Proposal of comprehensive management business of water and sewer services conduit asset

SEKISUI CHEMICAL CO.,LTD.

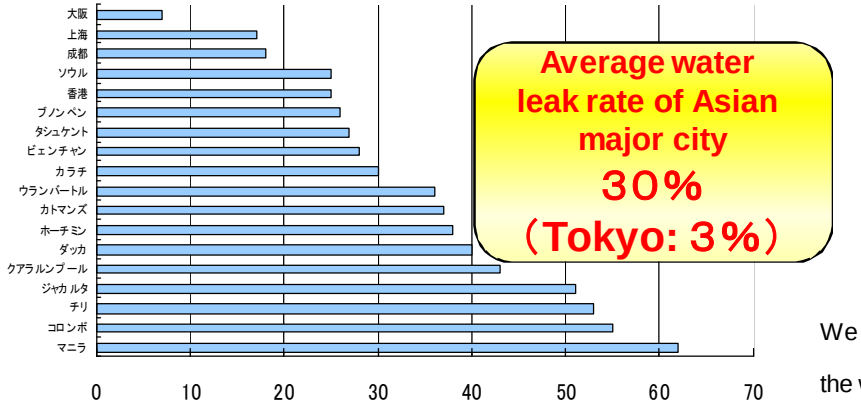
2010.2.14

Problems about conduit of water services

SEKISUI

◇Loss of valuable water resource by water leak

Water leak rate of Asian major city



Source: ADB"Water in Asia Cities, Utilities Performance and Civil Social View"

Way of thinking about amount of lost money

A constant cost is also needed in the production for the water leak, and it is irrecoverable through the water leak.

⇒It is thought that the produce cost of the water leak is the amount of lost money.

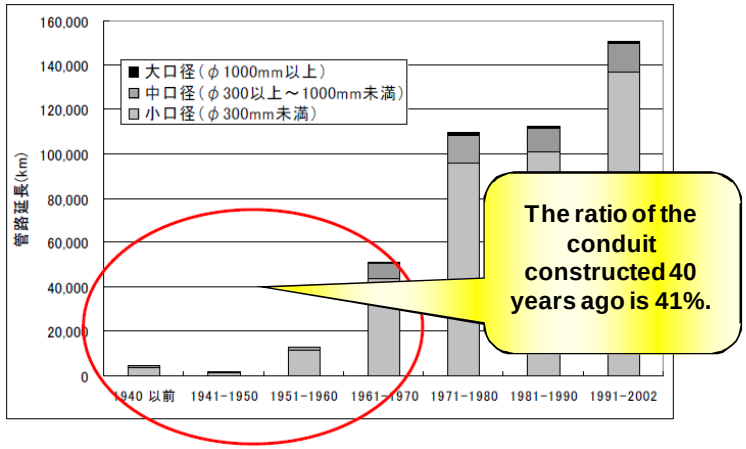
Amount of a loss = amount of water leak
(amount of total water supply × water leak rate) × production cost

We assume: they are amount of 500 million ㎥total water supply in one city during year, the water leak rate 20%and the production cost 150 yen/㎥; then:

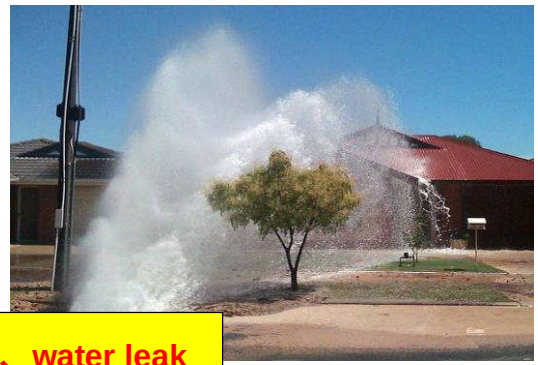
amount of lost money: 15 billion yen!

◇Occurrence of rupture accident because of superannuation of conduit

Extension of water service conduit in Japan according to construction fiscal year



Example of occurrence of rupture accident



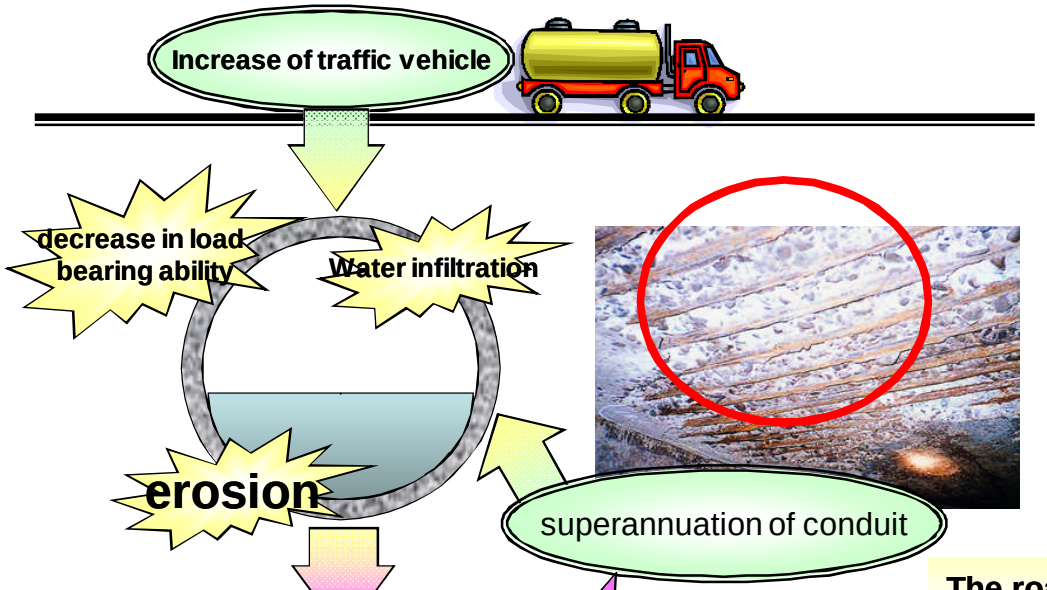
Superannuation of water couduit、water leak
Common problem in the world

Problems about conduit of sewer services

SEKISUI

◇Road sinking by superannuation

Mechanism of road subsidence



Example of occurrence of road subsidence **accident**

Chuo Ward Ginza (1999)

Minato Ward Shibakoen (Tokyo tower)

California , USA (2004)

Austria

The road subsidence of about 6,000 a year occurs in the Japanese whole country!
Similarly, the road subsidence occurs also in each city in the world!

Superannuation of sewer、sewage leak into Groundwater: Common problem in the world

Problems about conduit of water and sewer services

SEKISUI

Problem of rising nation

The infrastructure construction and maintenance is activated mainly in the rising nation.

（Manufacturing and construction by gaining power of local pipe manufacturer）

Water leak rates of the major city exceed 20% everywhere, therefore, the improvement is a pressing need (improvements of the product, the piping design, and the construction quality, etc.).

Problem in conduit superannuation measures

water-and-sewer-service- facilities constructed 30 years ago or earlier become superannuated.

① Loss of cost through water leak (water supply)

②Contamination of Groundwater through sewage leak, Function of filtration plant is overloaded through uncertain infiltration water（sewage）

③Function stop by subsidence（water and sewage）

Common problems

① As for the current state, the aspect is concentrated on maintenance and the management of the filtration plant and the treatment plant, compared with the conduit.

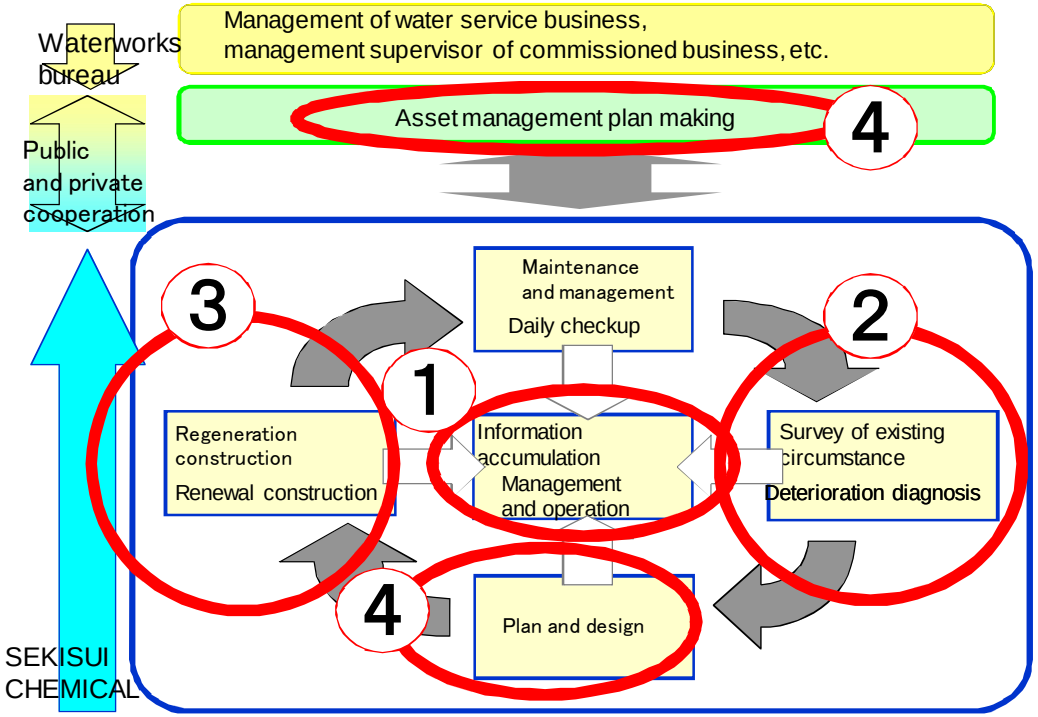
② It requires huge cost for the maintenance and the management of conduits, like the quality control, the superannuation investigation, the diagnosis of the conduit system, and the renewal and the regeneration of the conduit, etc.
(The ratio of the cost of maintenance and the management of the treatment plant and filtration plant and of conduit is 2:8(presumption)).

The management of total conduit is indispensable.

Proposal of introduction of comprehensive management of conduit

SEKISUI

【Introduction of asset management for strategic maintenance and management】



【Expected effect】

1) Selection and offering of the best technique

- From available various technology and knowhows, the best one is selected by the public and private cooperation.
  → **Use of inventiveness of private organization**

2) Cost down by making comprehensive

- Reduction in business expenditure etc. occurred by separate orders
- Budget leveling based on long-term plan
  → **Expenditure control and financial stabilization**

3) offering of safety and peace of mind in a region

- A safe and reliable drainage service is achieved by the management in a preventive maintenance-type.

Outline of industrial method and system that Sekisui Chemical Co., Ltd. Offers

①Information management（mapping system）：Centralized management of facilities information (investigation diagnosis, construction, and check information, etc.)

②Investigation and diagnosis：Regular execution of investigation of deterioration and leakage and soundness-diagnostics

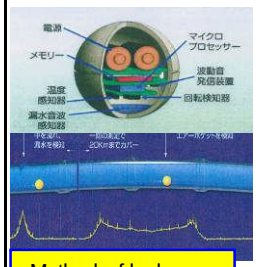
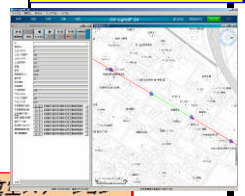
③renewal and the regeneration construction：The best technique is selected from two or more regeneration industrial methods (achievements of regeneration for more than 20 years).

④Plan and design：Decision of mid/long-term asset management plan by public and private cooperation

Selection & design of the best mending technique from the aspects of conduit information, ambient surrounding, and cost

Technology of conduit solution offered by our cooperation

SEKISUI

	Conduit general					
	Investigation and diagnosis	Plan making	Best design	**Piping materials and couplings**	**Piping technique and industrial methods**	**Maintenance Management**
Water supply （Pressure tube）	 Method of leakage investigation	Plan of maintenance and management	Basic design Execution design Various analyses	     		Information management system for conduit
Sewerage	Method of superannuation-diagnosis	Plan of making to long life				
						

Comprehensive order is possible in the field of conduit of water and sewer services.

SEKISUI（ SEKISUI CHEMICAL GROUP）

Consistent value based on the plan can be offered, by the cycle of all business of the conduit asset management.

HITACHI
Inspire the Next

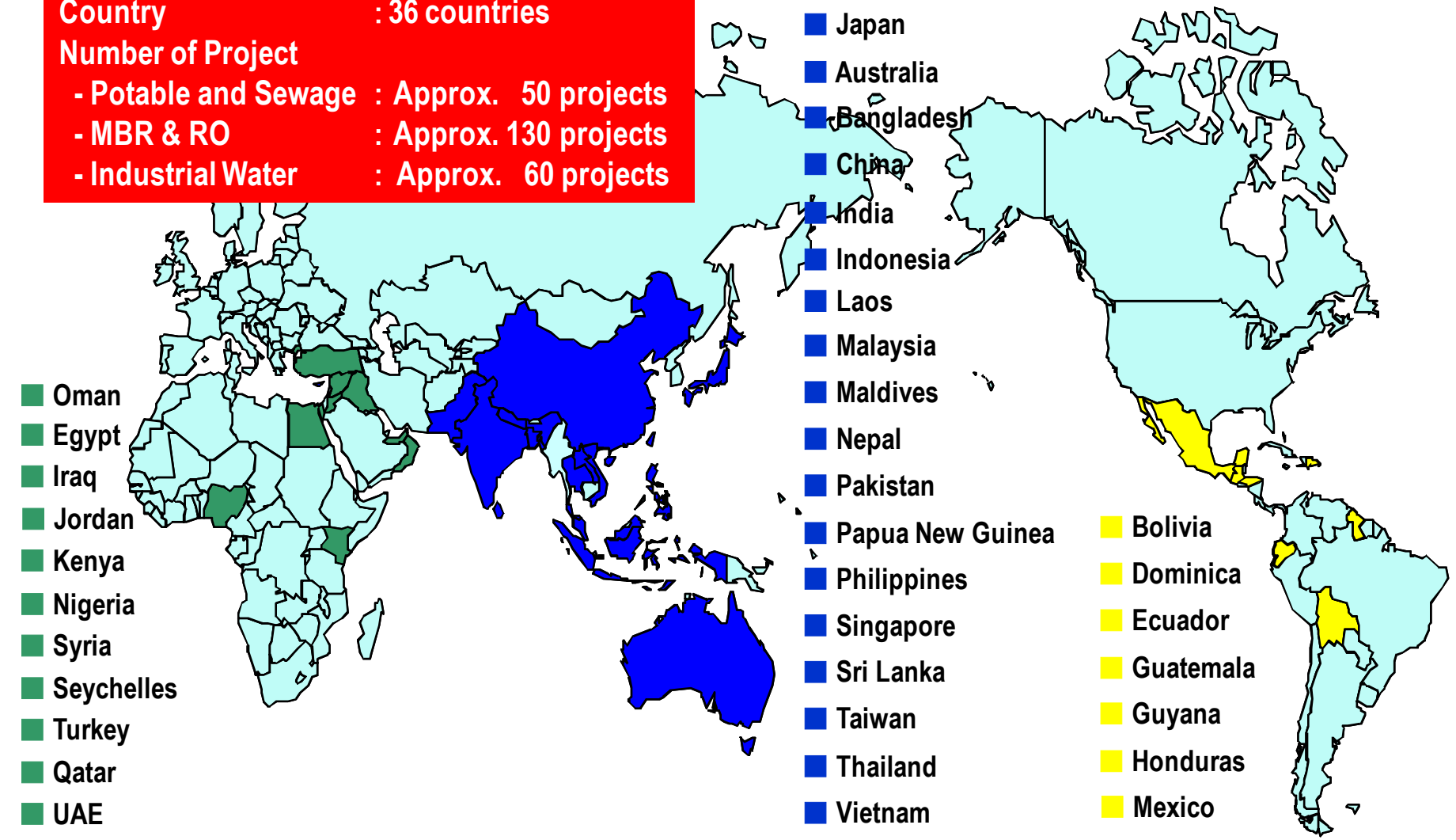
Hitachi Water Environment Solution Business

Feb. 14th, 2011
Water Environment Solutions Division
Hitachi, Ltd.

World Wide Supply Records

HITACHI
Inspire the Next

Country	: 36 countries
Number of Project	
- Potable and Sewage	: Approx. 50 projects
- MBR & RO	: Approx. 130 projects
- Industrial Water	: Approx. 60 projects



Technology Portfolio

HITACHI
Inspire the Next

Large-scale water supply pump for Water supply, Purification and Wastewater treatment and Electric power

China/manufacturing and sales base "Hitachi pump manufacturing (Wuxi Co.LTD " establishment (2006)

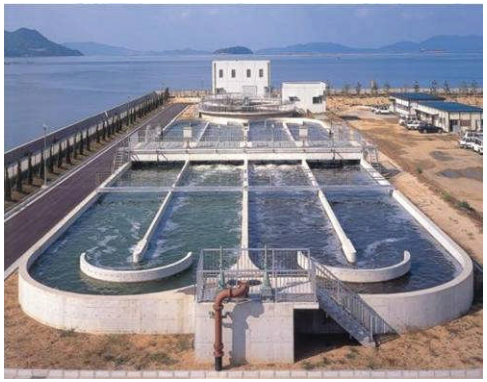
Hitachi Pump Manufacture(Wuxi)Co.,LTD

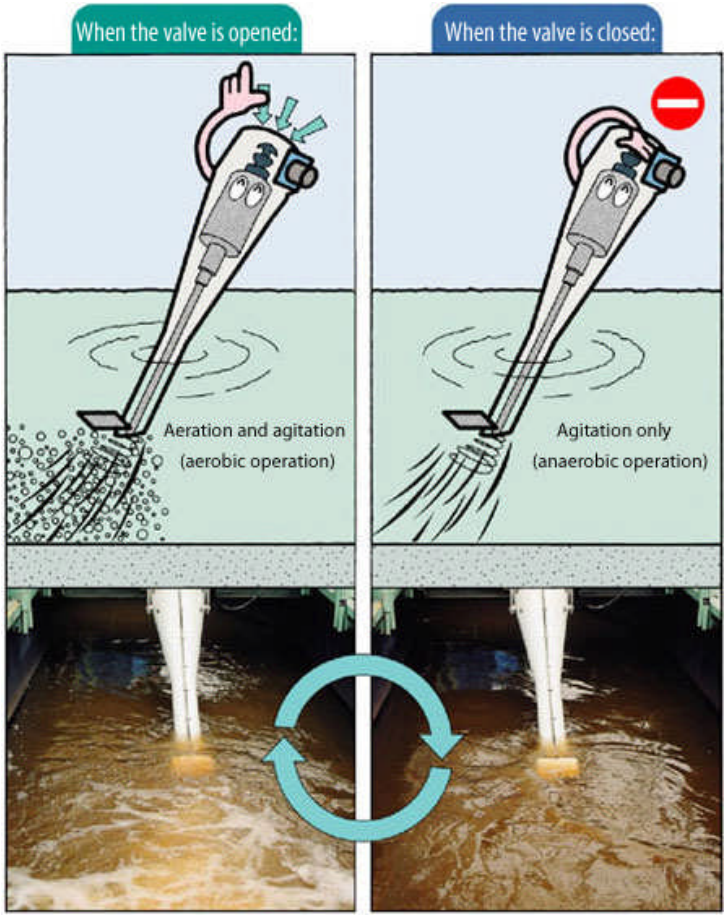
EGYPT Mubarak Pumping Station Project

Customer :
Ministry of Water Resources and Irrigation, Egypt
Year of Supply : 2002
No. of Sets : 21
Type : Vertical shaft, Single suction, Turbine volute pump
Bore : 94 × 70in (2,400 × 1800mm)
Flow : 16.7m^3/s
Total Head : 57.1m
Prime Mover : 12,000kW

HITACHI
Inspire the Next

The SPAROTOR is an aerator that also works for anaerobic agitation





●Overview

The SPAROTOR ACE is a high-efficiency aerator and agitator that can perform aerobic and anaerobic operation with just one unit. The simple valve controls can perform appropriate aeration operations while maintaining agitation force.

●Features

1. Easy operation when first put into service
2. Improved nitrogen removal rate
3. Can be applied to diverse applications

Technology Portfolio

HITACHI
Inspire the Next

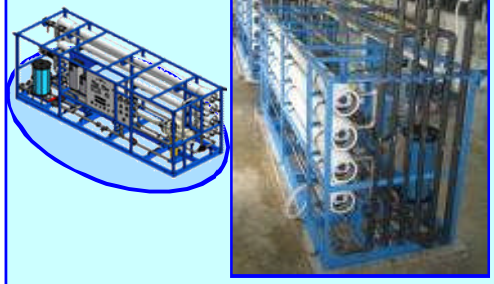
Water & Wastewater treatment

Proposal of treatment system that suits local environmental condition and needs

Water Purification System

Filter type water processing unit

Desalination RO※1unit

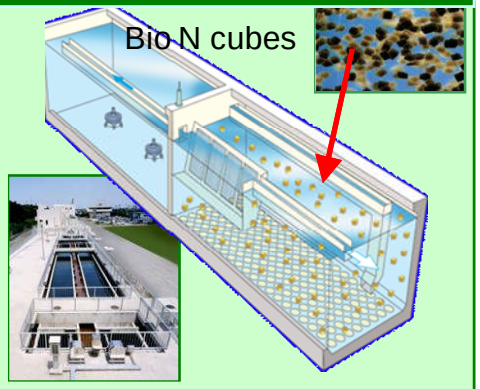


EPC record（Sri Lanka）

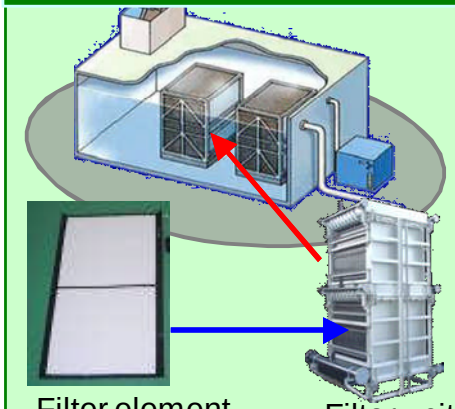
Candy city Purification plant
（Treated quantity：36,600m^3/d）

Wastewater Treatment System

Advanced wastewater treatment system



MBR※2system



EPC record（Malaysia）

Kuala Lumpur City sewage plant
（5 places、Treated quantity：250,000m^3/d）

※1. RO: Reverse Osmosis　※2. MBR: Membrane Bio-Reactor

EPC Supply Record

HITACHI
Inspire the Next

◆ Asia – Sri Lanka　Potable Water Treatment （Total 10 projects）

Project Name	Greater Kandy Water Supply Augmentation Project	The Project for Improvement of Water Supply System in Matara District
Source of Fund	JBIC Loan	Japan's Grant Aid
Contract Period	From Nov/03 to Oct/06	From Jan/04 to Sep/05
Capacity	36,600m^3/day	15,000m^3/day

Completion ceremony (Matara)

Katsugastota WTP (Kandy)

Intake Pump Station (Kandy)

Marimbada WTP (Matara)

EPC Supply Record

HITACHI
Inspire the Next

◆Asia – Malaysia　Waste Water Treatment

Project Name	The Construction of Sewage Treatment Plant Project (Phase-I)
Source of Fund	JBIC Loan
Contract Period	From Dec/03 to Mar/08
Capacity and Process method	**5plants total capacity :250,000m³/day** Bunus : 2stages step feed Pantai : 2stages step feed Puchong : 2stages step feed Bandar Tun Razak : SBR Southern Klang Valley : 3stages step feed

Bunus STP

87,000m³/day

Pantai STP

93,000m³/day

Puchong STP

37,000m³/day

Bandar STP

25,000m³/day

EPC Supply Record

HITACHI
Inspire the Next

◆Asia – Vietnam　WasteWater Treatment

Project Name	Tan Son Nhat International Airport Terminal Construction Project
Source of Fund	JBIC Loan
Contract Period	From Nov/05 to Jul/07
Capacity	2,250m^3/day

Aeration tank

Grit chamber

Pump Room

Panel Room

HITACHI
Inspire the Next

Water Management System

Managing various facilities from intake level to distribution

Water management center

Demand forecast	Forecast by the multiple regression analysis
	Retrieval on similar days of the past weather etc.
Water utilization plan	The CO2 reduction is evaluated Optimization technique use

Intake water facility*1

Municipal water treatment plant

Water distribution Plant*2

Customer

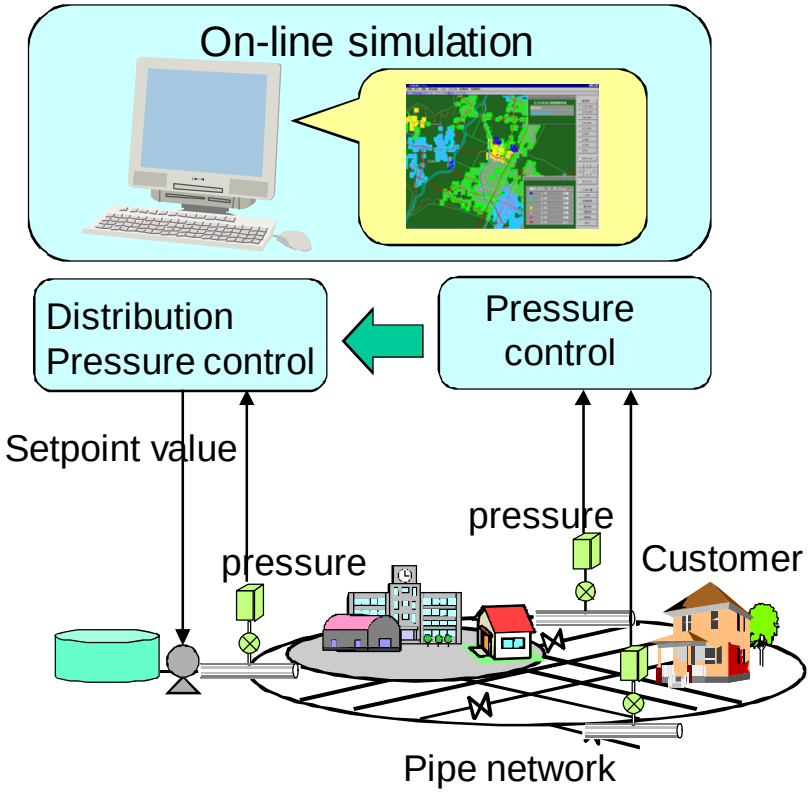
*1 From Nishinomiya city HP
*2 From Kashiwa city HP

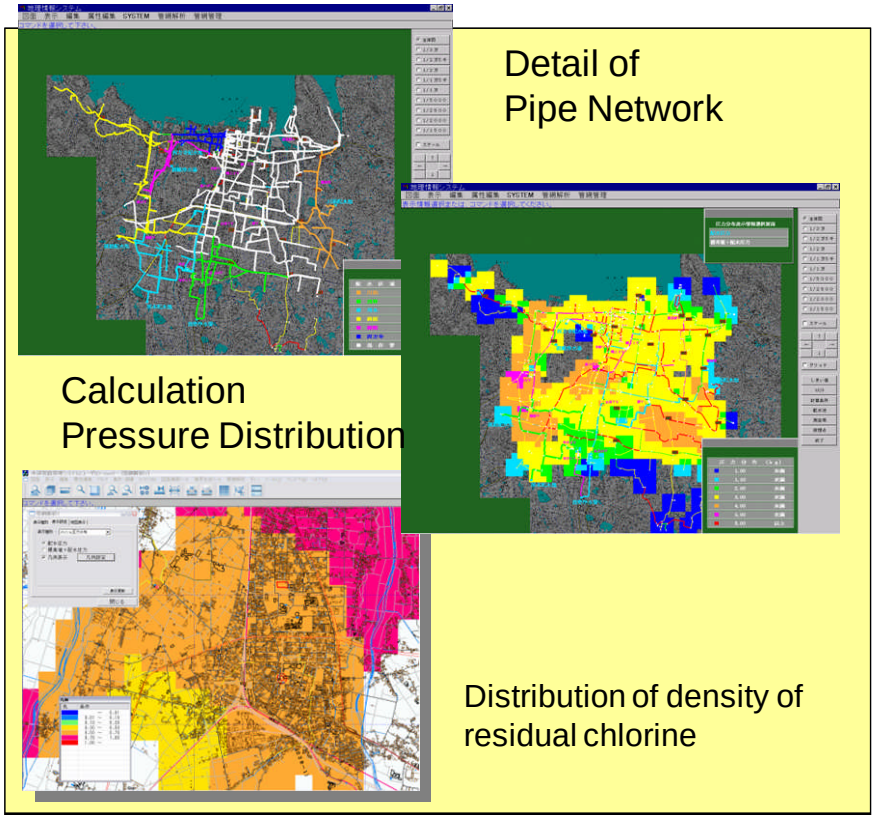
HITACHI
Inspire the Next

Water Distribution Management System

System Features

- Monitor & data management through geographical interface.
- Adaptability of demand fluctuation based on real-time analysis.
- Saving energy and leakage reduction.

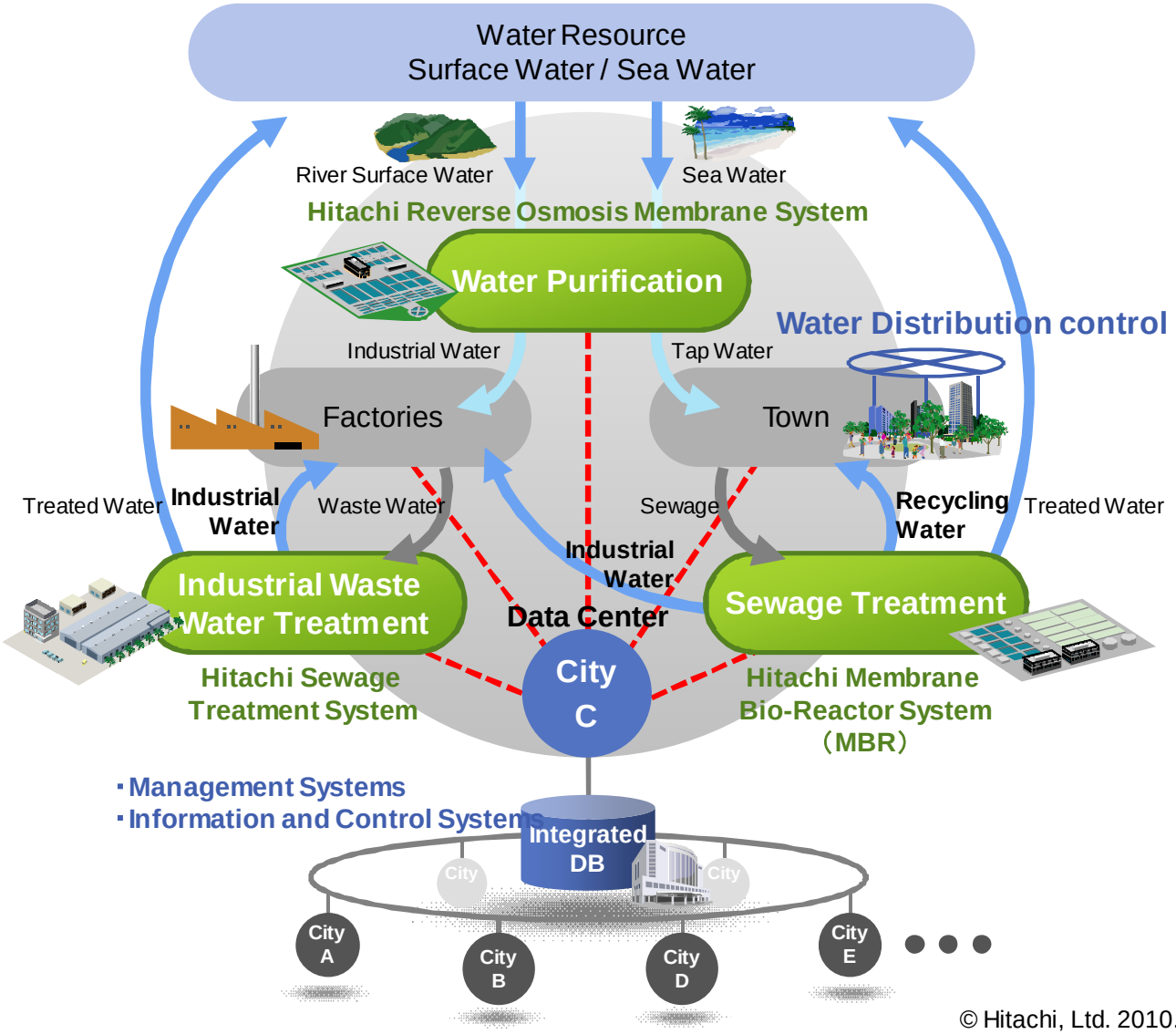




Intelligent Water System

HITACHI
Inspire the Next

Hitachi's Proposed Variety of Water Recirculation System



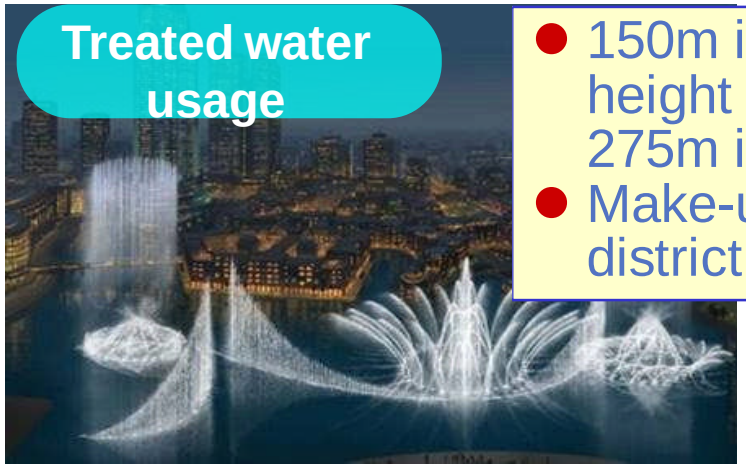
Solution Portfolio

HITACHI
Inspire the Next

Construction of water resource circulation cycle

- MBR+RO unit（About 50 delivery around UAE Dubai）
  Burj Dubai Waste water treatment plant（3,000m³/d）

O&M of 3 years



- 150m in maximum height , Fountain of 275m in total length
- Make-up water for district cooling

HITACHI
Inspire the Next

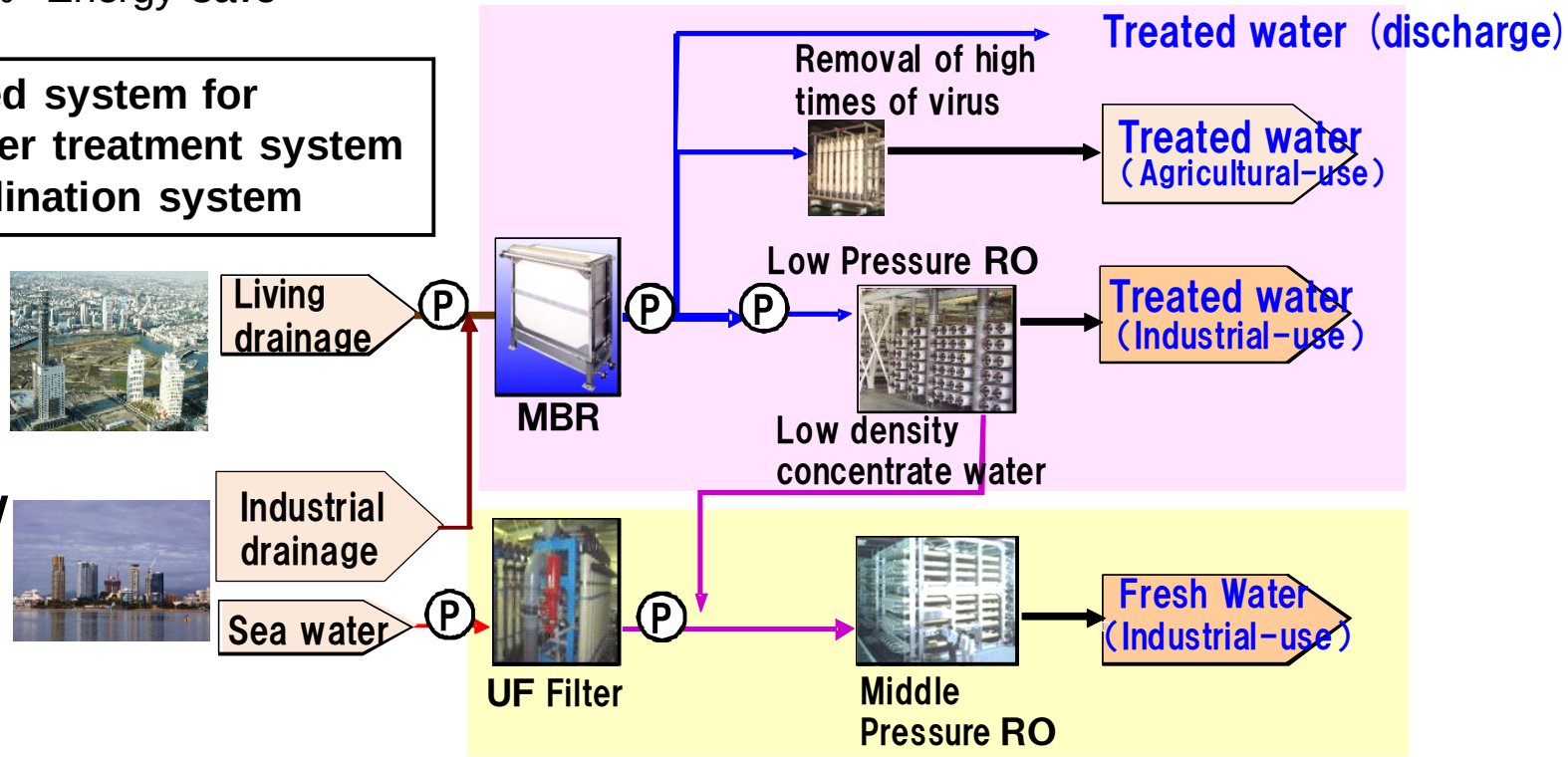
Construction of water resource circulation cycle

NEDO※Water Plaza (Kita-kyusyu city & Syunan city)

An advanced water circulation system by the integration of , industrial waste water treatment, and the seawater desalination to be proved.

Treated water to be supplied from high-quality level to the lower.
30% Energy save

Combined system for wastewater treatment system and desalination system

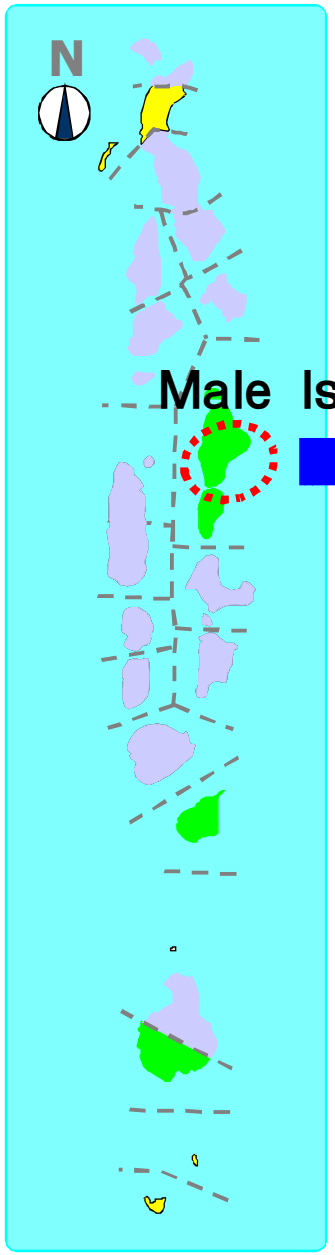


※NEDO: Independent administrative agency New Energy and Industrial Technology Development Organization

(Note) The business provider of this matter is "Overseas water circulation solution technology research union" that the Hitachi plant technology Ltd. and Toray Ltd. established on March 10, 2010.

Solution Portfolio

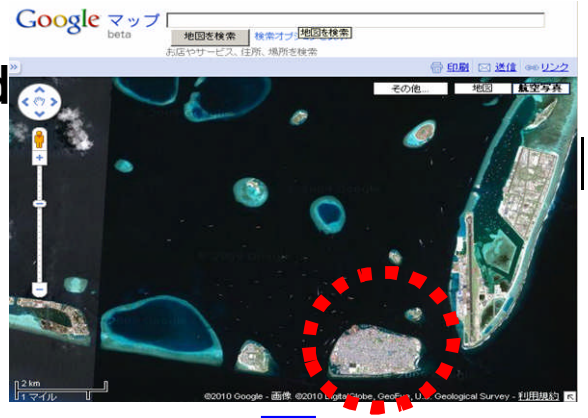
HITACHI
Inspire the Next



Management Business

Hitachi Plant Technologies, Ltd. acquired 20% share of Male' Water and Sewerage Company (Maldives).

Entered the management business



- Increase and update of existing equipment
- Accumulation of management knowhow
- Application of Intelligent water system

- Promotion of energy saving
- Improvement of managerial efficiency by total management of water

HITACHI

Inspire the Next

Ebara Engineering Service Co., Ltd.

February 2011

EES History

- 1912 Inokuchi Type Machinery Office founded by Issei Hatakeyama
- 1920 EBARA Corporation established
- 1956 EBARA-INFILCO established with INFILCO Inc(USA)
- 1994 EBARA-INFILCO became 100% subsidiary of EBARA Corporation
- 2009 All EBARA's water related business unit integrated to Ebara Engineering Service (EES)
- 2010 Mitsubishi and JGC joined EES
- 2011 EES has a new name from April 1

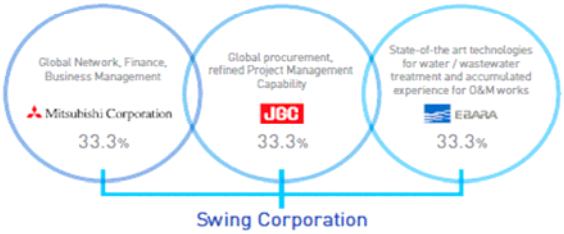
Swing Corporation

Swing Corporation Takes Off!

A major player in the Japanese water industry offering comprehensive services and technologies has a new name from April 1, 2011.

We are proud of our leading-edge water and environmental technologies, developed in Japan over the years. Under our motto "Produce, Refine and Manage water", we aim to combine diverse technologies with one-of-a-kind service to provide complete water support.

2010 Combined expertise of three leading Japanese companies.



We bring the world wealth and future health by offering comprehensive solutions to match customer needs, from engineering to water business management. We aim at further expansion in the global water business market.

2011

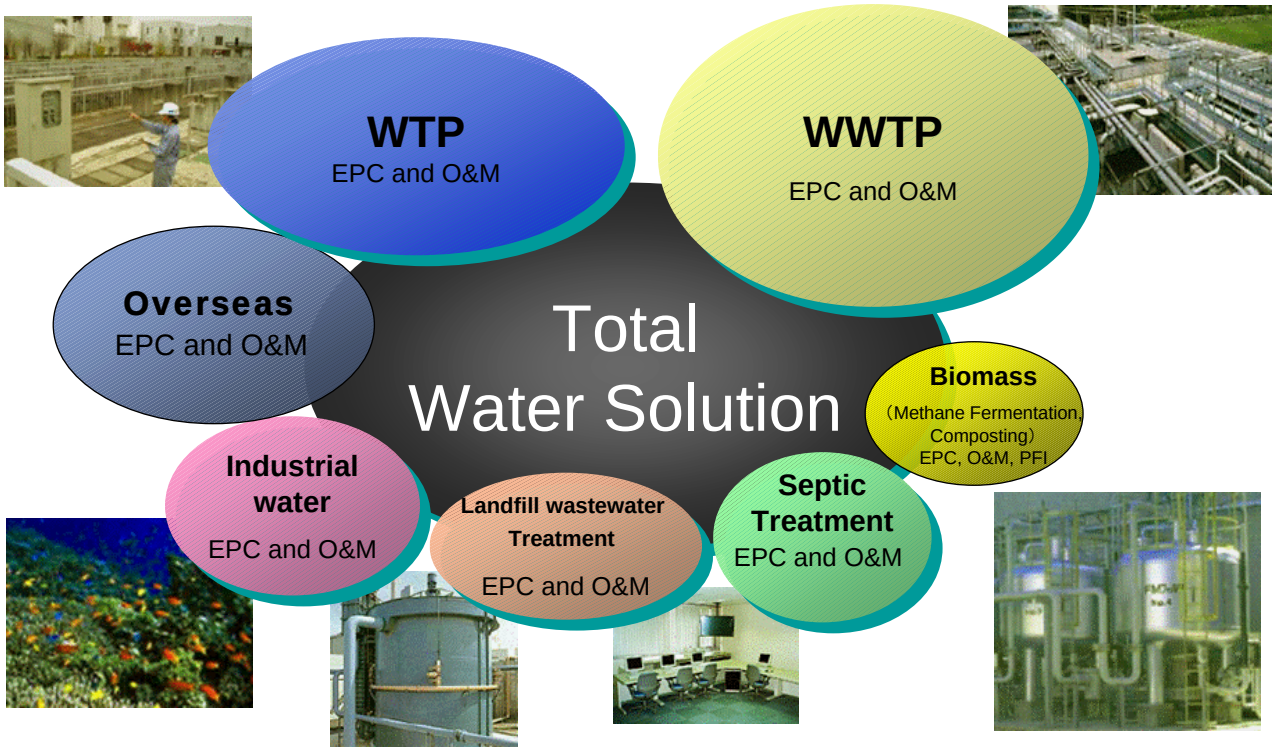
Sustainable **W**ater + ing

水 ing

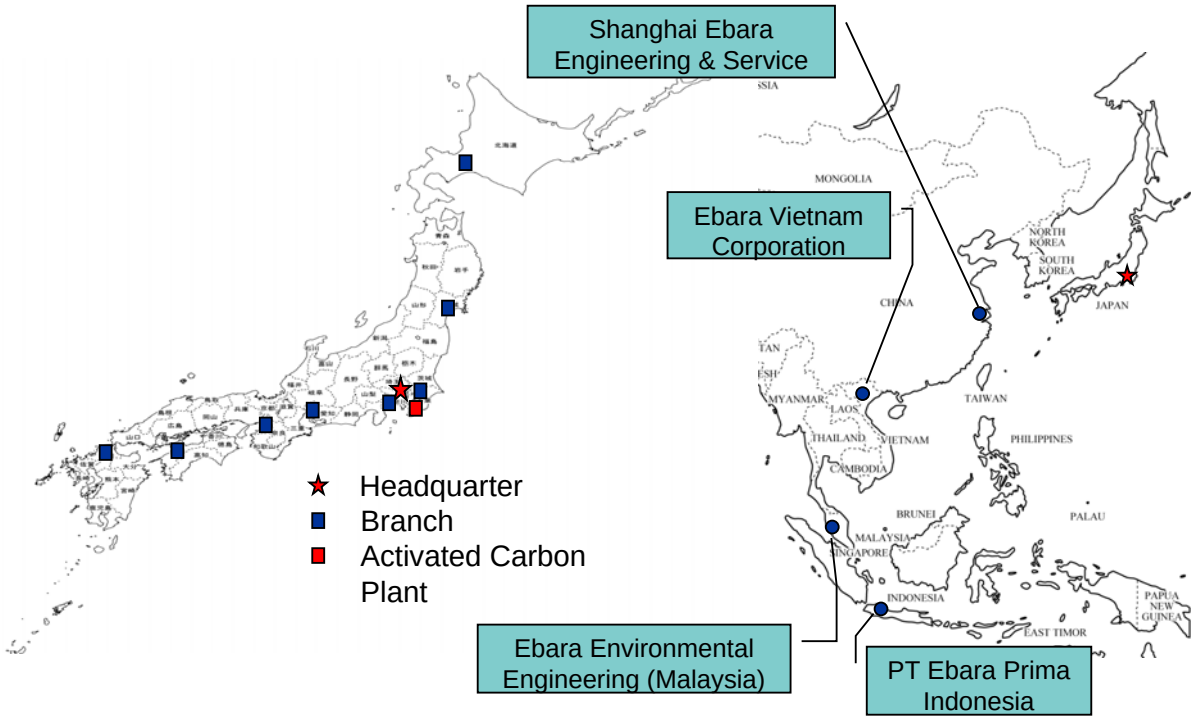
Swing Corporation

Our logo 水 ing in made up of the Japanese character for water 水 (pronounced sui in Japanese) and ing from English (an indicator of the progressive tense).

Abundant experience and accumulated technologies for total "Water" related solution



EES has 11 branches in Japan and 4 strategic subsidiaries in overseas



EES has abundant experience both in EPC and O&M works

EPC Business for public WTP & WWTP

Domestic Market Share : 30%

No.1 share in Japan

O&M Business for public WTP & WWTP

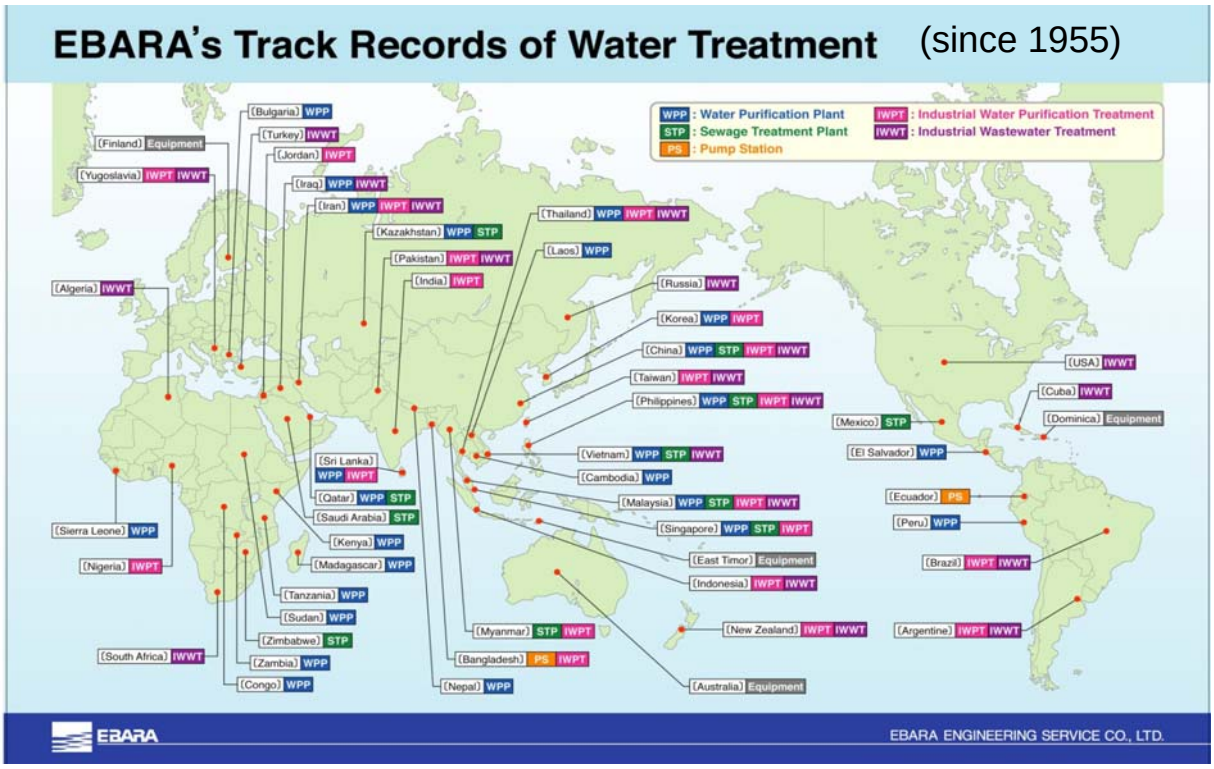
More than 450 facilities operated in Japan

for WTP	for WWTP
62 plants currently under operation	186 plants currently under operation

Septage/ Night soil	Landfill wastewater
60 plants currently under operation	50 plants currently under operation

Miscellaneous

EES accomplished EPC works all over the world and enjoys appreciations from our clients



Experience in Asia

WTP & WWTP in Kazahstan (100,000 m³/d & 135,000 m³/d)

WWTP in China (260,000 m³/d)

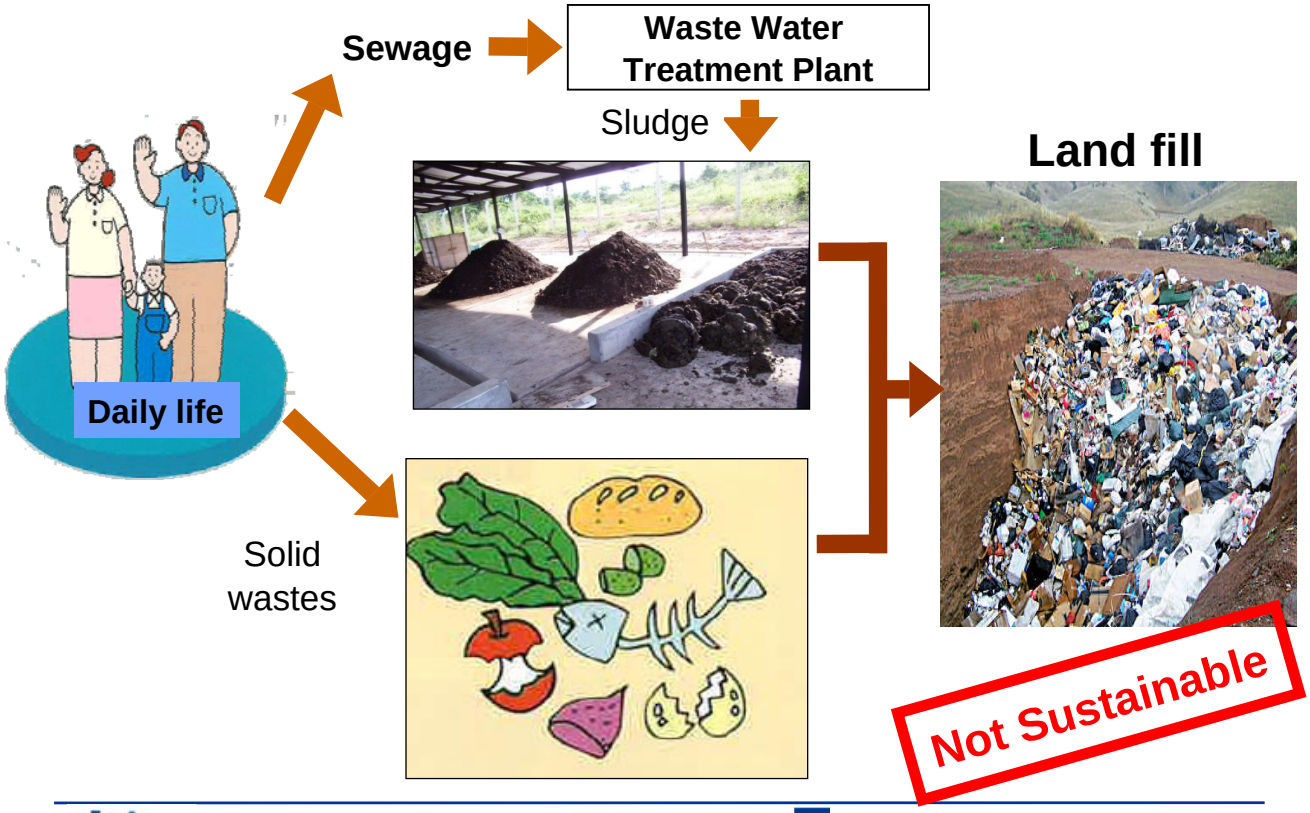
WWTP in Singapore (75,000 m³/d)

WWTP in Malaysia (59,000 m³/d)

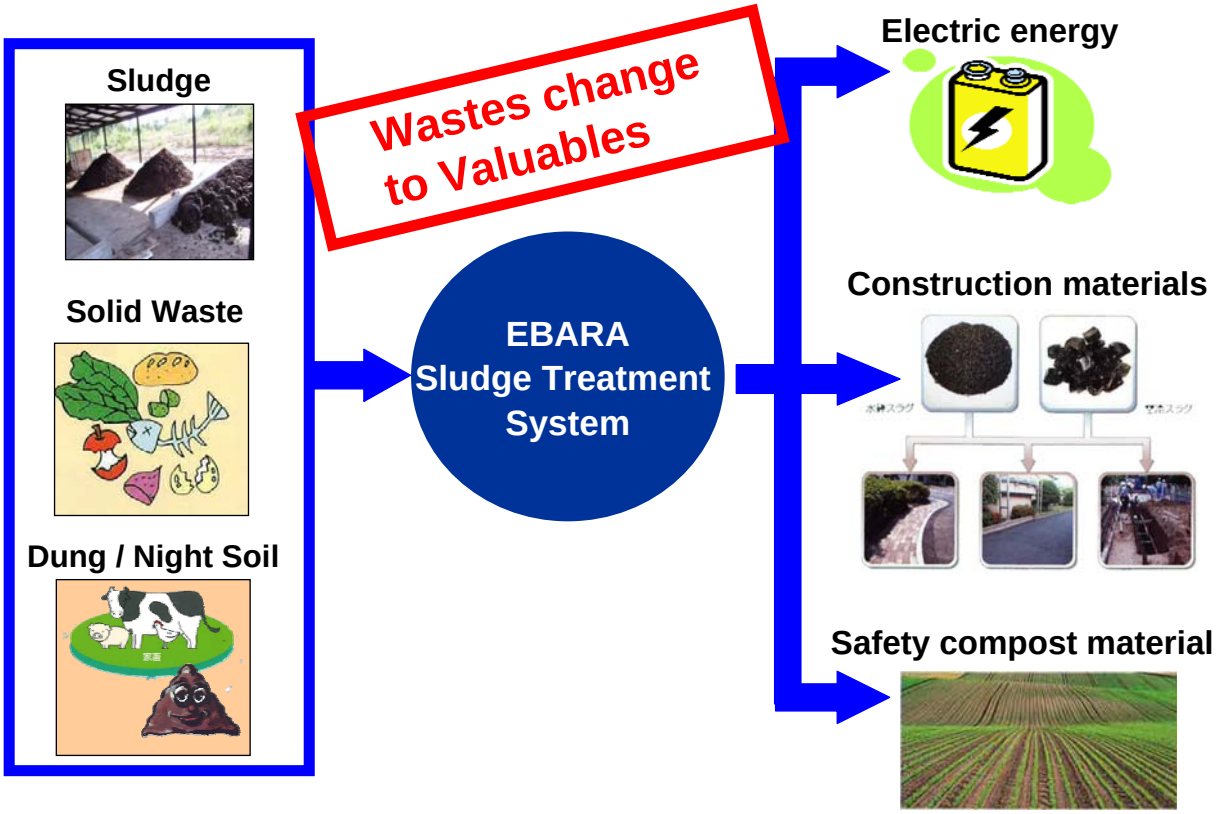
WTP in East Timor (5,200 m³/d)

WTP in Sri Lanka (5,000 m³/d)

Now landfill disposal but・・・



EBARA Sludge Treatment Technologies



Biogas Plant in KUROBE City

1.Sewage Sludge (25,034 m3/year)
2.Septic Tank Sludge (134 m3/year)
3.Agricultural Village Sludge (1,080 m3/year)

Mixing

Biogas Power Generator (95kw)

Electric Power (Captive)

Heat

Boiler

Dryer

Dry Sludge (W/Cont. 40%)

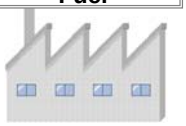
Biogas

Coffee grounds (2,884 m3/year)

Methane Fermentation

Dewatering

Coal Alternative Fuel



Power Plant

Biogas Plant in JYOETSU City

Kitchen Waste (42.2 ton/day)

Steam

Methane Fermentation

Biogas

Boiler

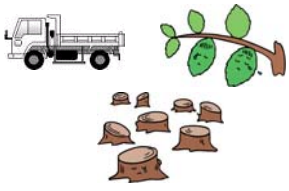
Digester

Waste Water Sludge (52.1 m3/day)

Dryer

Dried Sludge W/Cont.10%

Cement Material



Burner

Hot Air

Wood Waste (7.5 ton/day)

Pellet

Fuel Pellet

Project Experience: Viet Nam

Activated Sludge, Advanced Treatment (Denitrification), Sludge Dewatering

Advanced sewage treatment in Hanoi
CP-12
(2,300 m3 /d & 3,700 m3 /d, 2005)

Sewage treatment in HCM
(141,000 m^3/day, completed in 2009)

Sewage treatment in in Thang Long North
(42,000 m^3/day, completed in 2008)

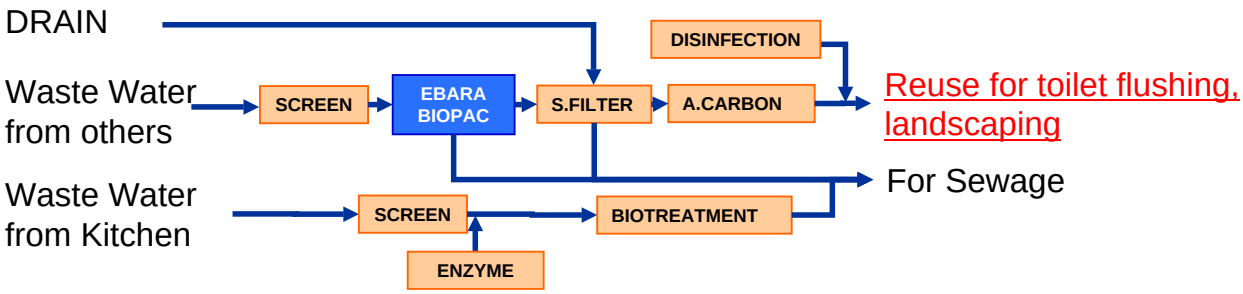
Water reuse for commercial building

Roppongi Hills

Treated Water ; 1,050m3/d

Yebisu Garden Place

Treated Water ; 1,051m3/d



Project Experience: Japan

Leachate Treatment
in Central Breakwater Landfill Site
(20,500 m3/d)

Fenton, Bio-Denitrification, Activated Carbon

Ebara Engineering Service Co., Ltd.

↓

SWing Corporation

To

provide best “Sustainable Water” solution based on advanced key technologies