Sewage works of Yokohama City

Today's topics

[1] Introduction of Yokohama City

[2] Sewerage development

[3] Wastewater Treatment Method

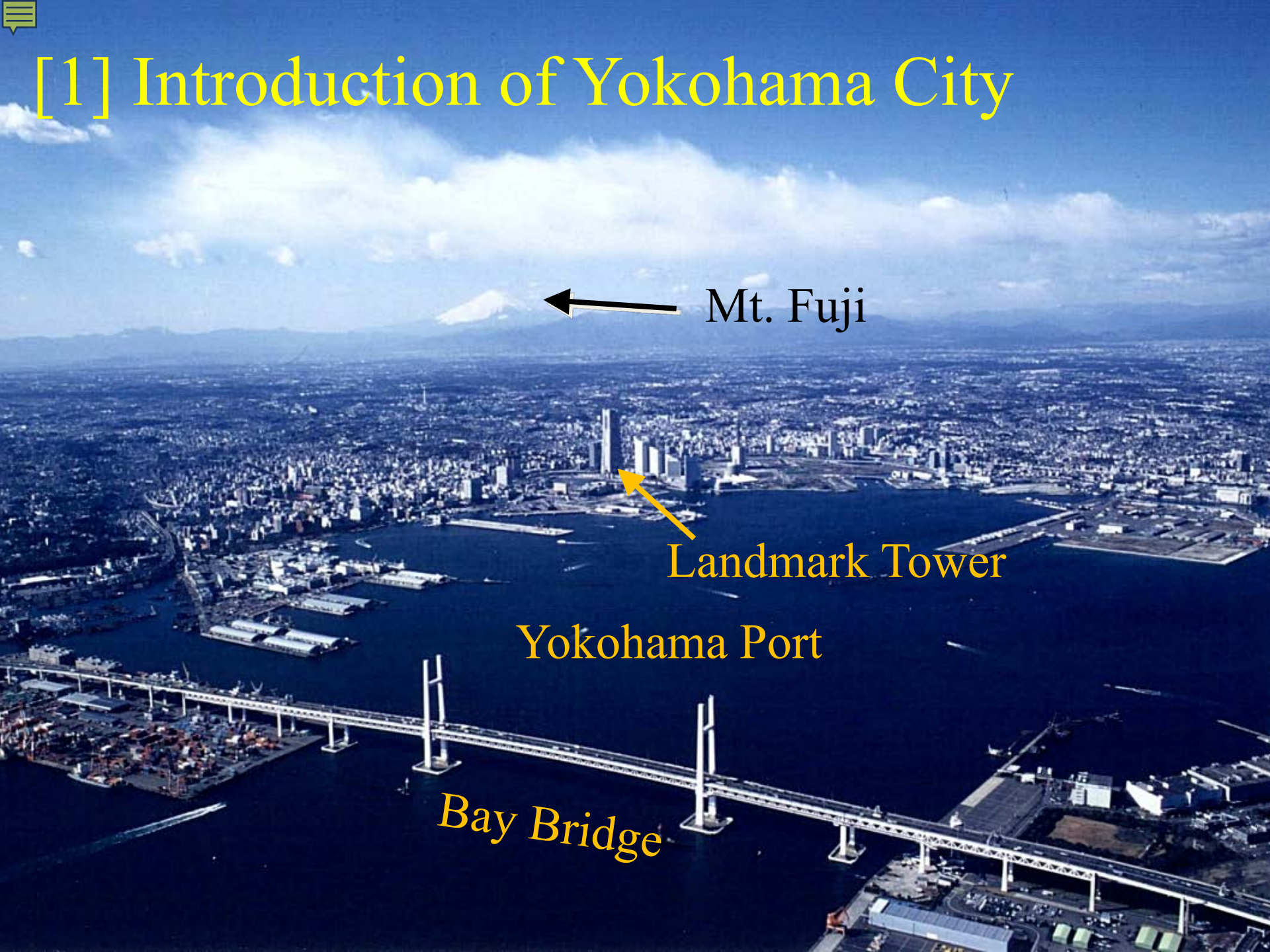
[4] Sludge Treatment Process

[5] Effective utilization of sewer resources

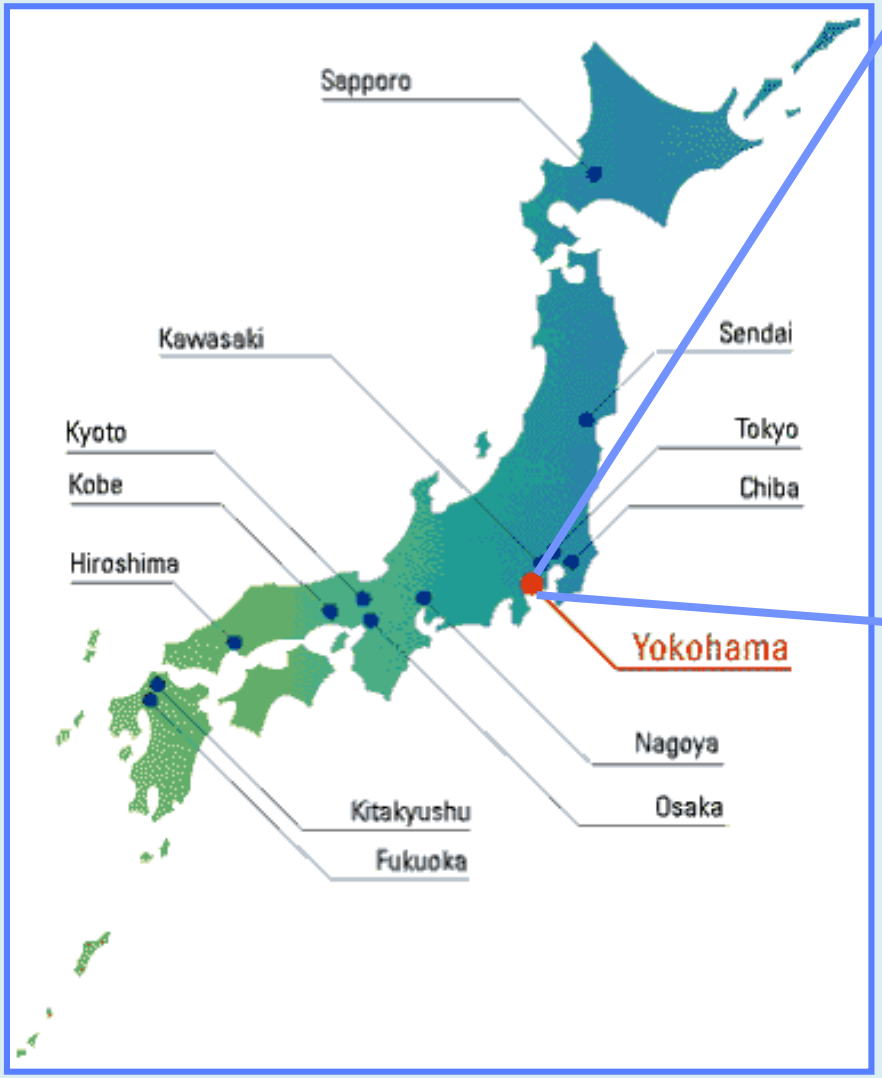
[6] Comfortable water environment

[7] International Cooperation

[1] Introduction of Yokohama City



Outline



Land area	435 km^2
Population	3.7 million
Household	1.6 million
Budget (FY 2015)	USD 34 billion

(JPY/USD = 100)

International City

Nissan Stadium, where the final game of Rugby World Cup 2019 will be held.

Pacifico Yokohama is a convention center, where the ADB's 50th annual meeting was held in 2017

M	Meeting
I	Incentive Travel
C	Convention
E	Event/Exhibition

International conventions

91 times (2016)

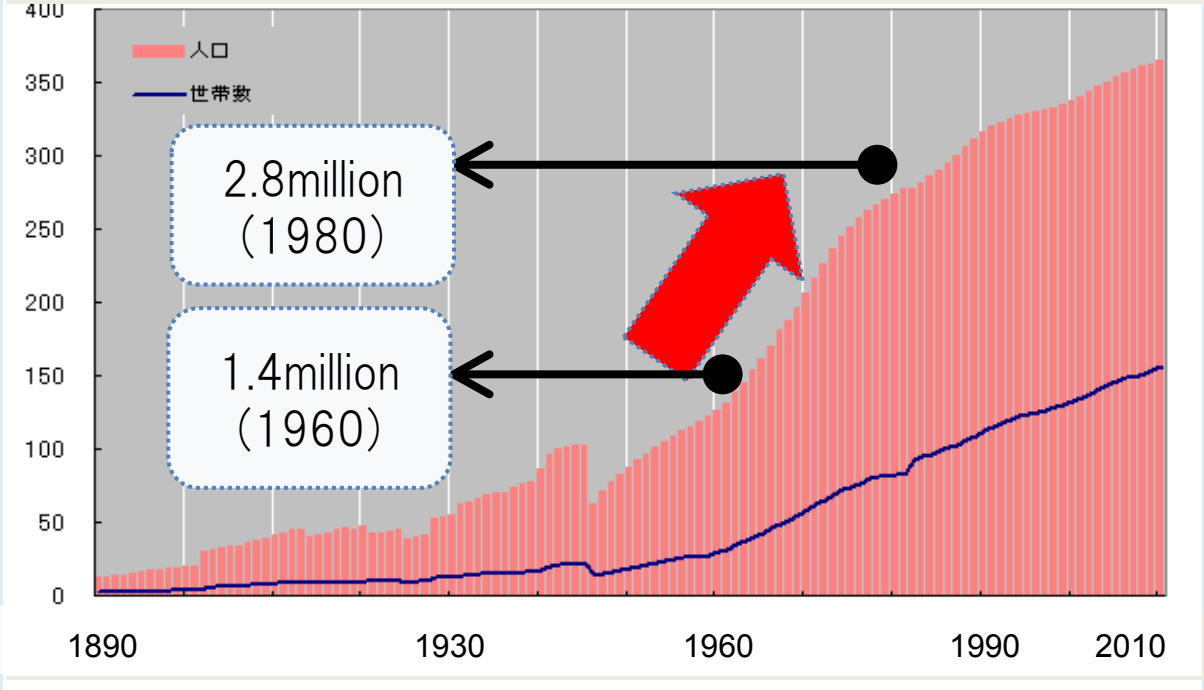
The high economic growth period

High economic growth starting in the 1950's

High population density
⇒ disorderly urban sprawl
⇒ rapid deterioration of the housing environment

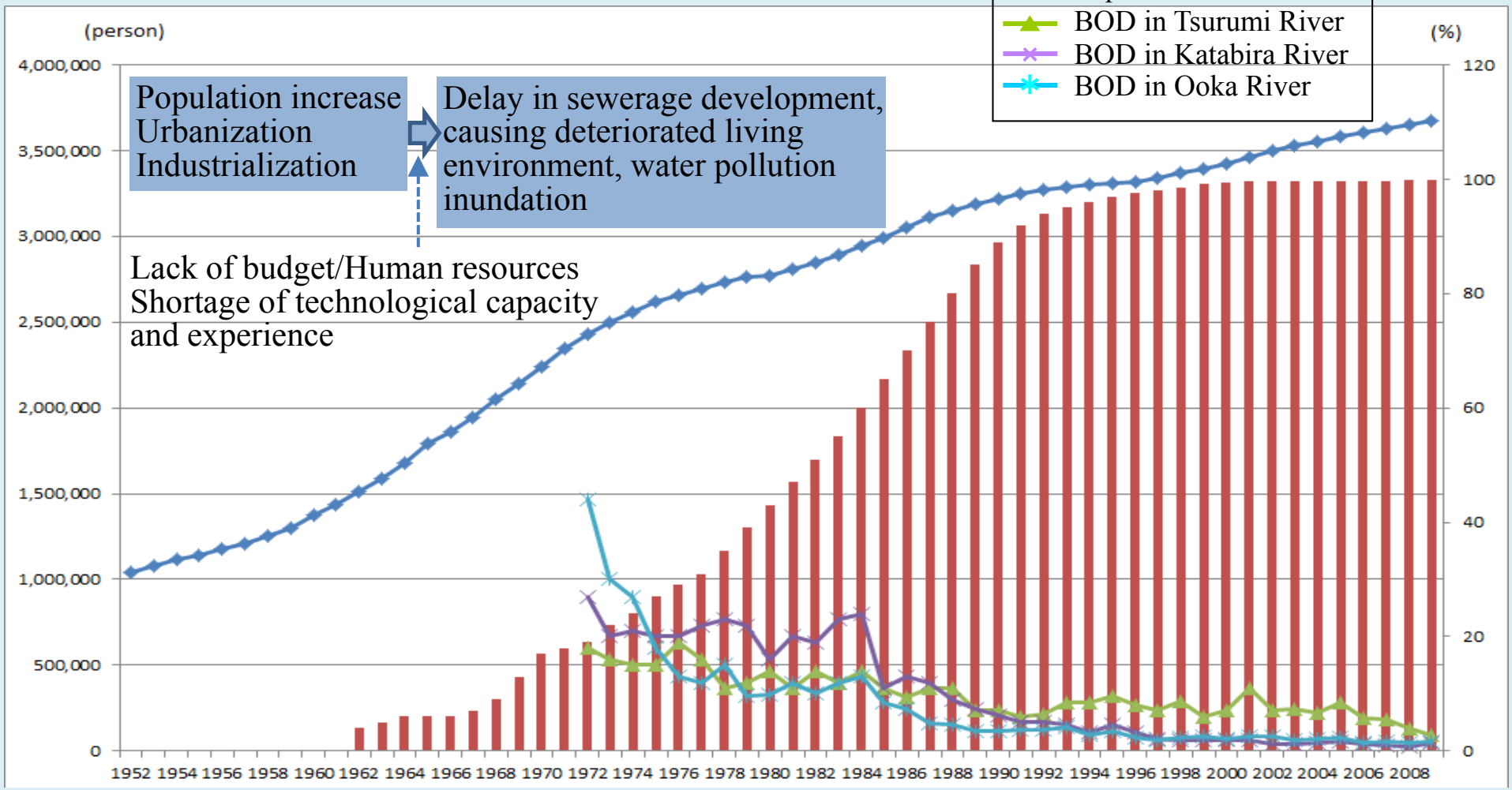
The present population
About 3.7 million

Increase in population and number of households



The harm caused by urbanization

[2] Sewerage development

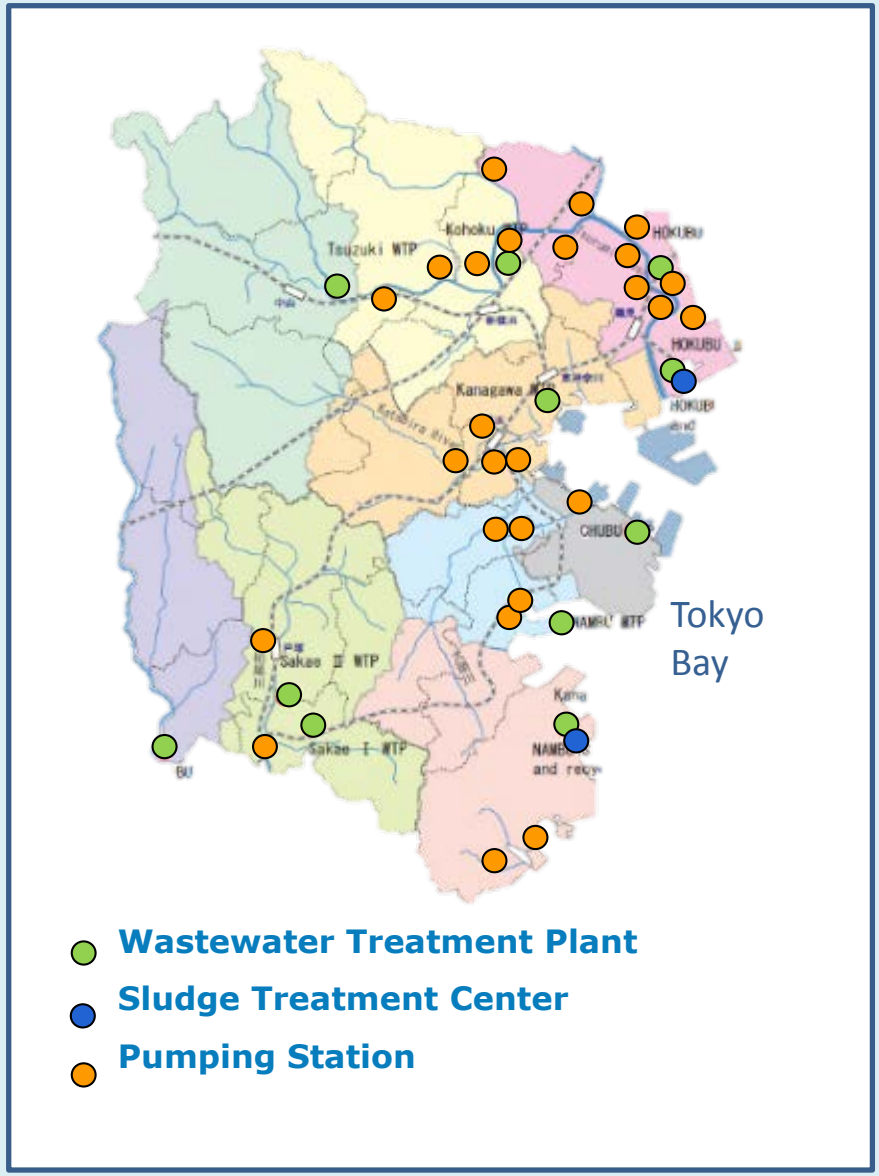


Yokohama's approaches

- Strategic planning and phased construction
- Adoption of advanced technologies
- Cooperation with private sector
- Sound financial management
- Strengthening of public relations
- Comprehensive flood control system

Treatment district and facilities

Item	Value
Sewerage Service Rate	99.9%
Treated Wastewater	1.6mil.m^3/day
Treatment zones	9 zones
Wastewater Treatment Plant	11 places
Sludge Treatment Center	2 places
Pumping Station	26 places
Total Sewer Length	11,800 km



Budget and Personnel

	Budget	Employees
Total in City	USD 32.9 billion	25,283
Sewage works	USD 2.6 billion (8%)	806 (3%)

(JPY/USD = 100)

(FY 2012)

Management Policy for Sewage Works

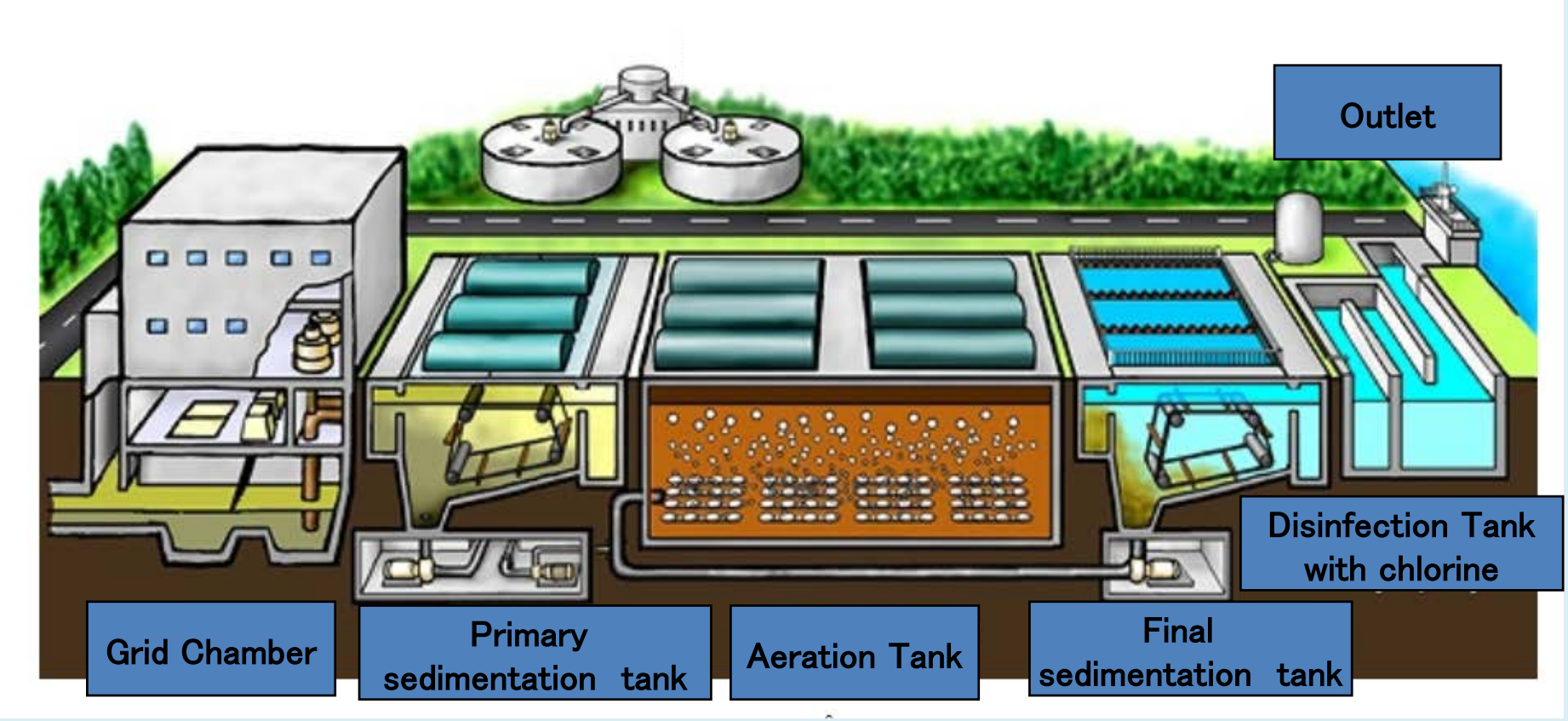
- ✓ *Improvement of water quality*
  - Advanced treatment method, Combined Sewer Overflow control
- ✓ Contribution to disaster-resilient City
  - Comprehensive flood control, inclusive of structural and non-structural measures
  - Earthquake-resilient facilities and business continuity preparedness
- ✓ Contribution to global environment
  - Energy and resource recovery (esp. in sludge treatment)
  - International technical cooperation
- ✓ Asset Management
  - Preventive O&M and rehabilitation of aging facilities
  - Sustainable financial management
  - Training of staffs, publicity

Regeneration of the Environment

[3] Wastewater Treatment Method

Conventional Activated Sludge (CAS Process)

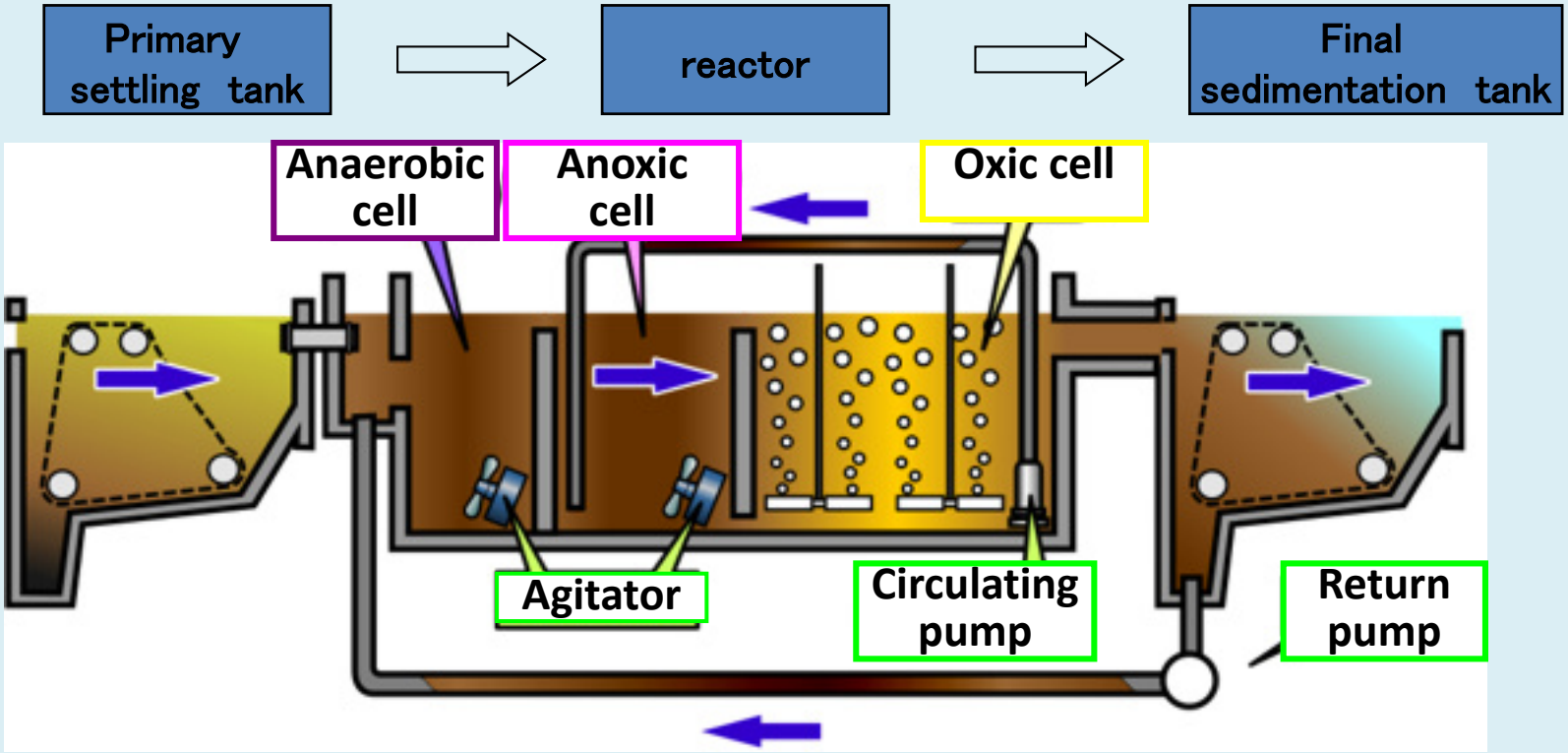
CAS is a standard wastewater treatment method that aims to remove organic substances.



Advanced Treatment Method

Anaerobic-anoxic-oxic Process (A2O Process)

The A2O process is a method that aims to remove nitrogen and phosphorus in addition to organic substances.



Red tide in closed water area

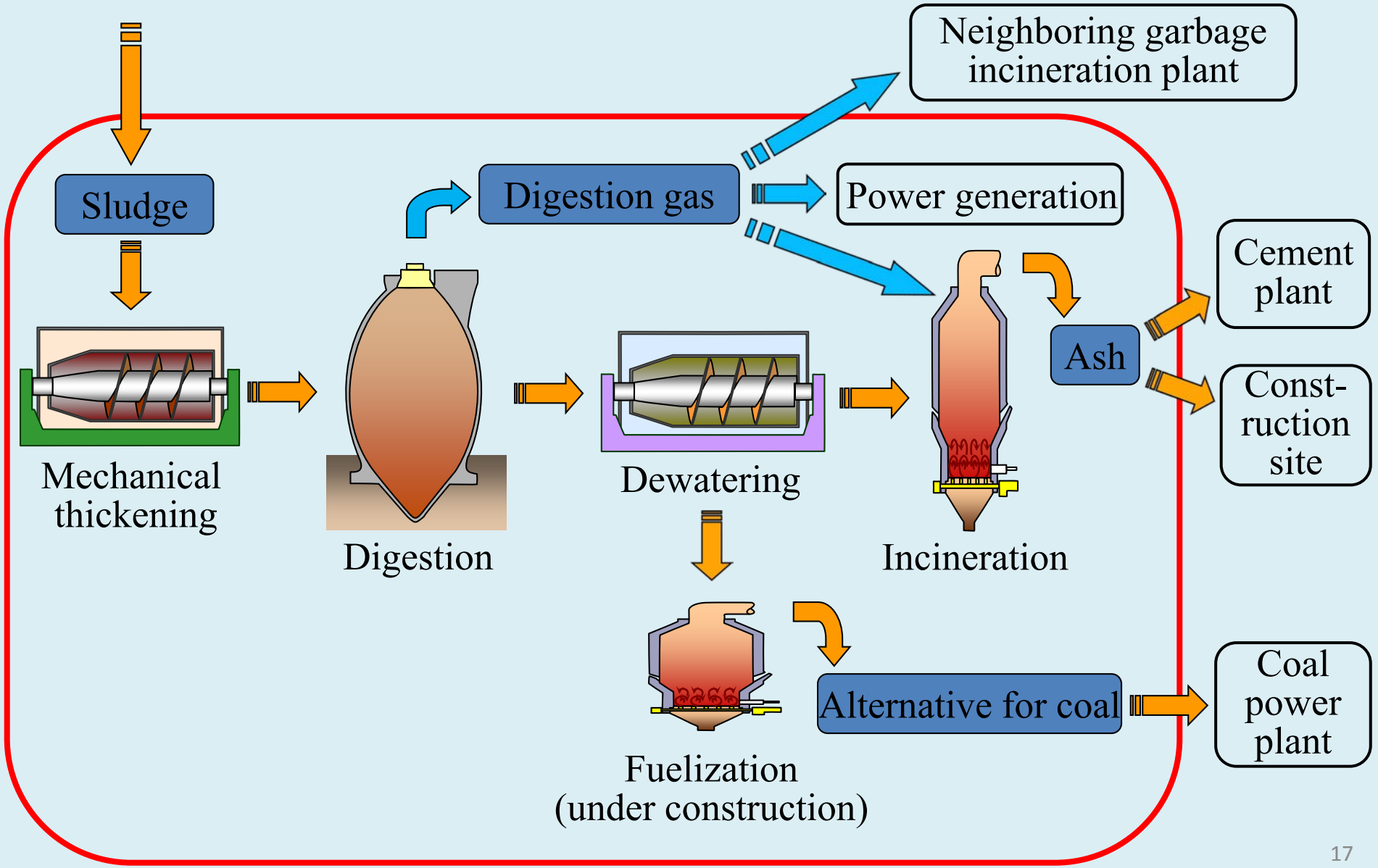
It it necessary to remove not only organic matters but also nitrogen and phosphorus to prevent red tide in closed water area.

Average value of water quality（2011）

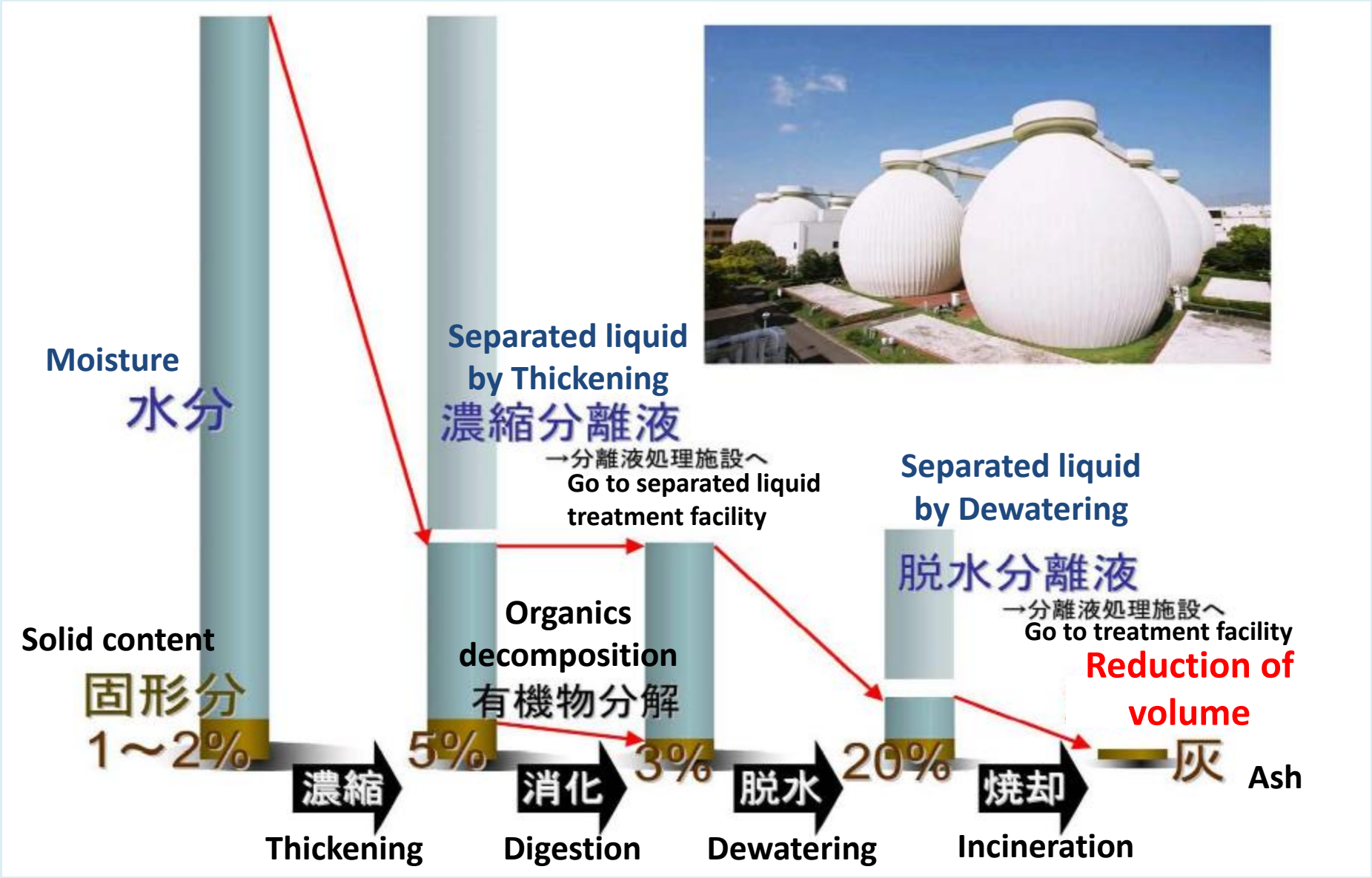
Category	Water quality (mg/l)(2011)		Target (mg/l)	Removal rate (%)
	Influent	supernatant		
BOD	170	5.3	25	97
COD	90	8.9	20	90
SS	150	2.0	50	99
T-N	27	9.4	30	65
T-P	3.5	1.1	3	69

Nitrogen/phosphorous removal rate（%）			
Standard methods (1997）		**Advanced treatment (2010）**	
Nitrogen	**Phosphorous**	**Nitrogen**	**Phosphorous**
48	**54**	**74**	**85**

[4] Sludge Treatment Process

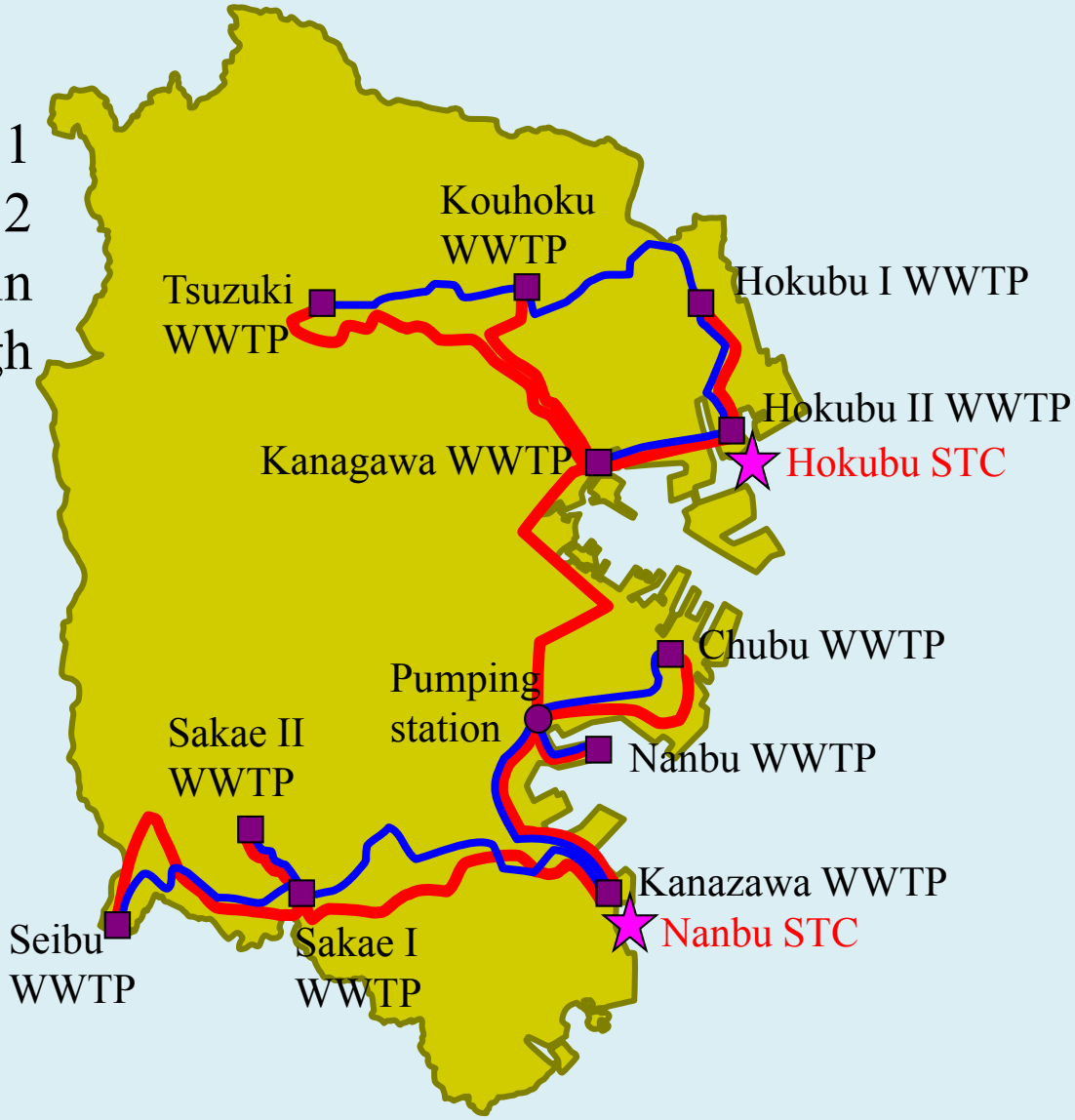


Reduction of sludge volume



Centralize sludge treatment since 1988

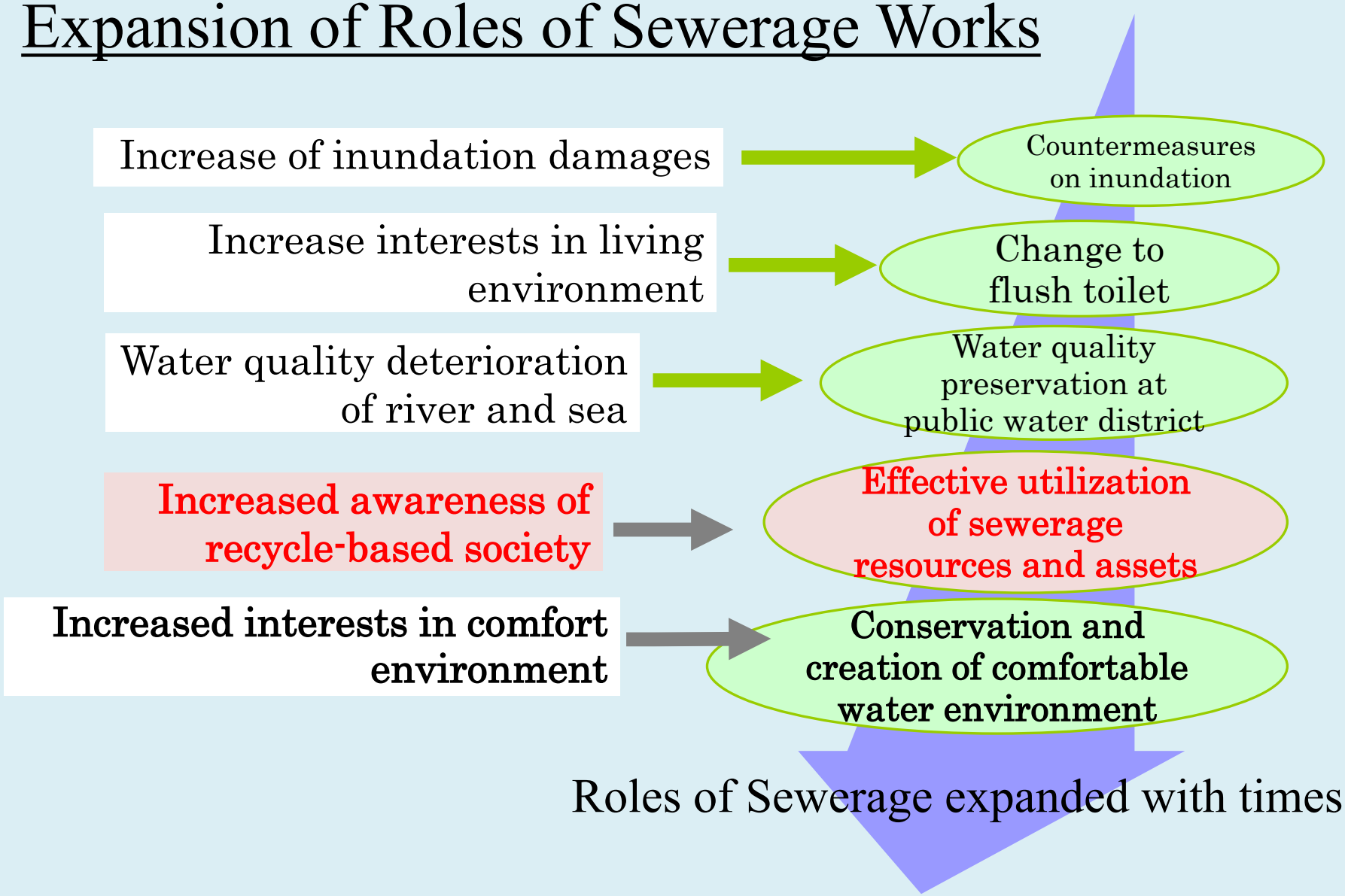
Sludge generated in 11 WWTPs conveyed to 2 Sludge Treatment Centers in the industrial zones through pressurized pipelines



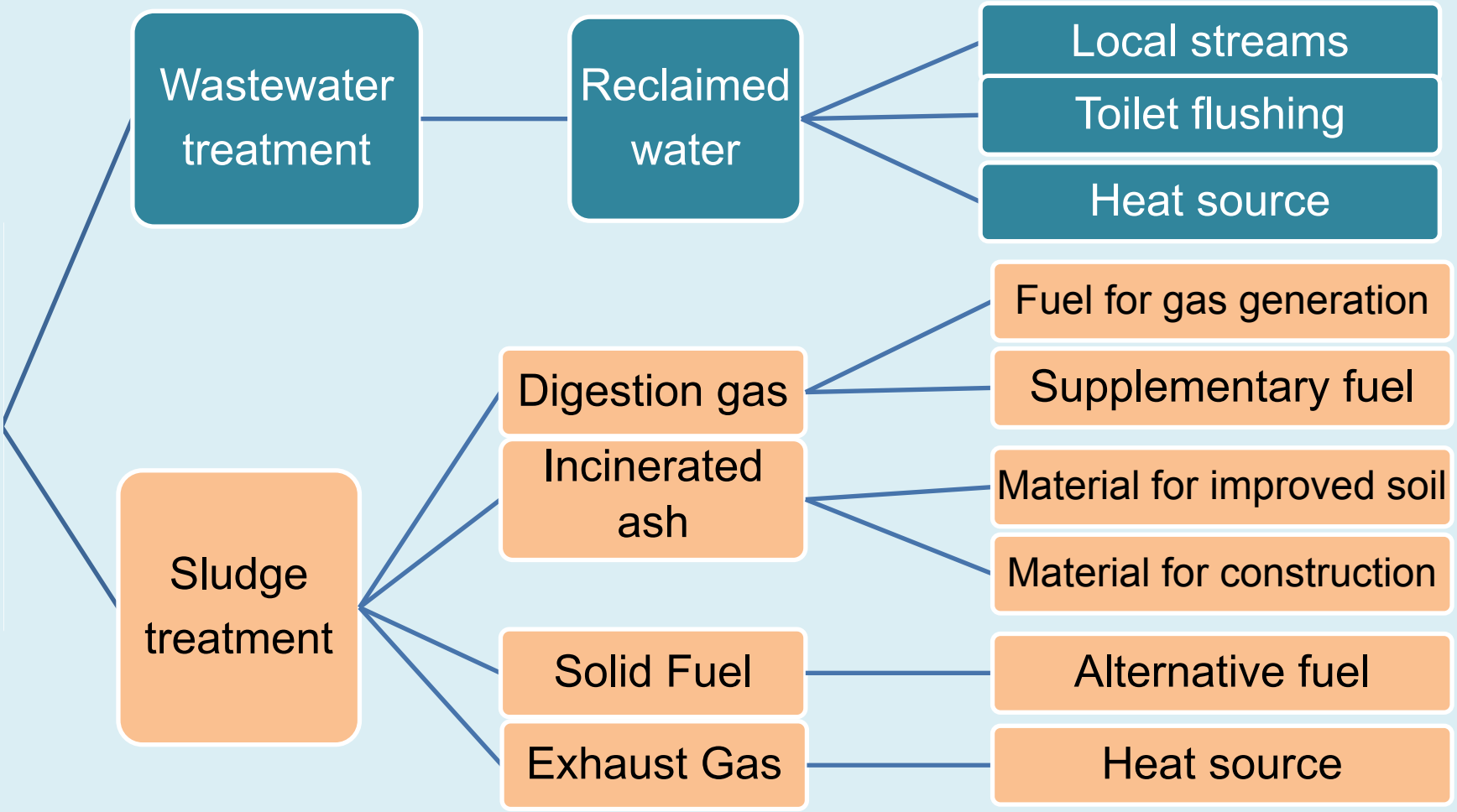
Total pipeline length: 153 km

[5] Effective utilization of resources

Expansion of Roles of Sewerage Works



Effective Use of Wastewater and Sludge



Treated water

Wastewater treatment plant

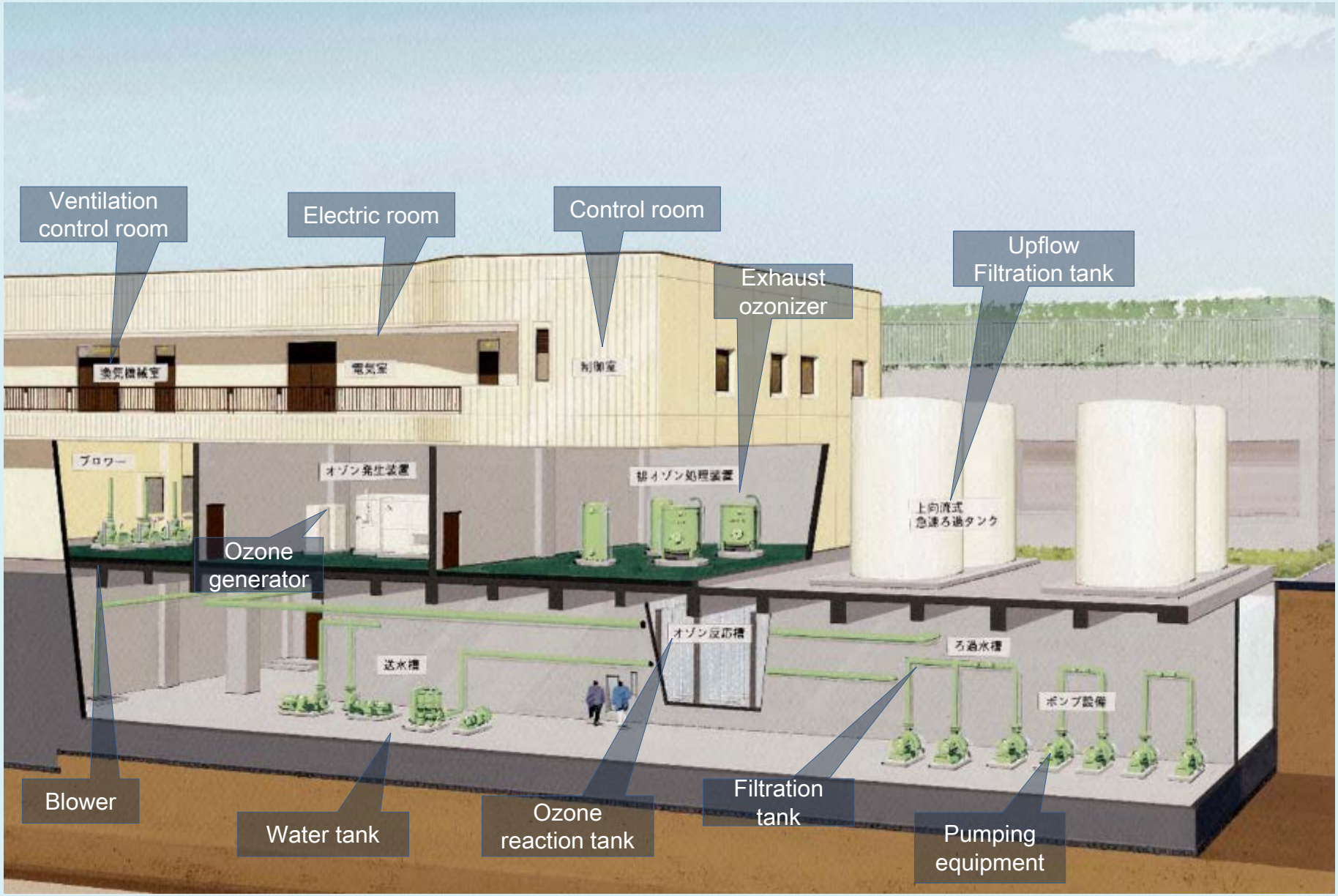
Water discharged into public water bodies

Used in facilities such as toilets（Sold recycled water）

Usage for small streams

Heat/Cool for air conditioning

Overview of reclamation of treated wastewater



Treated Water

Sewage Sludge

Sludge treatment center

Digestion gas

Incinerator ash

Coal alternative fuel

Power generation using digestion gas

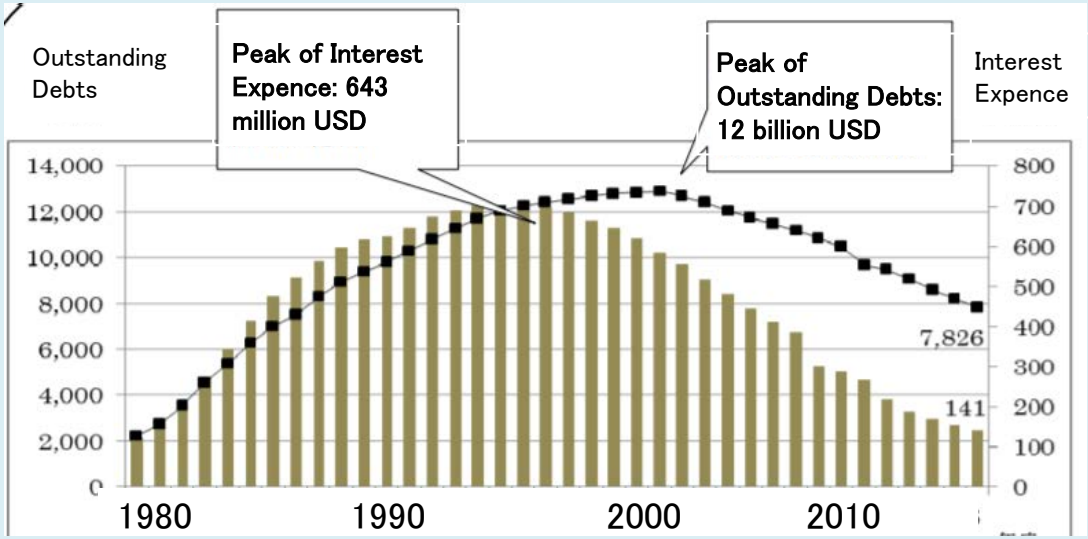
Auxiliary fuel for incineration

Improved soil for backfill

Cement raw material

Effective Use of Facilities

Appropriate Asset Management



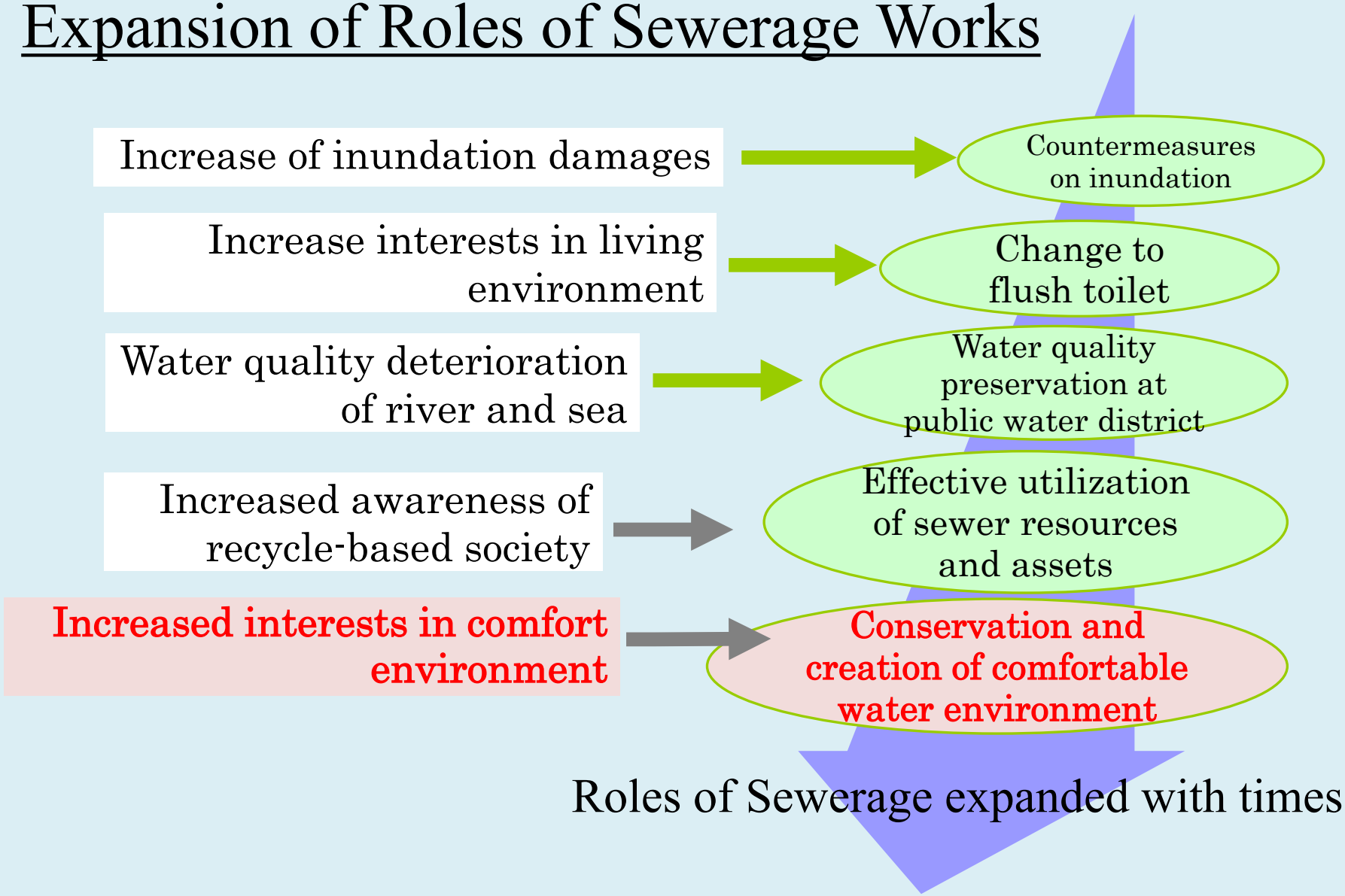
Well-planned pipe cleaning
(Preventive Maintenance System)

Solar Panel on the roof of treatment facility

TV camera survey

[6] Comfortable water environment

Expansion of Roles of Sewerage Works



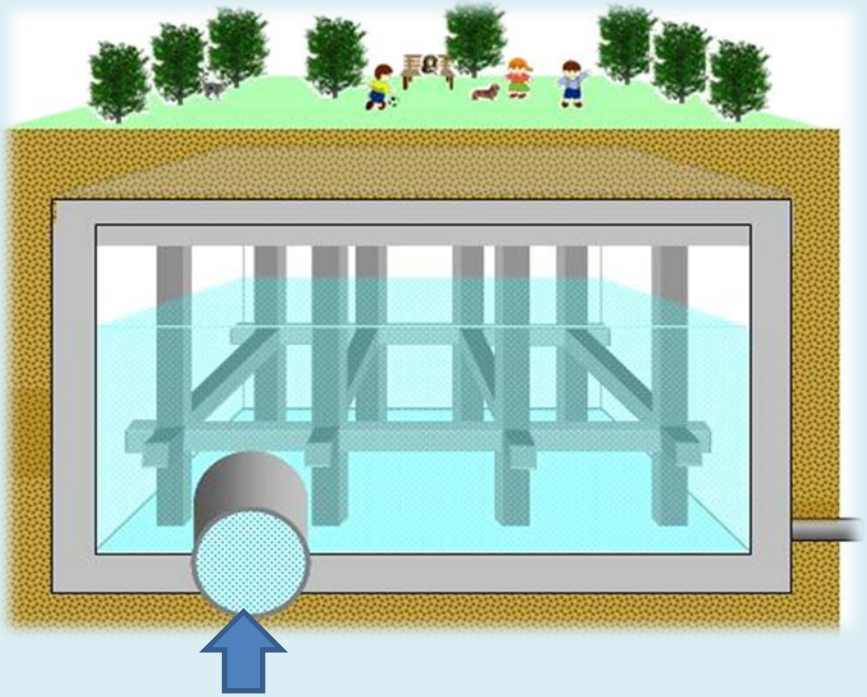
Restoration of water environment

Maintained by the community

Treated wastewater from WWTP

Environment and Disaster Prevention

Public Park and Underground Rainwater Tank



Rainwater from Sewer

[7] International Cooperation in the field of wastewater management

- **Actions in Cebu city, the Philippines**

Collaboration between Cebu and Yokohama

Government of Philippines

Relationship between the National Government

Government of Japan

JICA

JICA、ADB、WB etc

Collaboration

City of Cebu

Cooperative agreement between the cities

City of Yokohama

MCDCB

Local businesses

Relationship between businesses and academic organizations

Private sector and academic sector

Promote sustainable urban development

Collaboration between Cebu and Yokohama

2012 **Cooperative agreement** for sustainable urban development was signed

2013 to 15 **Long-term vision** for urban development in metropolitan Cebu was elaborated

2015 **Road map** for the urban development including improvement of septage management and sewerage system was also elaborated

2015 Amcon's **pilot project** on septage management

2016 **Project proposal by Yokohama City** to JICA to improve septage management in Metro Cebu to JICA

2017 JICA started **feasibility study** for the septage management project

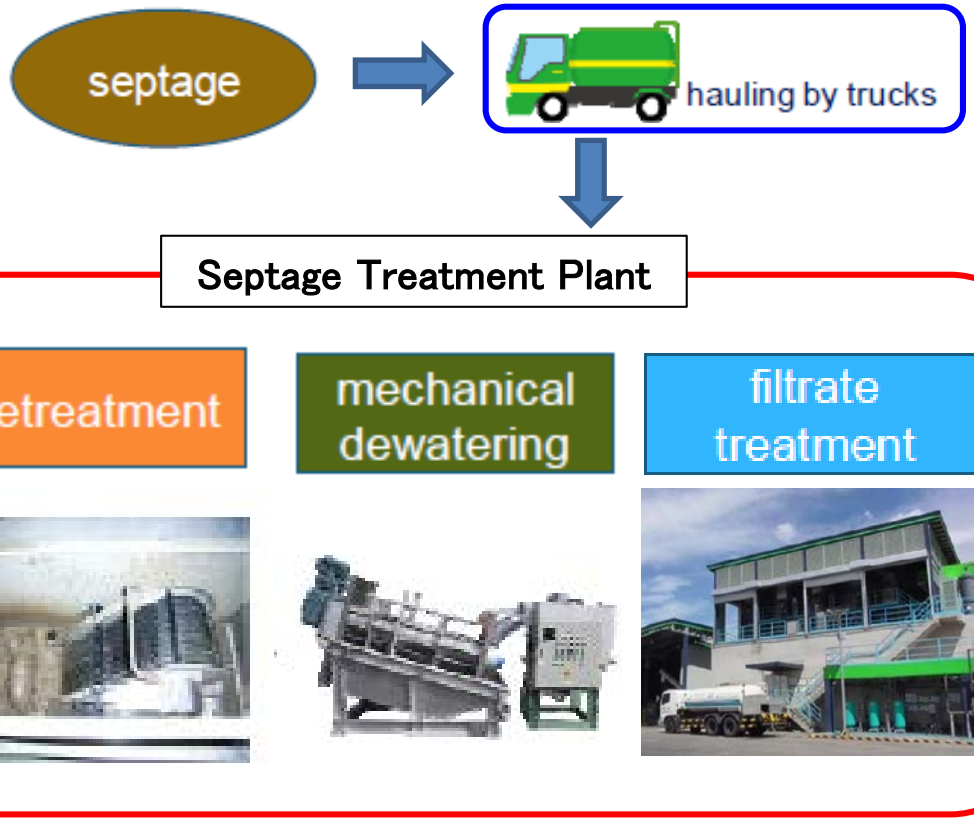
Actions in Cebu city, the Philippines

Sludge dewatering equipment from Amcon Inc

	Sludge separator of Amcon	German equipment
Rate of moisture content of mud cake after pressing	75%	87.8%

Outline of the Septage Management Project

I. Septage Collection and Transport



II. Septage Treatment

III. Sludge Disposal/Reuse

thank you for your attention