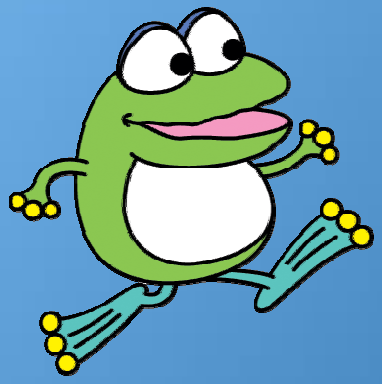
Concept of asset management, performance indicator and customer publication in Yokohama Waterworks Bureau, in response to the Great East Japan Earthquake



Character of YWWB
“Hama-pyon”

Yokohama Waterworks Bureau,
Planning Division
Hiroyuki KONDO

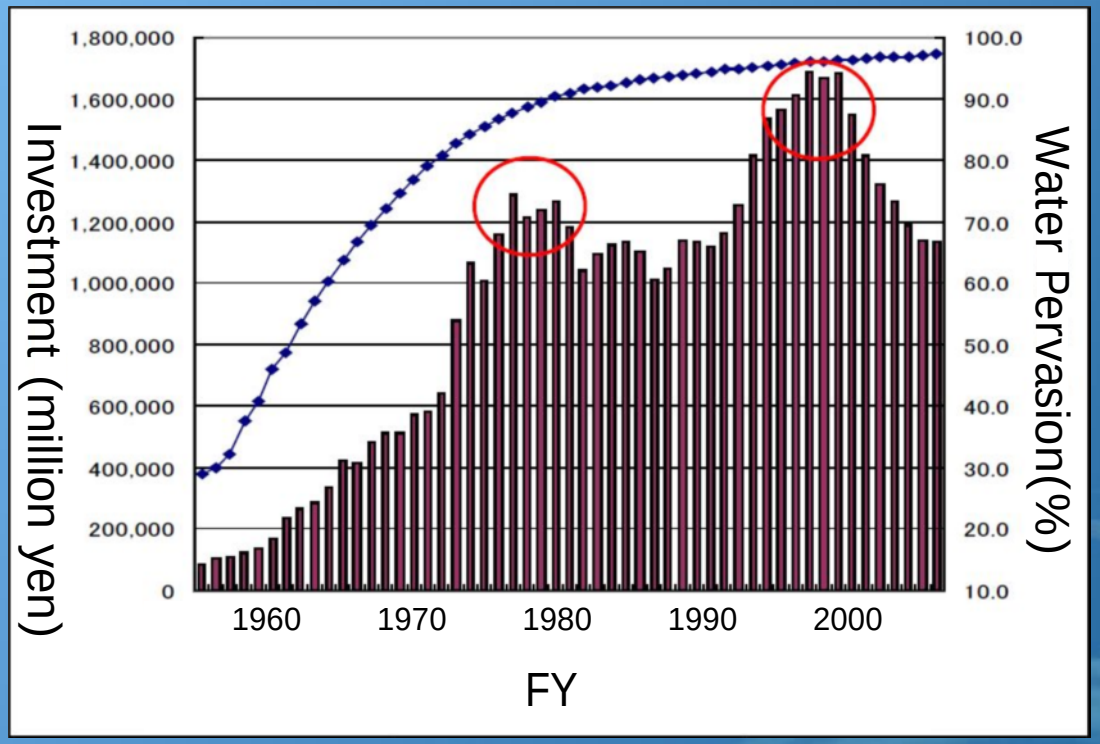
Contents

- Situation of water utilities in Japan
- Asset management of water utilities in Japan
- Asset management in YWWB
- Response to the Great East Japan Earthquake

Situation of water utilities in Japan

Transition of Investment for waterworks facilities in Japan

Water coverage in Japan is about 97.5% (2009)
Investments for waterworks facilities have two peaks in 1970s and 1990s

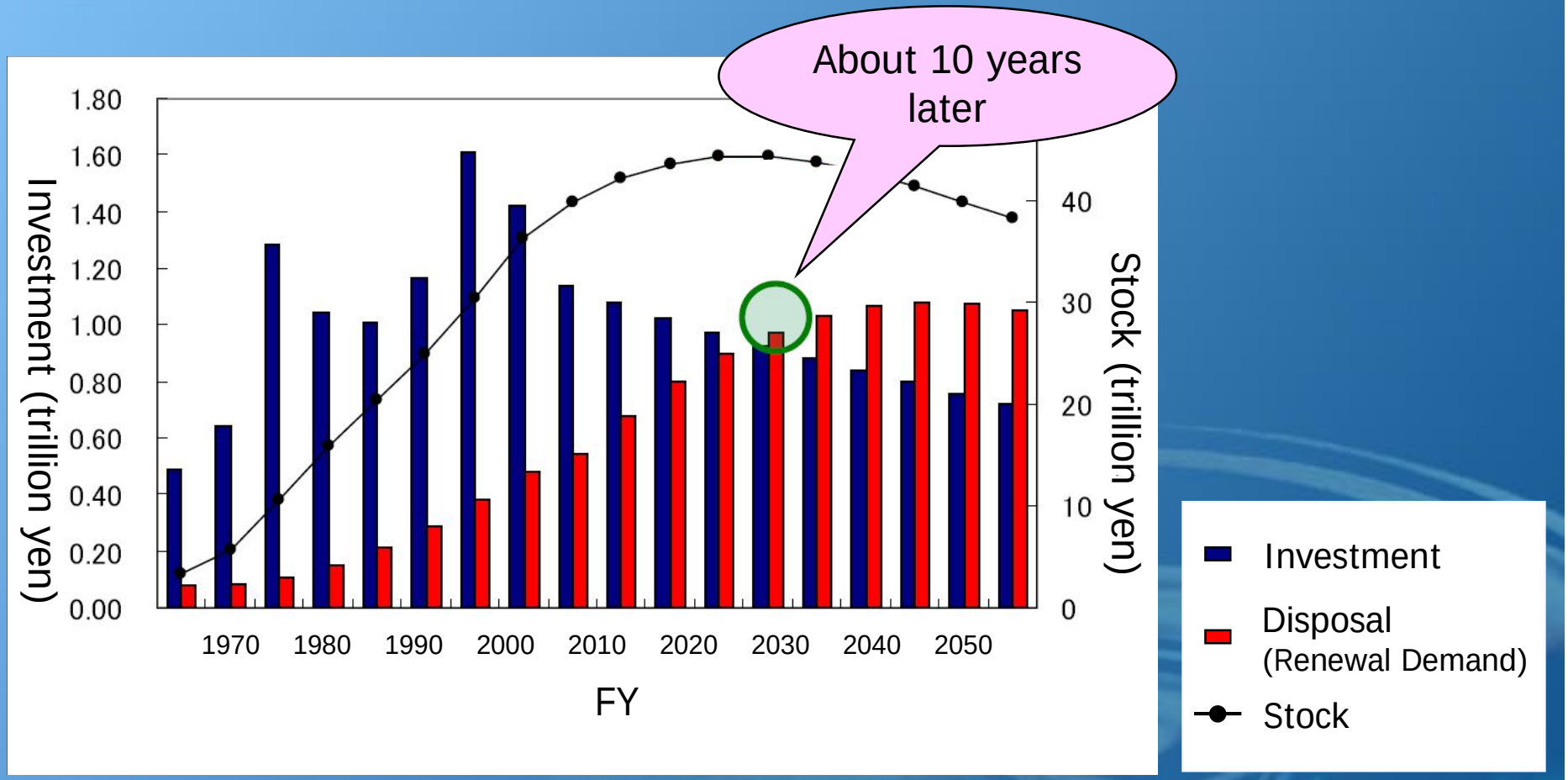


Source: Waterworks Vision Follow-up Committee

In Japan, a lot of facilities that were developed in the high economic growth period in the 1970s will demand the renewal.

Transition of Investment and renewal demand

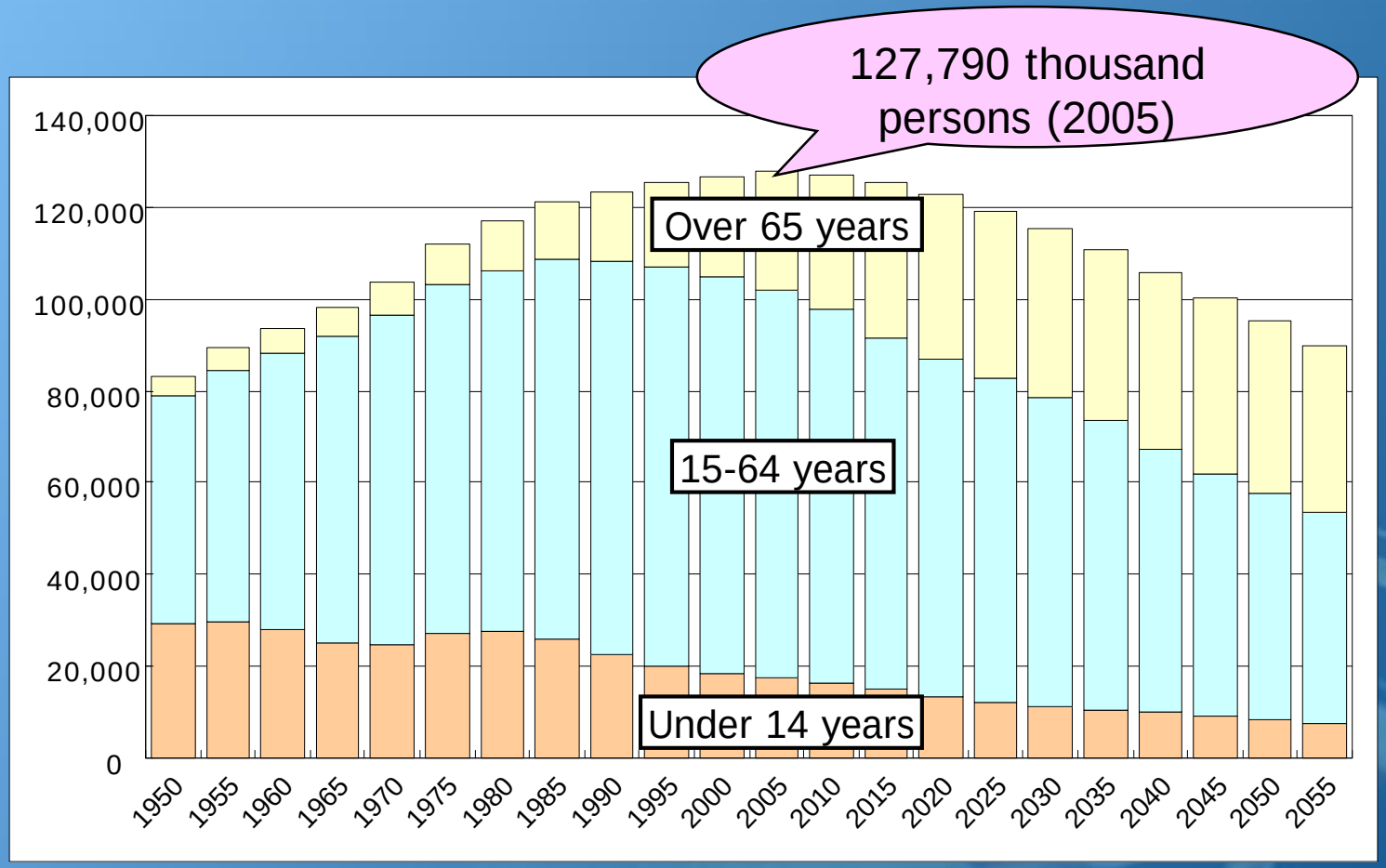
Population decreases and increase of revenue is not expected in the future.
Investment for waterworks facilities will exceed renewal demand (2020~2025)



Source: Waterworks Vision Follow-up Committee

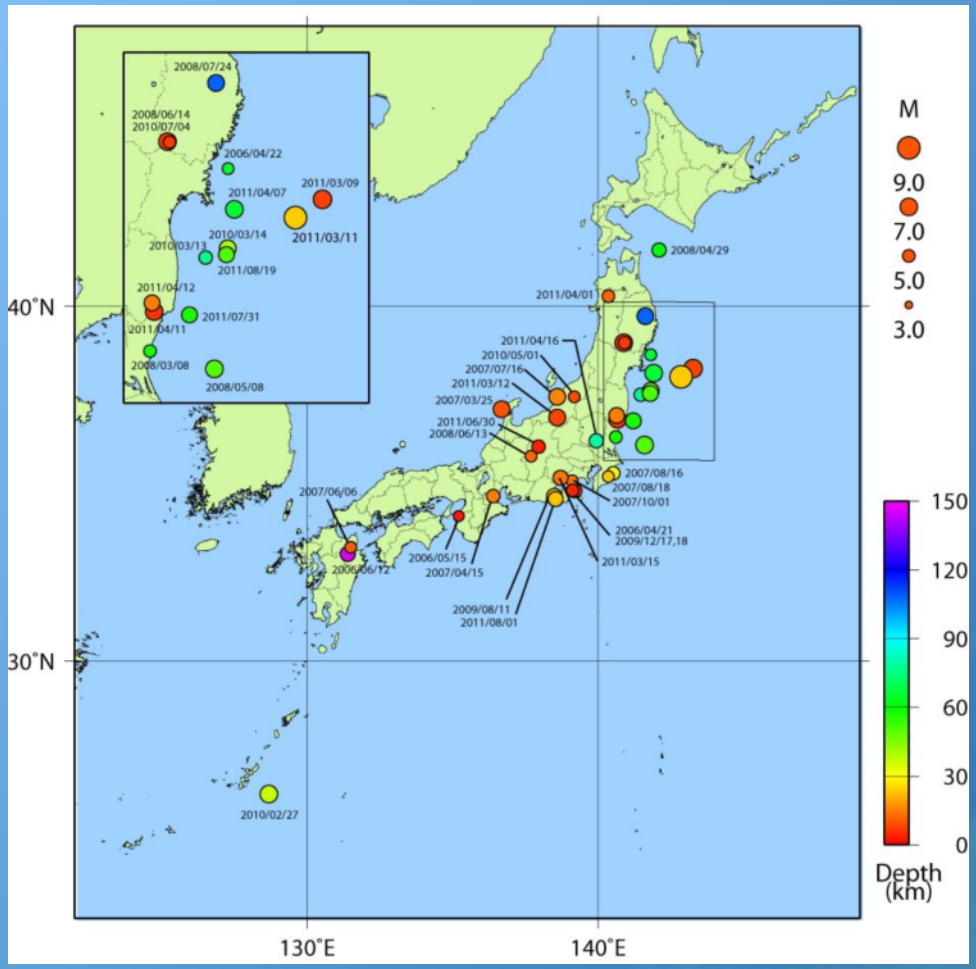
Transition of population in Japan

Peak of population in Japan was 127,790 thousand persons (2005)
Population of the elderly (over 65 years) will be 40.5% (2055)



Source: National Institute of Population and Social Security Research
"Future estimated population and number of households"

Earthquakes around Japan



Since 2006, many earthquakes have hit Japan.

Source: Japan Meteorological Agency "Epicentral distribution of major earthquakes in Japan(2006-2011.9)"

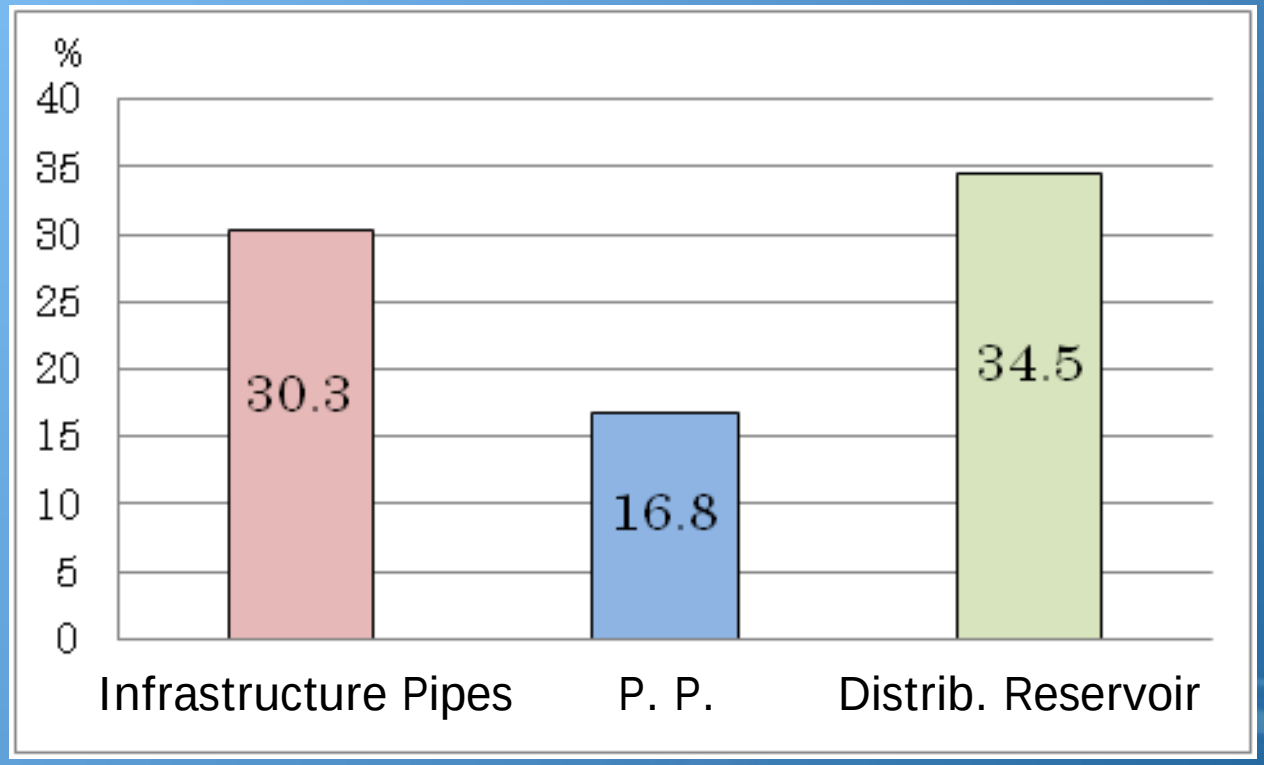
Earthquake-resistance of waterworks facilities (2)

Earthquake name	date	Seismic intensity	magnitude	No water Household	No water period
2004 Chuetsu earthquake	2004.10.23	7	6.8	130,000	1 month
2007 Noto earthquake	2007.3.25	6+	6.9	13,000	13 days
2007 Chuetsu offshore earthquake	2007.7.16	6+	6.8	59,000	20 days
2008 Iwate-Miyagi Nairiku earthquake	2008.6.16	6+	7.2	5,500	18 days
2008 Iwate Engan hokubu earthquake	2008.7.24	6-	6.8	1,400	12 days
2009 Shizuoka earthquake	2009.8.11	6-	6.5	75,000	3 days

Source: Ministry of Health, Labour and Welfare
”Recent major earthquake and water damage”

In the Great East Japan Earthquake, persons without water were about 2.2 million households at its peaks.

Earthquake-resistance of waterworks facilities (2)



Source: Ministry of Health, Labour and Welfare
”Status of seismic waterworks facilities” (2009)

In conjunction with renewal, promoting earthquake resistant facilities is important issue in Japan.

Asset management of water utilities in Japan

Introduction of AM

Practices of AM are essential to prepare for large-scale renewal.

Revised “Waterworks Vision” (July, 2008)

(1) Promote renewal, operation and maintenance of waterworks facilities based on a long-term perspective and efficient strategy.

(2) Promote funding measures such as renewal reserve.

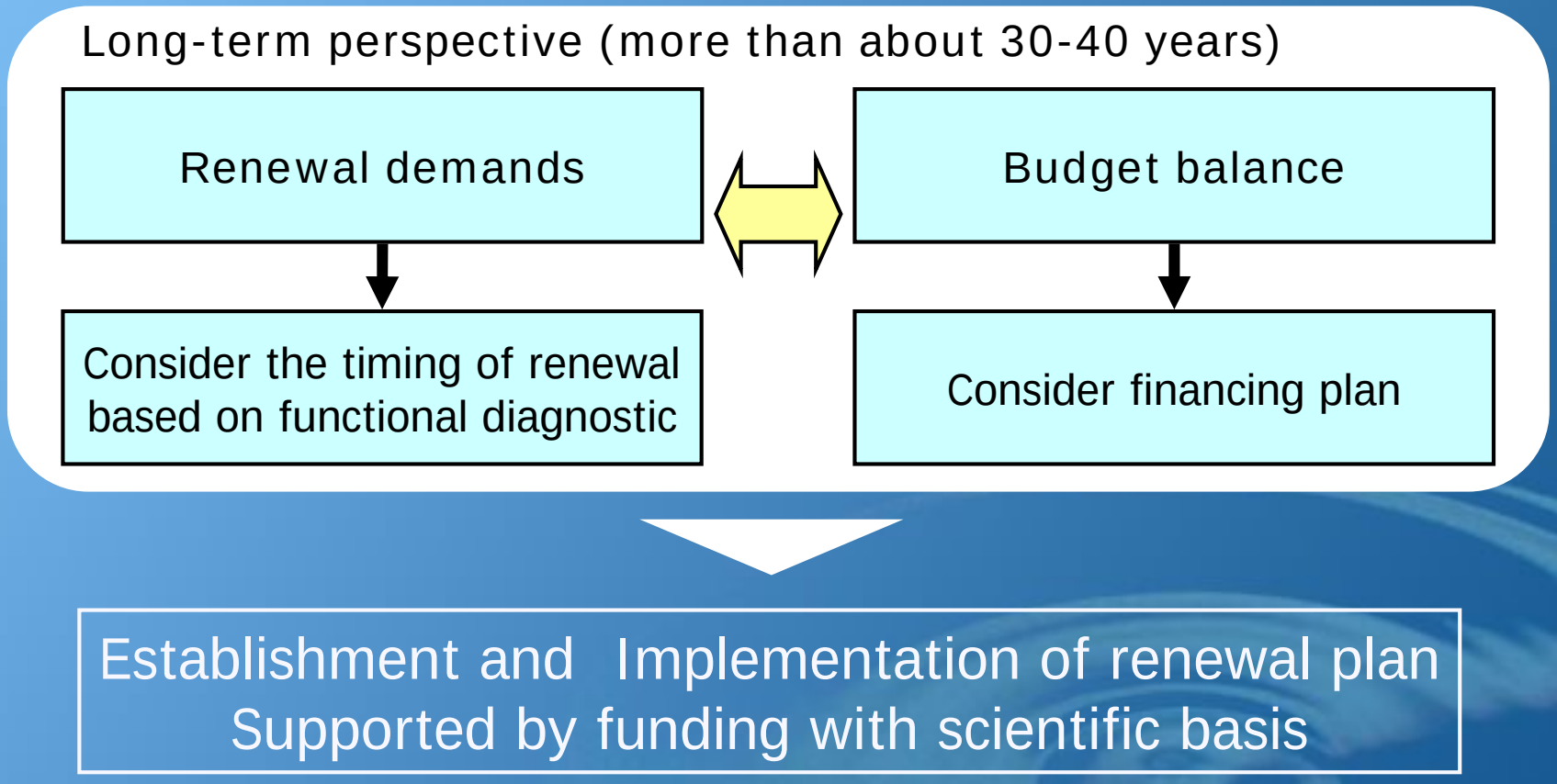
(3) Promote to consider how to provide information to help customers understand the burden required for renewals and updates.

Only some utilities are renewing their facilities with long-term perspective.
Practices of asset management should be promoted to all utilities!!

“Guideline for asset management in water utilities” (July, 2009)

Asset Management in Waterworks

[Concept]



Asset Management in Waterworks

[Effects]

(1)Evaluation of existing facilities helps to understand the renewal demands and equalize the investment in light of importance and priority.

(2) It is possible to planned investment for updates becomes possible.

(3) Long-term life cycle costs are reduced by preventive maintenance for accident and damage.

(4) It is possible to fulfill the accountability to parliament and the user.

Asset Management in Waterworks

[Practical Cycle of Asset Management]

(1) Development of needed information

To register the databases of ledgers, specifications, data inspection and diagnosis of all facilities from water intake to water distribution.

(2) Implementation of Micro-Management

To operate, manage, check, investigate, diagnose and evaluate of each facilities.

(3) Implementation of Macro-Management

To set the timing to update and reinvestment price, considering the importance and priority or soundness and seismic performance of each facilities.

To consider the fiscal balance forecast.

(4) Application of renewal demand and fiscal balance forecast

To reflect the regional water vision or the basic plan.

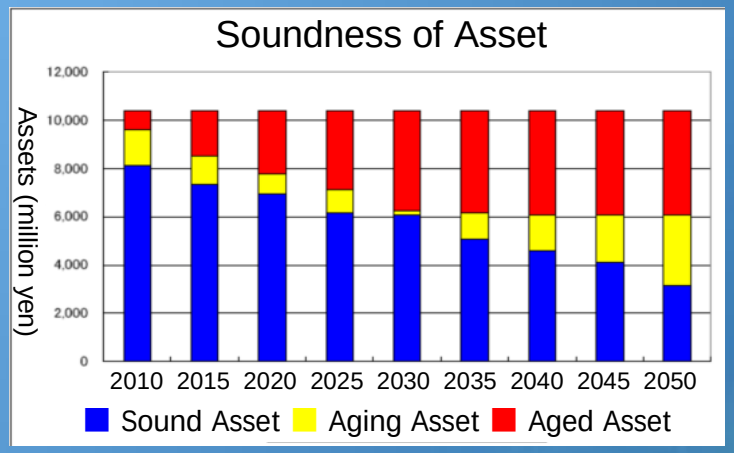
To provide information about the need for renewal investment or effect of renewal investment.

Promotion of Asset Management

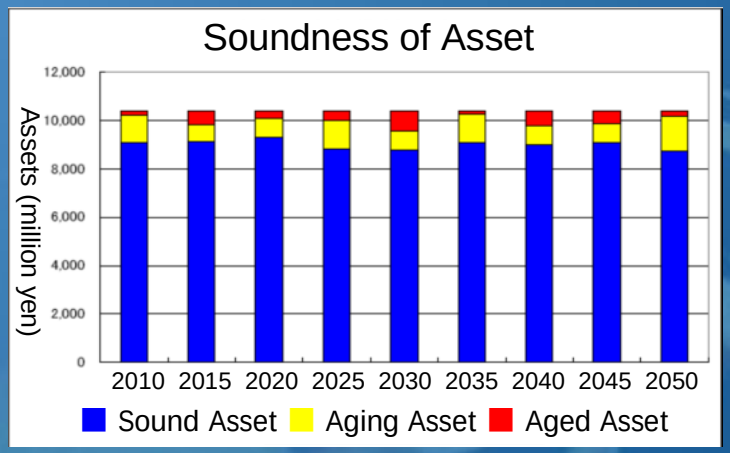
Guideline shows concrete case studies to make water utilities who introduce the asset management for the first time understand easier.

This guideline shows simple approach which can be studied even if the data is insufficient.

Without renewal



With renewal based on renewal standard

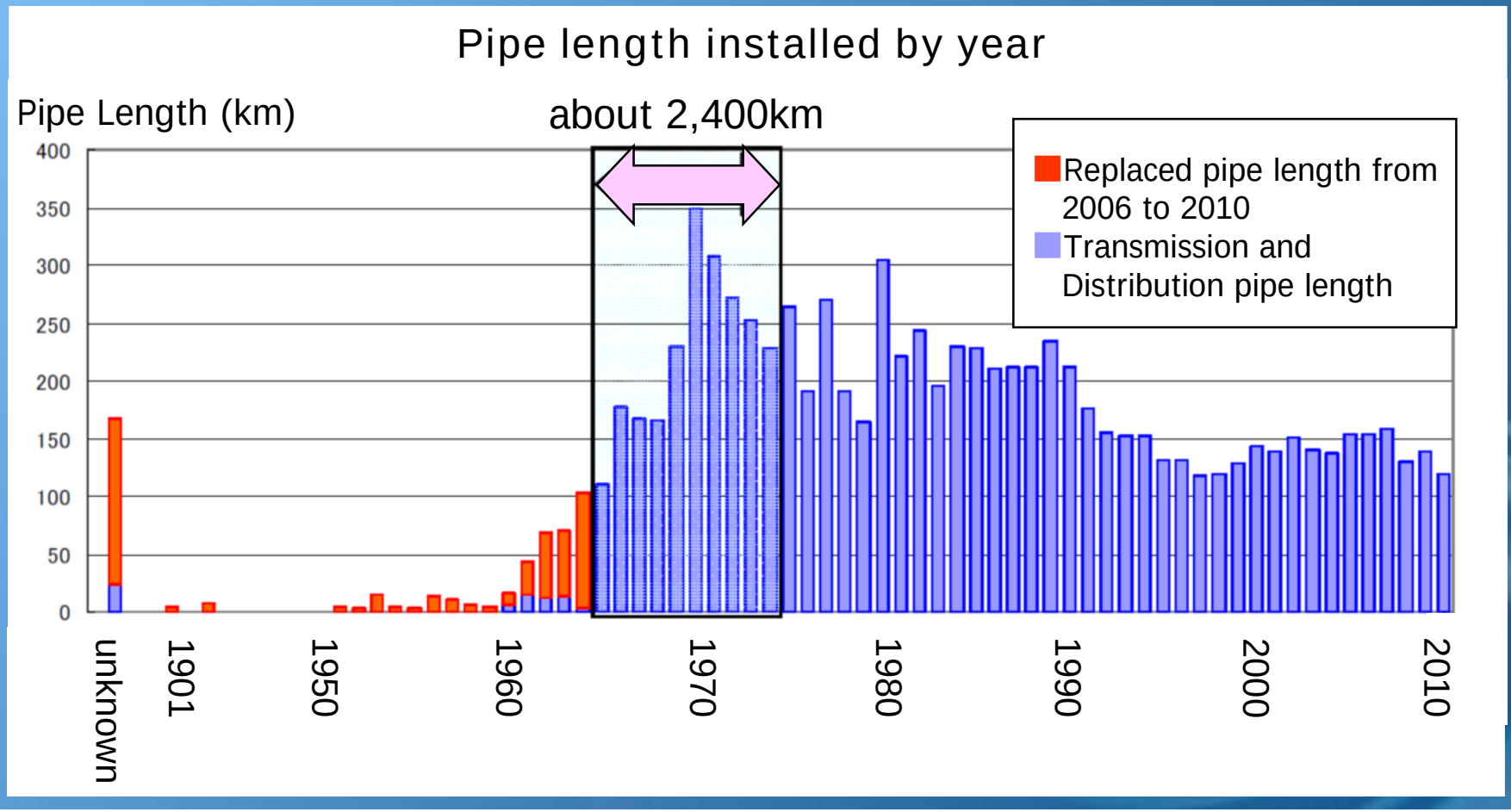


Example of outcome of case study on renewal demand

Asset management in YWWB

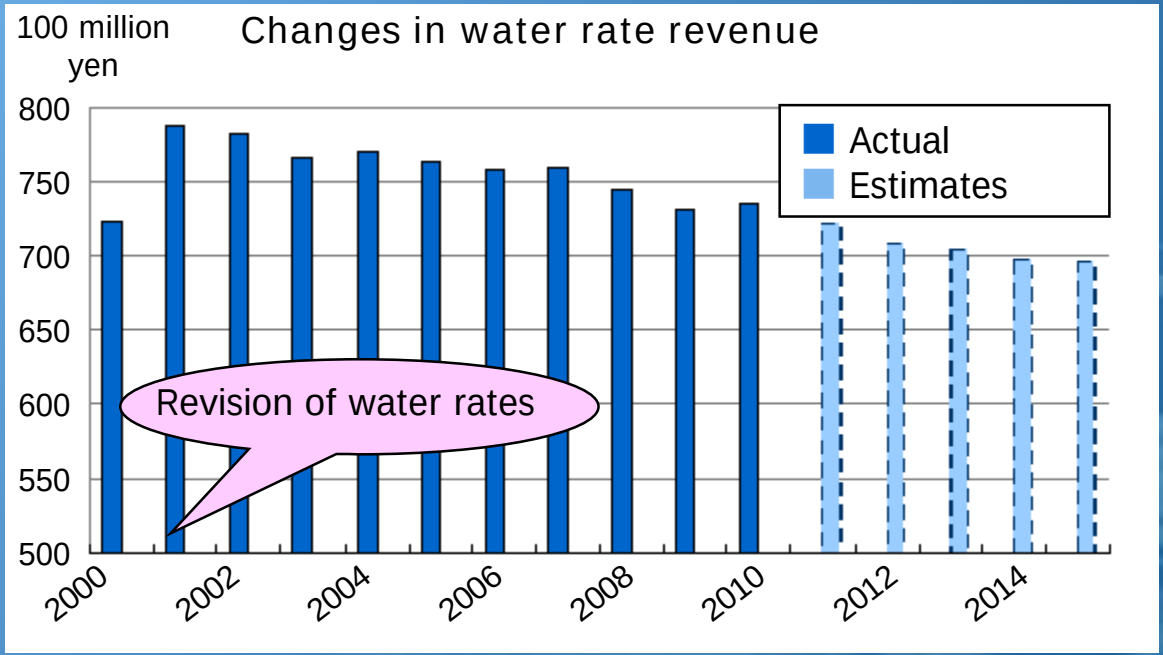
Necessity to utilize Asset Management

In Yokohama, a lot of facilities that were developed in the high economic growth period for 1965 to 1975 will demand the renewal.



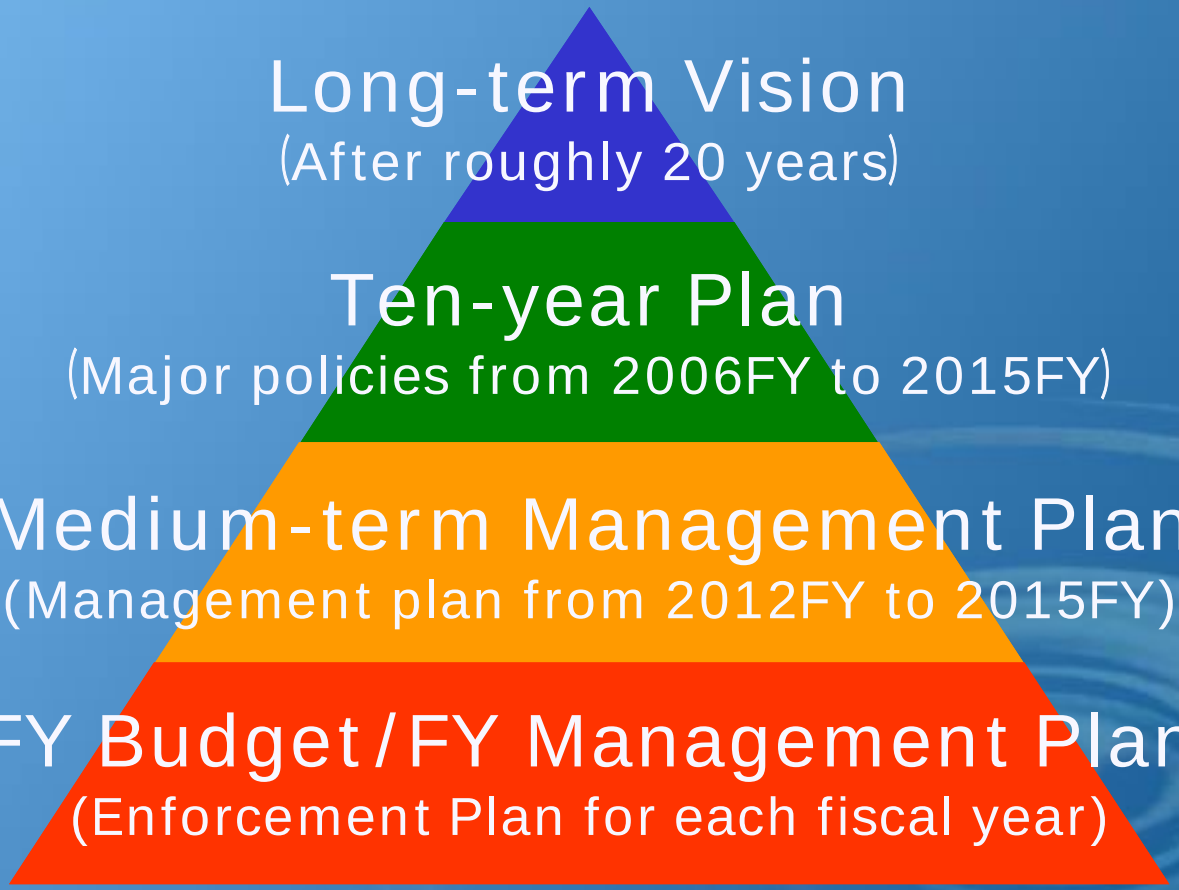
Necessity to utilize Asset Management

Increase of renewal demand is expected, on the other hand, fee income tends to decrease.
Therefore, it is expected that promoting facility renewal will become more severe.



Management Plans in YWWB

YWWB establish “Long-term Vision” and “Ten-year Plan” based on the long-term financial and is managing facilities properly incorporating asset management method.



Management Plans in YWWB

Long-term Vision (2006)

In this plan, YWWB looked to the future of Yokohama Waterworks in 2020 in which peak of the population is expected. And In this plan, YWWB set Six Goals.

Ten-year Plan (2006)

YWWB showed the key measures and considered a budget balance in the future with long-term perspective. In this Plan, YWWB set concrete numerical goal for the level of development such as seismic rate.

Medium-term Management Plan (2012)

This plan is 3-5 year specific implementation plan based on “Ten-year Plan”.

YWWB are reflecting this plan in annual operating policy and budget.

Management Plans in YWWB

Goal of seismic rate in “Ten-year Plan”

YWWB declare the target value in 5 and 10 years.

	Conveyance pipe (gravity flow)	Transmission pipe	Distribution Reservoir	Distribution Pipe
existing condition (2004)	94.3%	59.0%	15.2%	8.8%
5 years later (2010)	100%	66%	52%	15%
10 years later (1015)	100%	72%	96%	23%

In addition to seismic rate, YWWB set many target values like facilities development rates, water quality goals and environmental goals targets.

Positioning and concept of asset management

- When established the facility improvement plan, YWWB set up **own useful life depending on facility situation**.
- In civil structures, YWWB **set up own useful life** according with the **long useful life policy** in Yokohama. In electrical and instrumentation equipments, YWWB **decided to own useful life** considering safety and stability based on historical accident data. YWWB is regularly maintaining and properly repairing and plan to **extend the useful life of these facilities**.
- In pipelines, YWWB **set up design useful life**, properly diagnose the degree of obsolescence based on the accident information and the mapping data and will **renew the facilities at the appropriate time** depending on the diagnosis result.

Facility Improvement based on asset management

[Infrastructures]

YWWB promotes further earthquake resistance of facilities like Conveyance pipe, purification plant and distribution reservoir.

In promoting projects, YWWB considers importance of each facility, role in the overall system, risk of secondary disasters and impact on citizens due to lack of functionality in the event of disaster and determines the overall priority and importance. In addition, YWWB determines how to diagnose each facility. YWWB sets target goals to improve the facilities and develops their facilities.

Facility Improvement based on Asset management

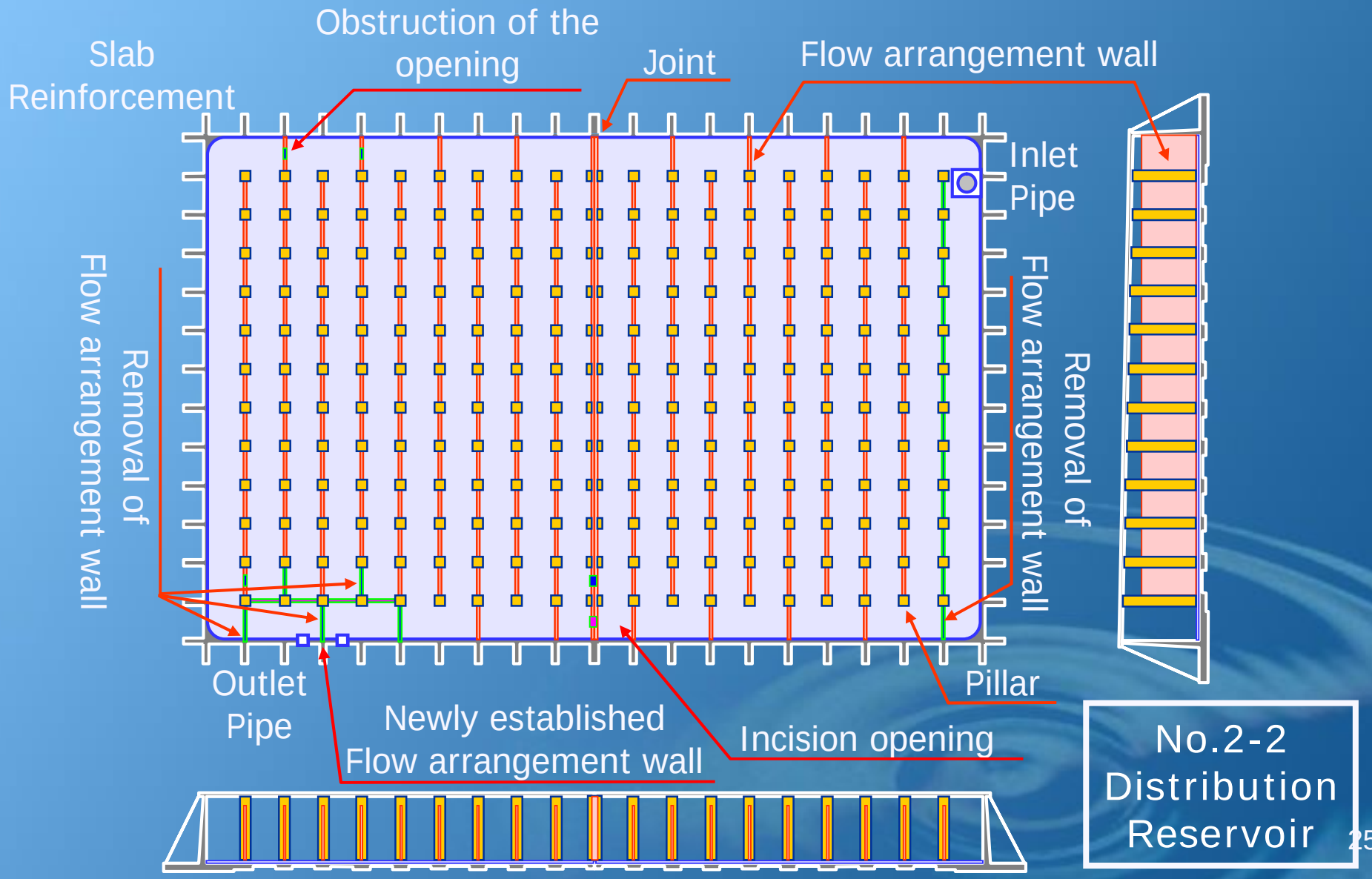
Goals of earthquake-resistant rate in “Medium-term Management Plan”

	2010	2015
Conveyance Line (gravity flow)	75%	80%
Purification Facility	0%	43%
Distribution Resouvoir	59%	93%
Transmission and Distribution Pipe	15%	22%

[Application of Performance Indicator]

YWWB set annual goals of facility improvement, **review the progresses at the end of the year** and **explain their achievements to the city council and citizens**.

Seismic Reinforcement of Nishiya P.P. No.2 Distribution Reservoir



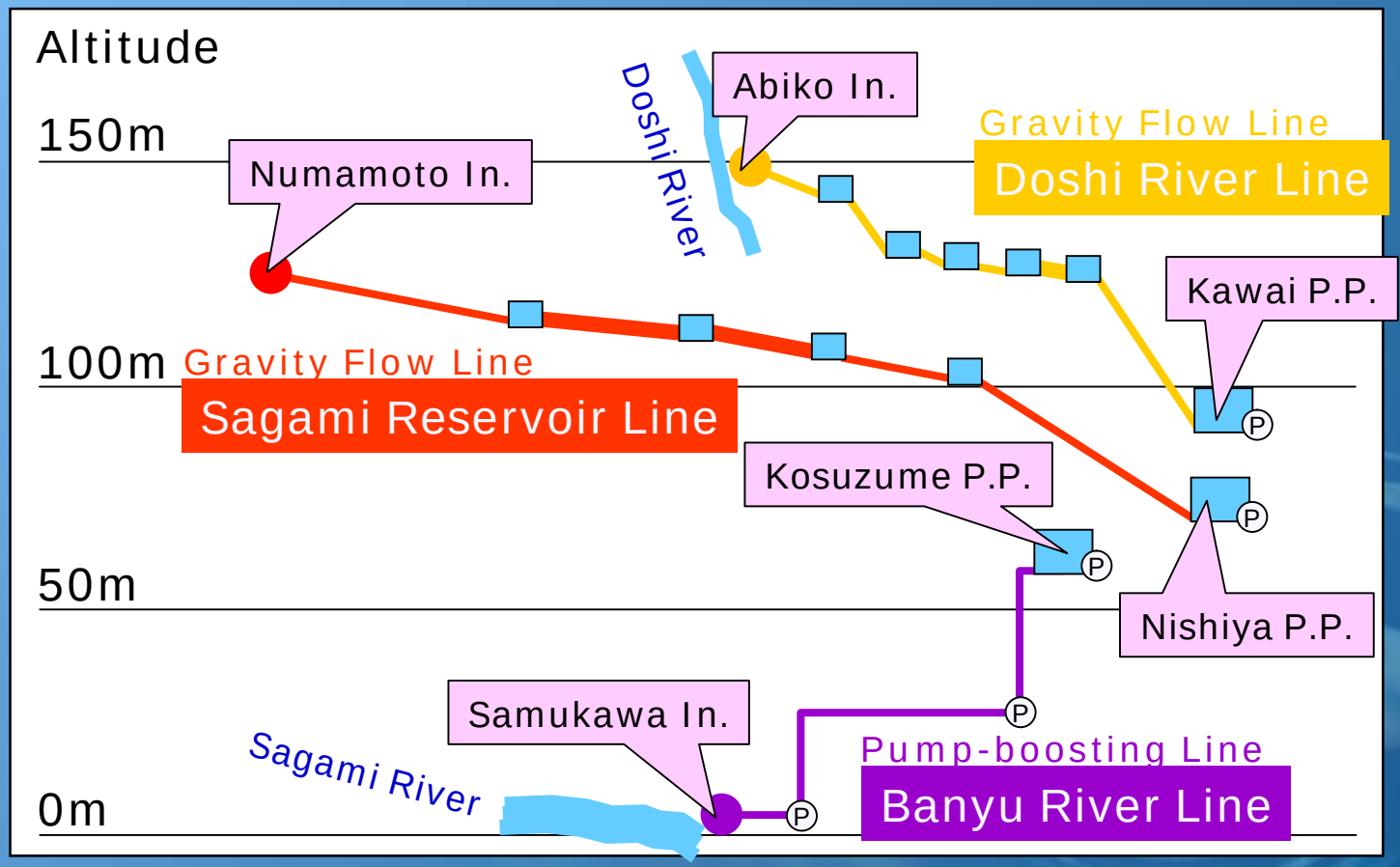
Reinforcement assembly of deck slab and underground beam

Installation of cinder concrete of pillar section

Completion of Seismic Reinforcement

Concept of facility improvement: Prior use of gravity flow systems

YWWB gives a priority to improvement of gravity flow systems over pump-boosting systems.



Concept of facility improvement: Loop Line Network

Loop Line Network:
- Planning Length is 89km
- It's completion by 2014

	2007	2011
Improvement Rate of Loop Line Network	91%	96%

Under Construction (2010-2014)

Facility Improvement based on Asset management

[Pipelines]

Total length of our pipeline is about 9,000km.

2,400km pipelines that were developed in the high economic growth period will demand the renewal.

Therefore, YWWB established the “Promoting Earthquake-resistant Distribution Pipe Plan” based on “Long-term Vision”.

In the 10 years from 2011 to 2020, YWWB is accelerating the replacement of the distribution pipes efficiently and effectively. YWWB understands the appropriate service period by evaluation of pipe materials and soil conditions and to prepare for large earthquakes, YWWB gives priority to replace the pipes in the area where Liquefaction is assumed.

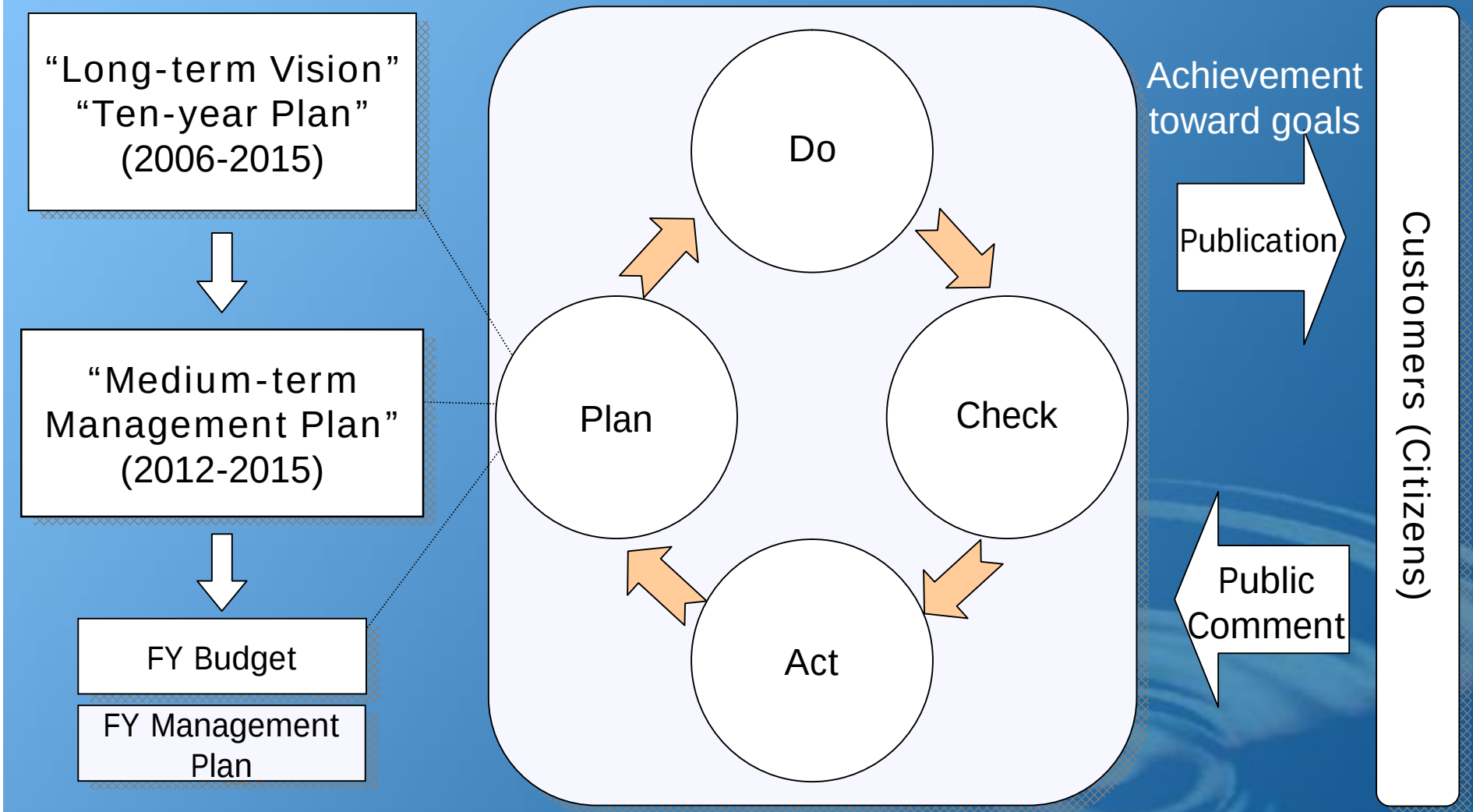
Expected Useful Life for Pipeline

YWWB set **"Expected Useful Life"** for pipes based on Technical Documents and Past Actual Leakage in Yokohama

Expected Useful life of each type of pipe

Type of Pipes		Expected Useful Life
Hard-type Polyvinyl Chloride Lined Steel Pipe		40 years
Hardened Impact-resistant Vinyl Pipe		
Cast Iron Pipe		50 years
Steel Pipe		60 years
Ductile Cast Iron Pipe	Without Polyethylene Sleeve	70 years
	With Polyethylene Sleeve	80 years
	Seismic Pipe with Polyethylene Sleeve	

Concept of customer publication



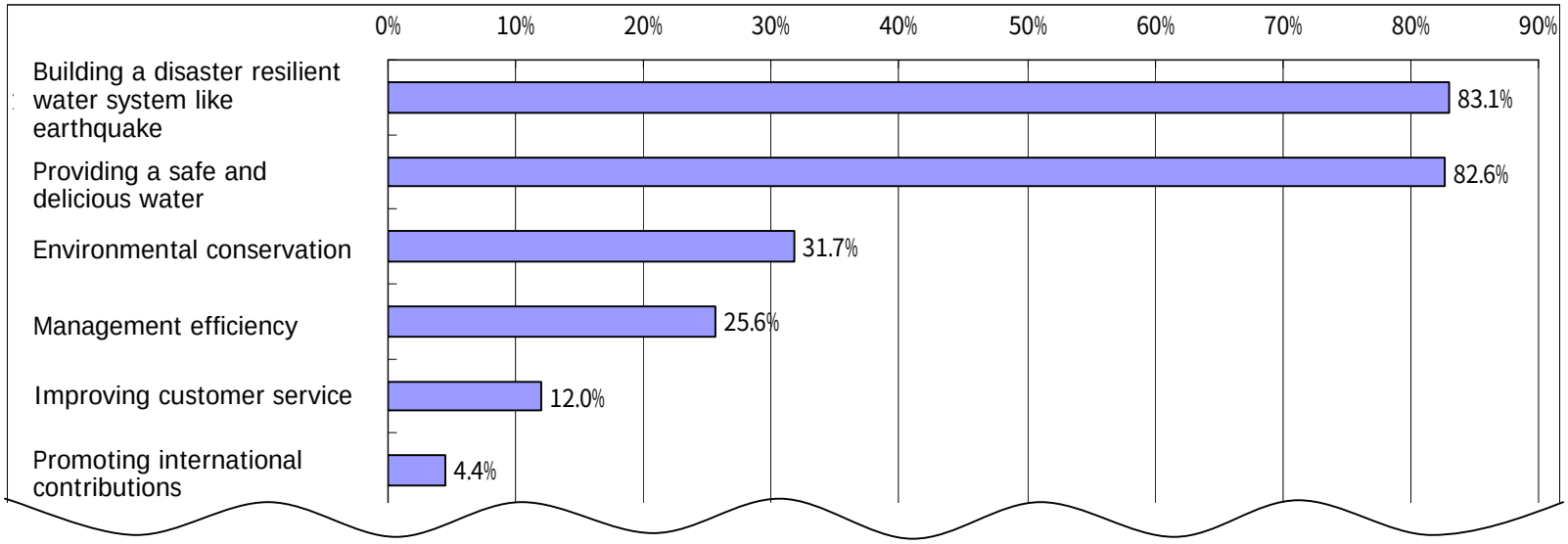
Response to the Great East Japan Earthquake

Response to the Great East Japan Earthquake

Earthquake heightened customers' awareness of earthquake-resistant facilities and water outage countermeasures due to power outage.

(from "2011 Customer Awareness Survey")

Managements of YWWB are covered by fee income paid by customers. Among the following business, do you think any business should YWWB promote in particular in the future?



From "2011 Customer Awareness Survey in water and sewerage [for domestic]" Question 20

Response to the Great East Japan Earthquake

- Promoting earthquake-resistant facilities.
- Reviewing the plan for earthquake-resistant reservoirs, given the unstable power situation and the stable water supply.
- Reviewing how to back up the pumping station.
- Expanding the in-house power generation facilities in pump stations.
- Installing small hydro and solar power generation equipment.
- Investigating the possibility to introduce renewable energy.
- Considering the countermeasure against Tsunami.

For the future

- To provide more insight into long-term fiscal balance.
- To achieve sustainable waterworks effectively by efficient renewals.
- To review plans continuously and to respond flexibly to changes by Plan-Do-Check-Act cycle.