

Towards sustainable water supply business



Shozo KISHI

Water Supply Division

Department of Environmental Health and Food Safety
Pharmaceutical Safety and Environmental Health Bureau

Ministry of Health, Labour and Welfare

MDGs to SDGs

Millennium Development Goals 2001~2015

8 goals, 21 targets

The goal for developing countries
UN experts led

- Water supply sector has achieved the goal in 2010.
- However the proportion of improved water sources has increased, the coverage of the piped water on premises is not still high.
- Criticism that service level of water quality has not been considered also was a part.

Sustainable Development Goals 2016~2030

17 goals, 169 targets

The goal for all countries
Negotiations at UN all Member States

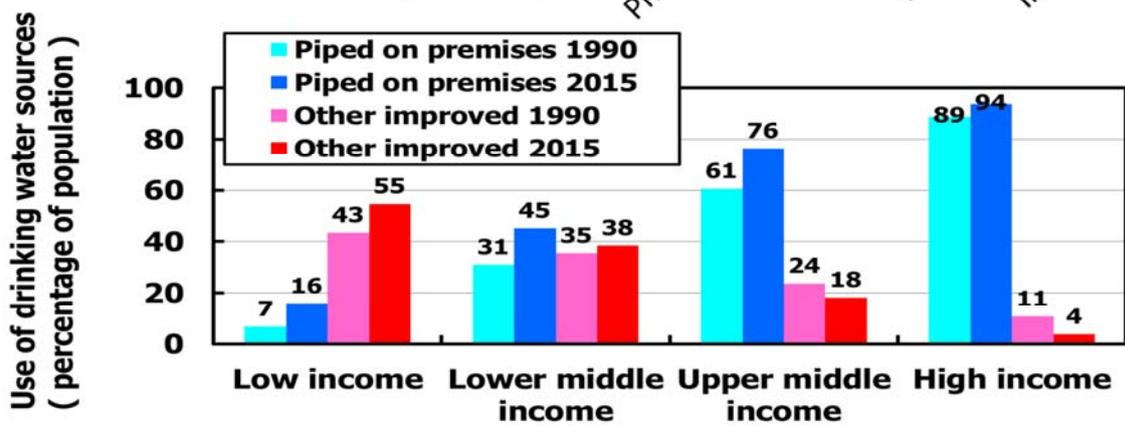
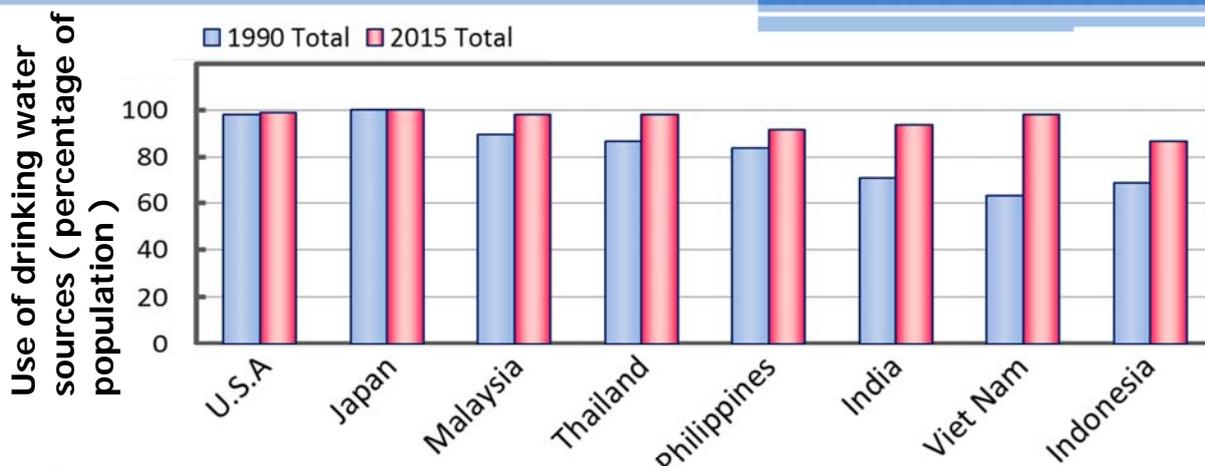


Goal 6

Ensure availability and sustainable management of water and sanitation for all

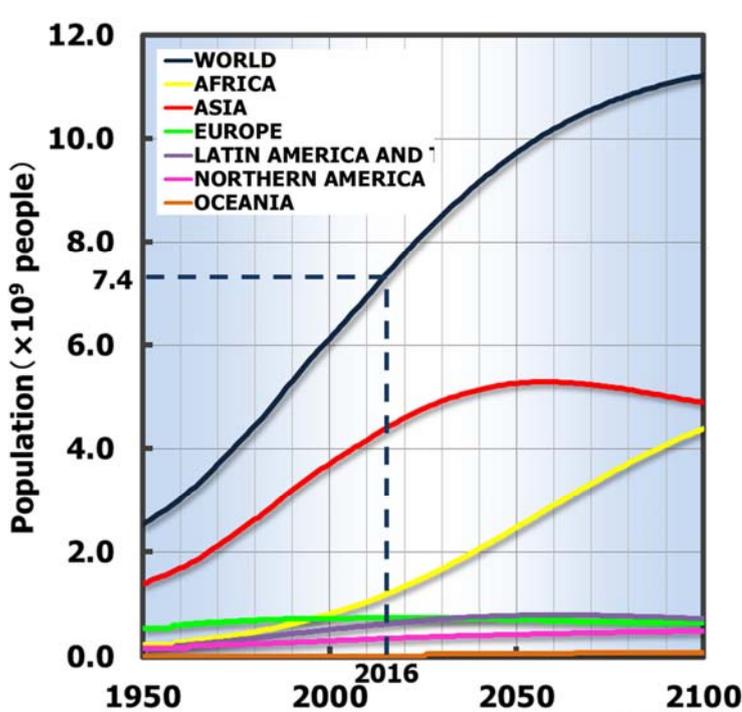
- 6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all
- 6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- 6.3 by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally
- 6.4 by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity
- 6.5 by 2030 implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
- 6.6 by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

Improved water use of drinking water sources



World population prospects

- The world's population is expected to be 11.2 billion people in 2100.
- In Asia, it peaked in the 2050s, then expected to decrease .
- Africa's population continues to increase, In 2100, is expected to reach about 3.6 times the 4.4 billion people of the current population.

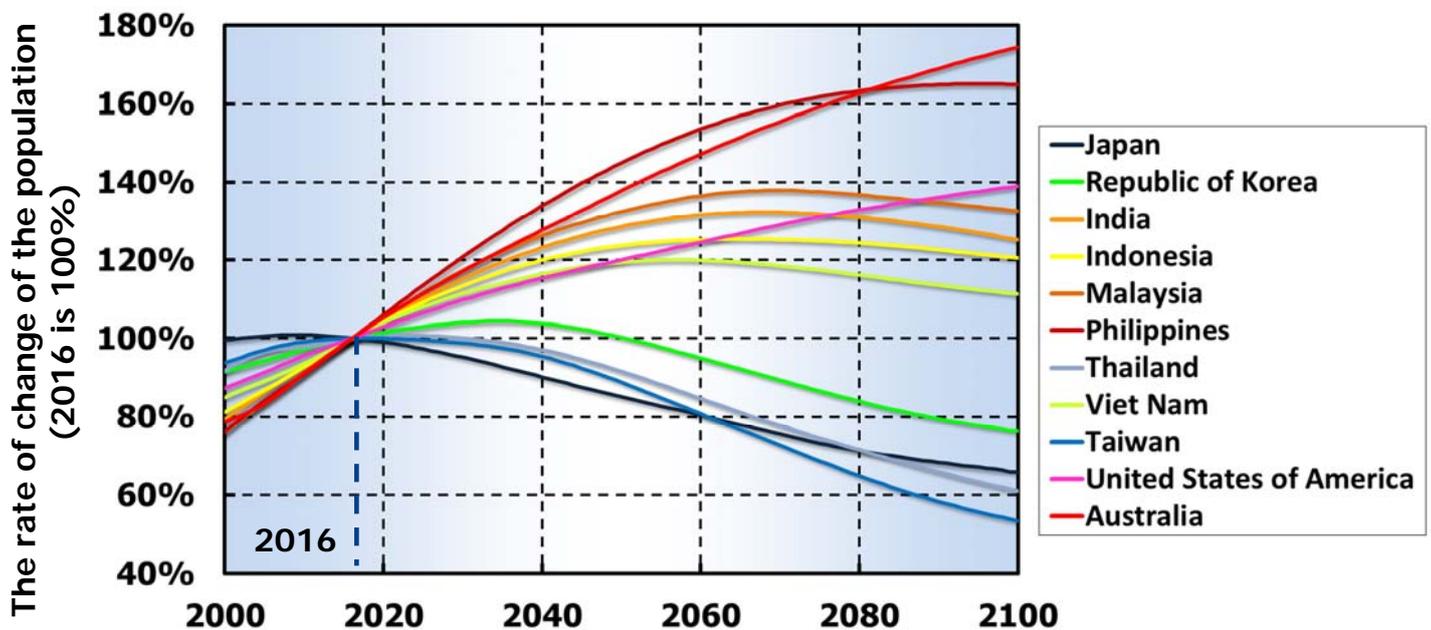


		× 10 ⁹ people		
Fiscal year		2016	2050	2100
ASIA		4.44	5.27	4.89
		100%	119%	110%
NORTHERN AMERICA		0.36	0.43	0.50
		100%	120%	139%
OCEANIA		0.04	0.06	0.07
		100%	142%	178%
EUROPE		0.74	0.71	0.65
		100%	96%	87%
AFRICA		1.22	2.48	4.39
		100%	204%	361%
LATIN AMERICA AND THE CARIBBEAN		0.64	0.78	0.72
		100%	122%	113%
WORLD		7.43	9.73	11.21
		100%	131%	151%

Sources : UN World Population Prospects: The 2015 Revision; medium variant

Each country's population prospects

- 【 Large growth 】 Australia, Philippines
- 【 Growth 】 U.S.A, India, Indonesia, Malaysia, Viet Nam
- 【 Decline 】 Japan, Republic of Korea, Taiwan, Thailand

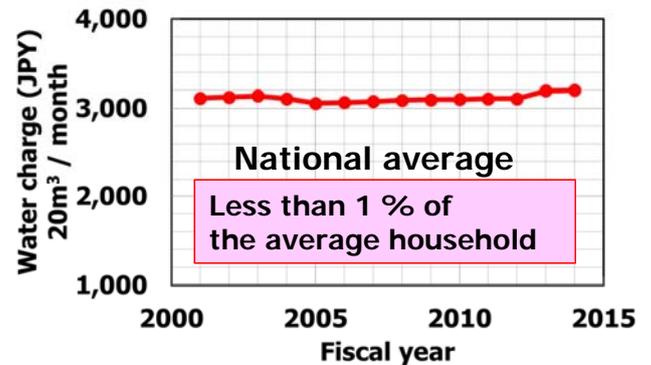
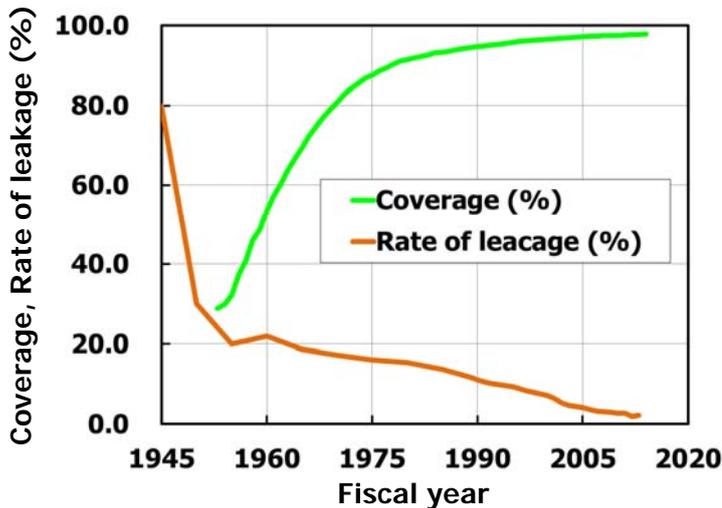


Sources : UN World Population Prospects: The 2015 Revision; medium variant

Current situation of Waterworks in Japan

7

- Coverage of Water supply 97.8%
- Tap water = drinking water
- Low leakage rate
- Affordable water charge



Price of the 500ml

PET bottle water
About 100 JPY

Tap water
About 0.1 JPY

1000 : 1

Source : Water supply statistics
※ Rate of leakage by Tokyo

Action Plan for National Resilience 2016

8

Notices :

- (1) Promotion of the proactive efforts of the private sector
- (2) Promotion of community-building of resilience for regional revitalization
- (3) Such as Enhancement of the new measures for responses to disasters that occurred in 2015
- (4) Deepening and practice of risk communication
- (5) **A priority promotion of international contributions** (Excerpt)

Japan that **many natural disasters occur**, is one of the countries that promoted the innovative initiatives related to National resilience even by international standards, **the mutual understanding with other countries in a variety of fields related to National resilience deepen**, we should continue to contribute to the international community. (snip)

In cooperation with the Economic Research Institute for ASEAN and East Asia (ERIA), as well as promoting public awareness activities such as symposiums to share the ASEAN countries and knowledge, (snip) National resilience on originated the Japanese efforts, promoting the exchange of opinions about the initiatives of foreign countries, to improve the understanding of the National resilience in the international socialization.

National policy on international contribution

Expansion of policy support tool

Partnership for Quality Infrastructure 2015.05 (excerpt)

- Japan will provide approximately USD 110 billion for “quality infrastructure investment” in Asia over the next five years.
- This initiative will play a catalytic role in further mobilizing global, private sector financial resources and know-how to Asia, a region full of potential, in a way that promotes necessary infrastructure investment, both in terms of quantity and quality.

Expanded Partnership for Quality Infrastructure 2016.05 (excerpt)

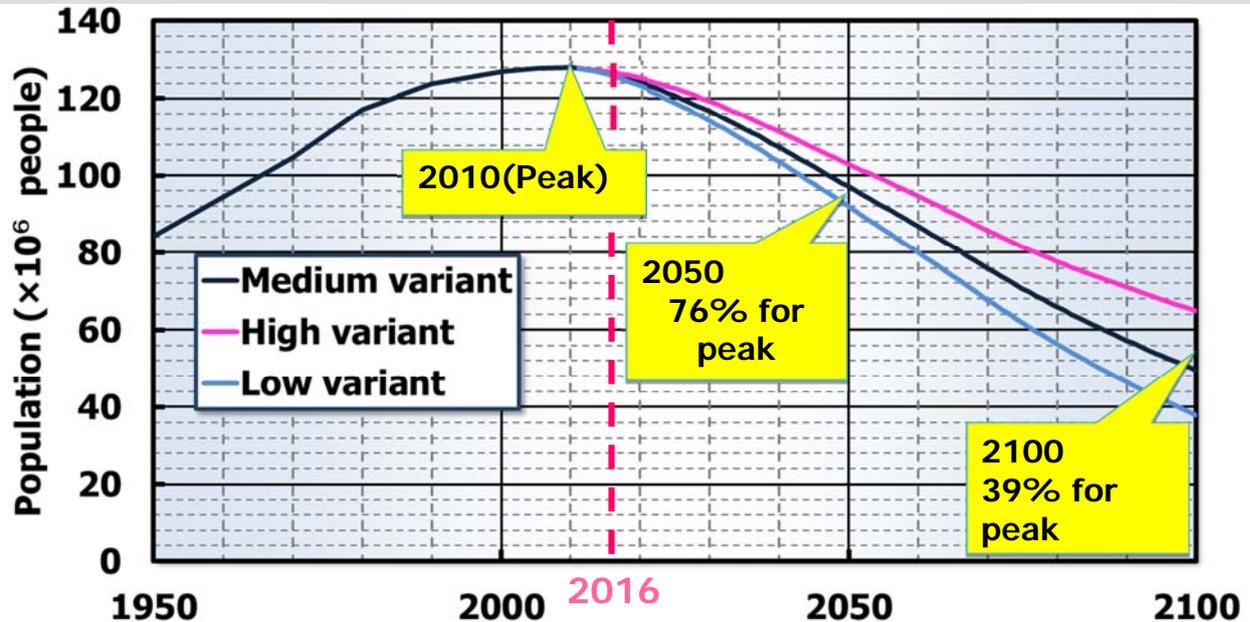
- Japan will encourage exports of its high-quality infrastructure and construct **win-win relationships** that contribute both to domestic economic growth and to economic development of partner countries.
- Japan will aim to provide, among all, financing of approximately 200 billion USD in the next five years to be allocated to infrastructure projects across the world, including those for natural resources, energy, etc.

“Quality” High quality, Good quality

Advantageous from the point of view of Life Cycle Costs (LCC)
(Long-lasting, low failure rate)

Challenges of Waterworks in Japan

- Japan's population has started to decline after peaking in 2010.
- The population was reduced to three-quarters to the peak in 2050, it is in 2100 expected to decline to about 40%.
- If the population decrease, since the water supply revenue decrease, there is a possibility that the water supply business will not be continued.
- Population decline is not limited to water, it is regarded as a major social problem.



Frequent large-scale earthquake disasters

- Intensity 6 or higher earthquake : since 1995, 50 times occurs (2.4 times / year)
- Long term water outage by disaster of main pipe

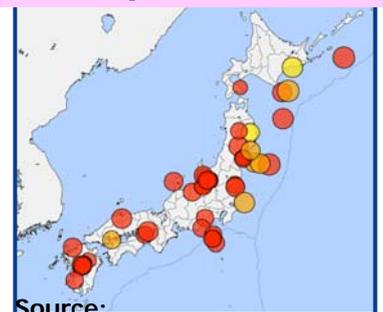
[The Great East Japan Earthquake]

- Damage of water facilities by tsunami, salt damage of well.
- The effects of radioactive substances on water quality.
- Long-term power failure
- Wide range of liquefaction

[The Kumamoto Earthquake]

- Twice the occurrence of quake of Intensity 7
- Prolongation of the turbid water of the well water source.
- disaster of vulnerable facilities of small-scale water

Earthquake location



Source: Japan Meteorological Agency

Miyagi

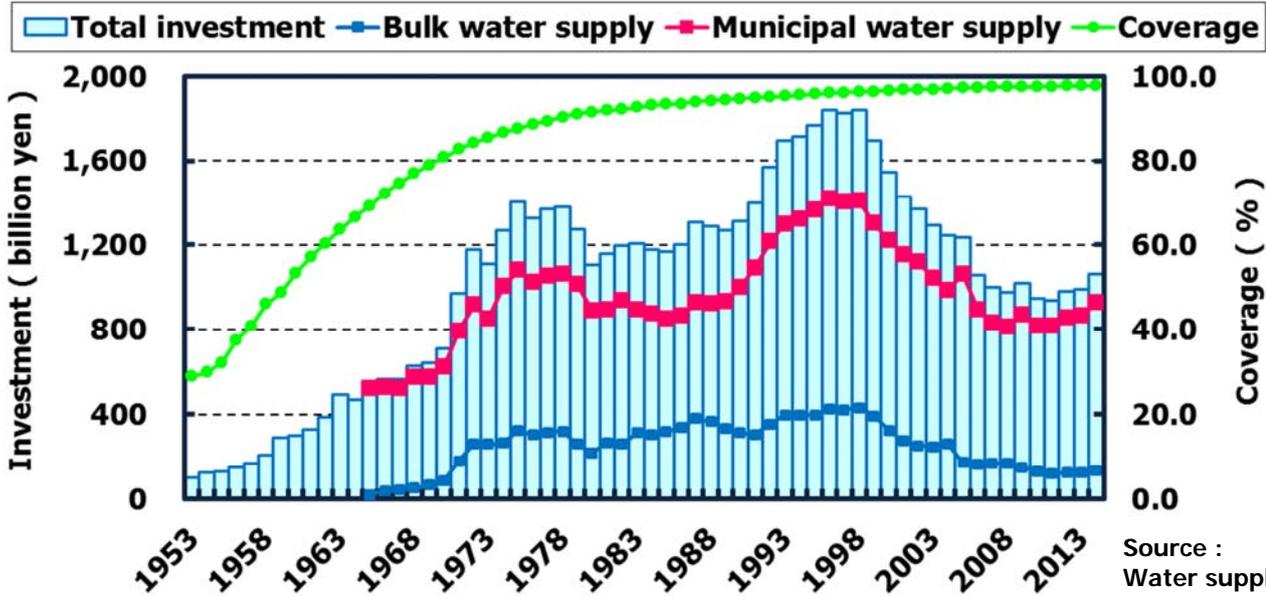


Kumamoto



Investment of the Water Supply System

- Total assets of water supply system was estimated about 64 trillion yen at 2014.3.
- A lot of facilities which installed during high economic growth period will require a large amount of renewals and rehabilitations from now.
- To ensure the renewals and rehabilitations cost, sound and stable management based on the water supply revenue will be required.



Aging of water pipeline

The aging pipeline rate is expected to be increased rapidly, because the renewal of aging pipeline which installed during high economic growth period is slow (Legal durable year is 40 years in Japan).

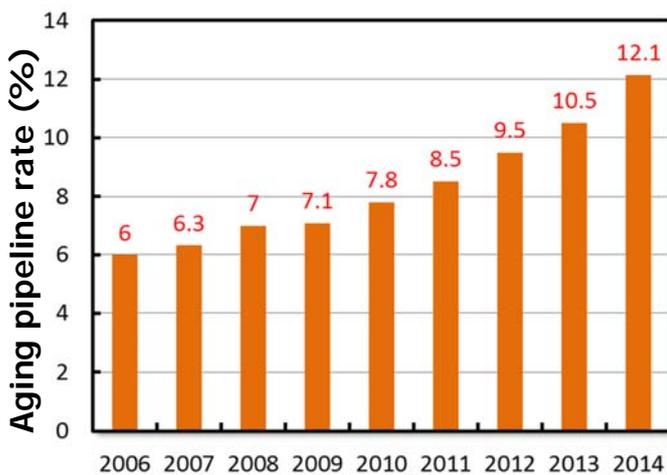
Aging pipeline rate (%)

$$\frac{\text{Pipe length in excess of the age of service 40 years}}{\text{Pipeline total length}} \times 100$$

Pipe renewal rate (%)

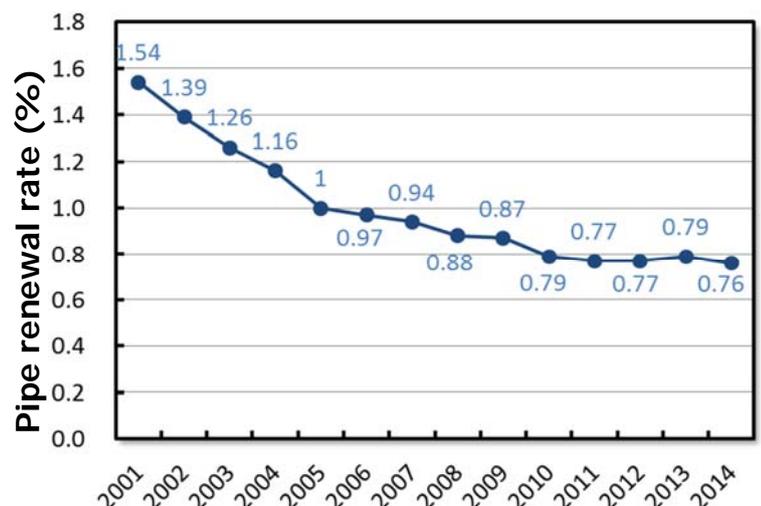
$$\frac{\text{Total length of renewal pipeline}}{\text{Pipeline total length}} \times 100$$

Aging of pipeline surely progresses.



Source : Water supply statistics

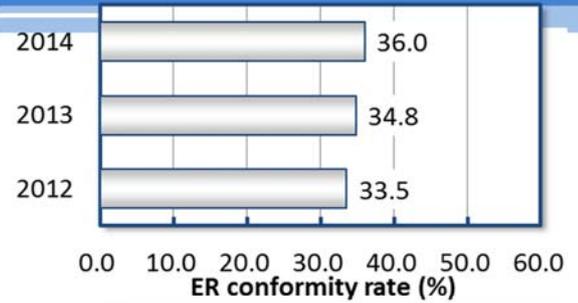
Renewal of pipeline has not been progressed.



Progress of earthquake resistance in water supply facilities (2014)

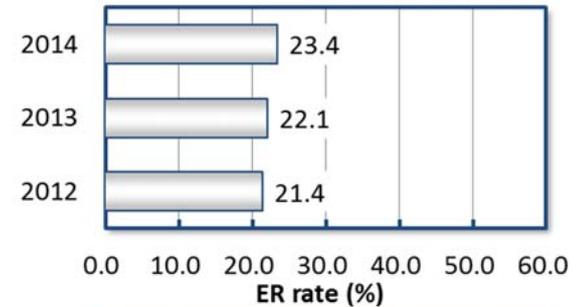
Main pipeline

- The situation that 1.2 points are risen from 2013, but it cannot be said that earthquake resistance advances.
- Progress of earthquake resistance in each of the water operators differ greatly.



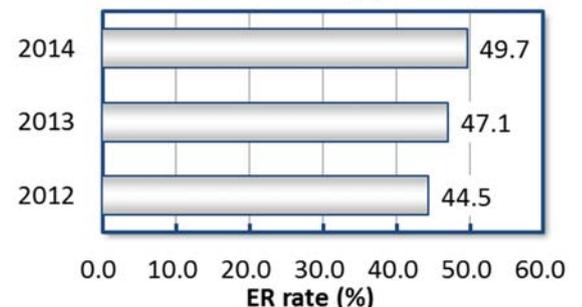
Purification Plant

- Earthquake resistance of the water purification plant, in many cases to be earthquake resistance at the time of renewal work of the water purification plant. Therefore, the slow progress of earthquake resistance rate of the water purification plant.



Distribution reservoir

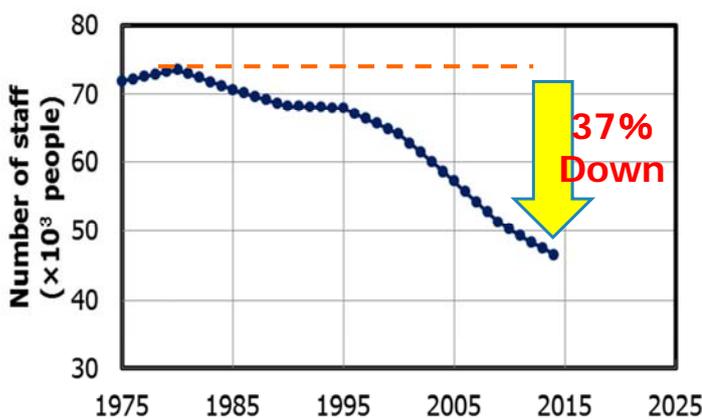
- In comparison with the construction of the water treatment plant, so easy to do the renovation of distributing reservoir, earthquake resistance of the distribution reservoir is progressing.



Trends in number of staff, and the age structure of the staff

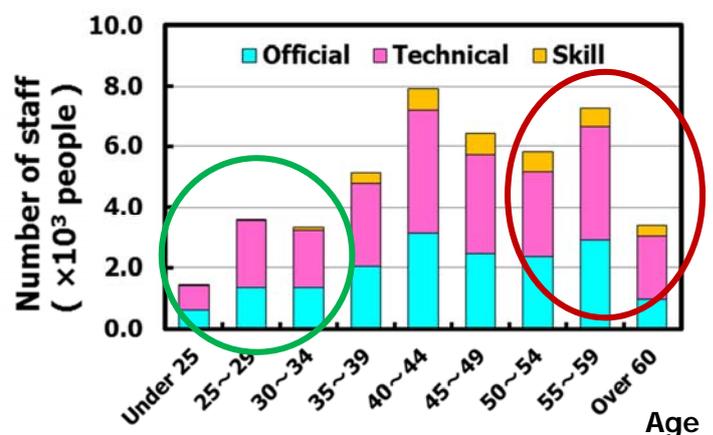
- The number of staff engaged in water supply business decreases more than 37% in comparison with a peak (about 35 years ago).
- Younger staff (<35) remains in approximately 20% while the expert staff (50<) occupies approximately 40%, and succession of the water supply technique becomes increasing challenge.
- To improve the operating foundations, business integration beyond the municipal border and public private partnership are key factors.

Reduction in the number of staff



Source : Water supply statistics

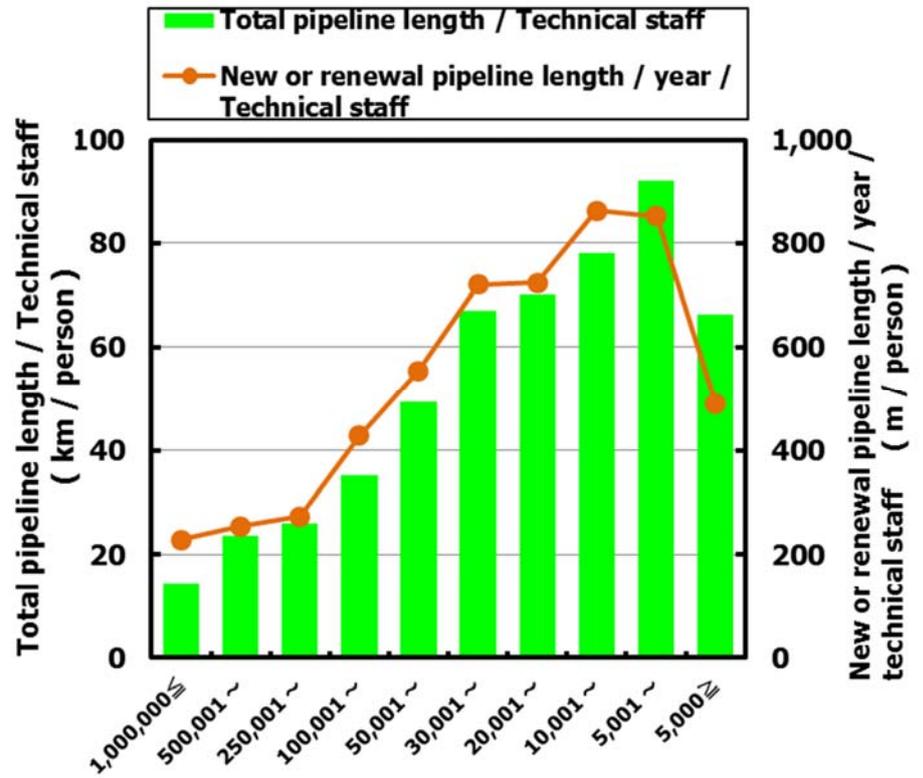
Age structure of the staff



Number of Staff at each business scale

Population	Staff number (ave.)			
	Official	Technical	Skill	Total
1,000,000 ≤	356	504	153	1,013
500,001 - 1,000,000	79	134	12	225
250,001 - 500,000	38	68	11	117
100,001 - 250,000	18	25	2	45
50,001 - 100,000	10	11	1	22
30,001 - 50,000	7	5	1	13
20,001 - 30,000	5	4	0	9
10,001 - 20,000	3	2	0	5
5,001 - 10,000	2	1	0	3
5,000 ≥	2	1	0	3

Source : Water supply statistics



The New Waterworks Vision and Concrete Measures

Release of the New Waterworks Vision

(Former) Waterworks Vision (2004)



- ◆ The Great East Japan Earthquake (March, 2011)
- ◆ Water supply in the population decline society

New Waterworks Vision (March, 2013)

[Concept]

Succession of reliable water supply to the future alongside communities

Keywords



Example of various policies

- ✓ Enforcement of the asset management
- ✓ Replacement and earthquake resistance of facilities
- ✓ Strengthening organization by Integration and Public private partnership

Promotion of the New Waterworks Vision

Key words	Safety	Resilience	Sustainability
Short-term Targets	Securing safe water by cooperation	Earthquake-resistance of main facilities	Carrying out asset management
Direction of measures	<ul style="list-style-type: none"> ■ High quality water resources ■ Maintenance of the facilities ■ Water quality management in the processes of treatment ■ Establishing the publicity system 	<ul style="list-style-type: none"> ■ Gradual earthquake-resistance ■ Reinforcement of facilities to supply essential water in case of disaster ■ Securing emergency water supply and restoration by cooperation in case of disaster 	<ul style="list-style-type: none"> ■ Careful management and operation of whole facilities ■ Replacement of aging facilities ■ Strengthening of the financial basis ■ Securing staffs with specialty

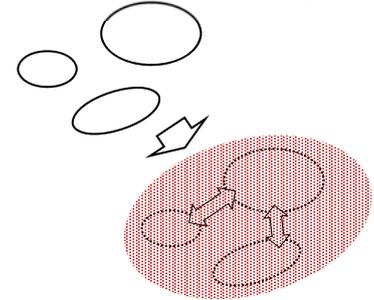
Measures currently discussed

The promotion of the wide area cooperation

Promotion in (example)

- Horizontal integration of water supply operators to each other
- Vertical integration of bulk water supplier and water supplier
- Consolidation of facilities
- Centralization of water quality management
- Joint of the facility management
- Joint management of water supply facilities
- Joint of the information system

The wide area Integration



Measures currently discussed

- Business support and Staffing to small and medium-sized businesses by the large-scale businesses
- Business support and guidance to the water business by prefectures



- Fostering and securing of human resources involved in the water supply business
- Strengthening the foundations of the water supply business

Measures currently discussed

The promotion of public-private partnership (PPP)

Promotion in (example)

Depending on the ability of such personnel and know-how that water operators have, take advantage of the PPP that can compensate for the weakness.

- Third party consignment
 - PFI (Private Finance Initiative)
 - Concession
- etc.

This field does not
much headway in Japan.

Measures currently discussed

- Promotion of public-private personnel exchange in consideration of the level-up. (technical, management)
- The promotion of human resources from the external.



- Fostering and securing of human resources involved in the water supply business
- Strengthening the foundations of the water supply business

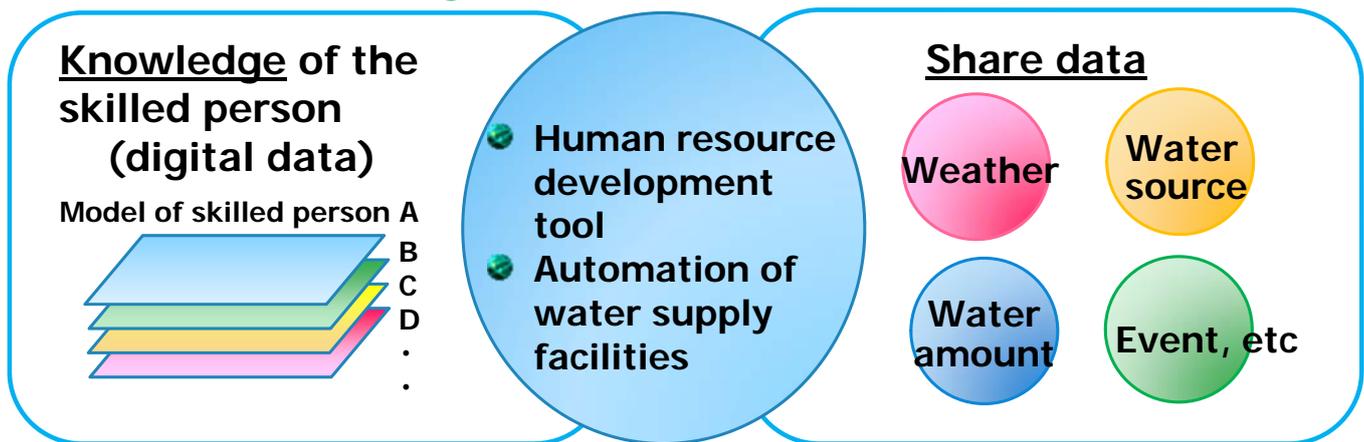
Measures currently discussed

Utilization of "Internet of Things (IoT)"

Promotion in (example)

- Remote measurement of water quality
- Remote monitoring and control of water supply facilities
- Water leakage monitoring of the pipe etc.

Measures currently discussed



Conclusion

● Promotion of the New Waterworks Vision

Clarification of current and future water supply

● Building measures to evolve in the water business in the population decline society

Wide area cooperation, PPP, use of IoT

● Promotion of international cooperation

The provision of high-quality infrastructure system

Human resource development based on the Japan of knowledge