WATER SUPPLY IN JAPAN

JAPAN WATER SUPPLY DATA REPORT 2012

Executive Director's Message

This report is published annually by JWWA and presents data from water utilities across Japan. The data is predominantly from FY 1975－2009.

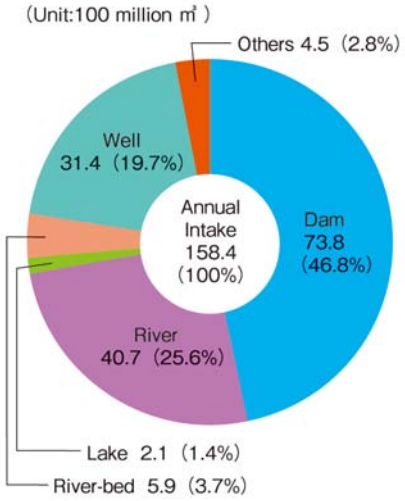
As executive director of JWWA, I am pleased to share this report with domestic and foreign water professionals. I really appreciate the supreme endeavors that the publication of this report has made in contributing towards an international exchange of information.

尾崎 勝

Masaru Ozaki
Executive Director

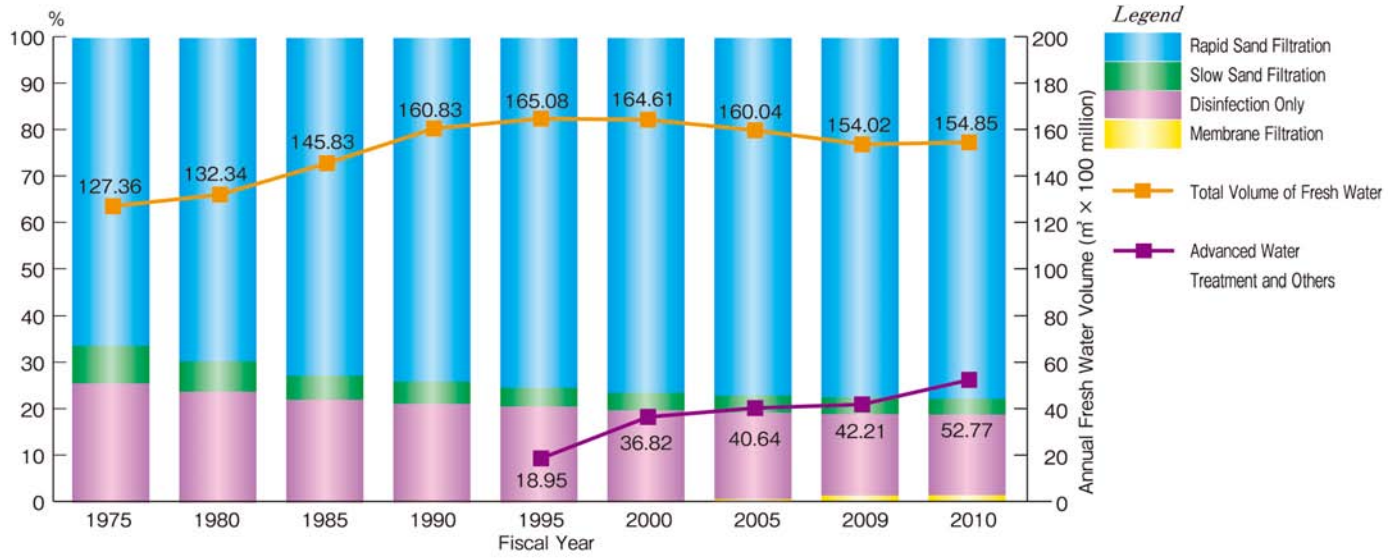
1. Water Resources & Treated Water Volume

Raw water makes up 72.4% of rivers and dams. The total annual volume collected is around 15.84 billion cubic meters.



Water Sources of Public Water Supplies and Bulk Water Supplies (as of March, 2010)

At present, chlorination is an obligatory form of disinfection for all water. Recently, the development of advanced water treatment systems, using ozone-GAC treatment (including membrane filtration) has been introduced in Japan, offering a viable method for treating water. The advanced water treatment system completely eliminates musty odors and THM substances that cannot be removed by conventional treatment systems.

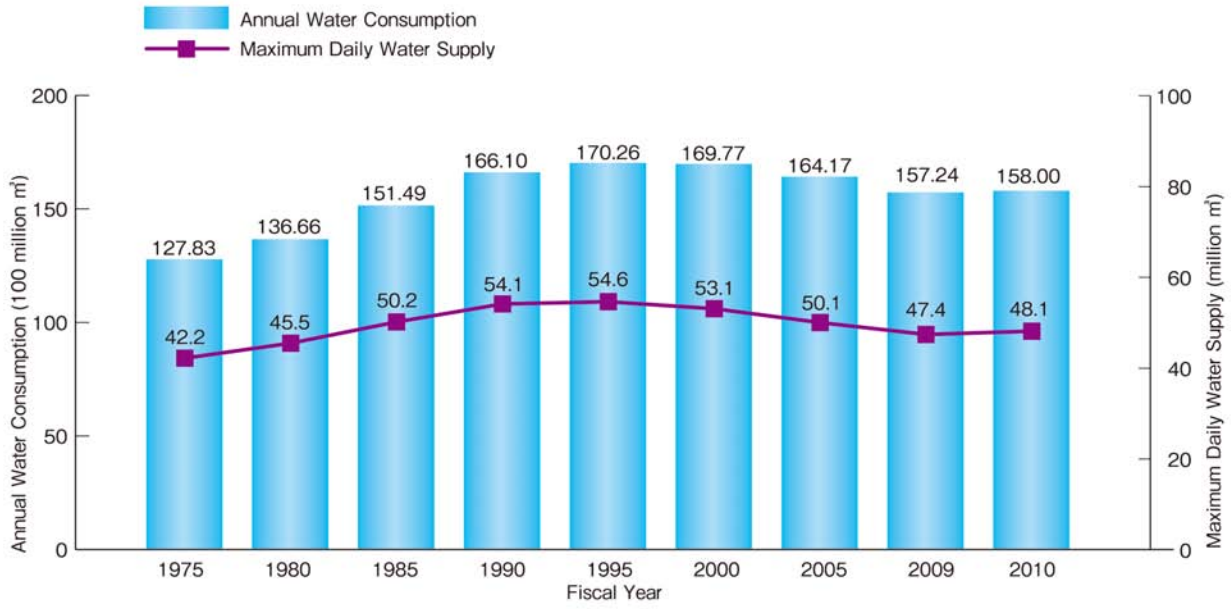


Annual Fresh Water Volume by Water Treatment Systems (Large Public Water Supply + Bulk Water Supply)

2. Water Supply Status of Japan

At the end of the fiscal year 2010 (March 31st, 2011; hereafter simply 'FY 2010'), there were 16,178 waterworks in Japan. According to waterworks law, 'waterworks' are defined as 'water supply systems, designed to supply more than 100 people with potable water through equipment such as pipes'. Public waterworks designed to supply water to a community of less than 50,000, make up 97.3% of all waterworks in Japan. Out of these, 93.6% serve a population of less than 5,000. The majority of water supplies in Japan today can therefore be classified as 'small-scale'.

Water supply utilities have been increasing their capacity to cope with an increasing water demand. The current trend however, is a decrease in water consumption due to the population reducing their annual water usage.



■ Trend of Annual Water Consumption and Maximum Daily Water Supply

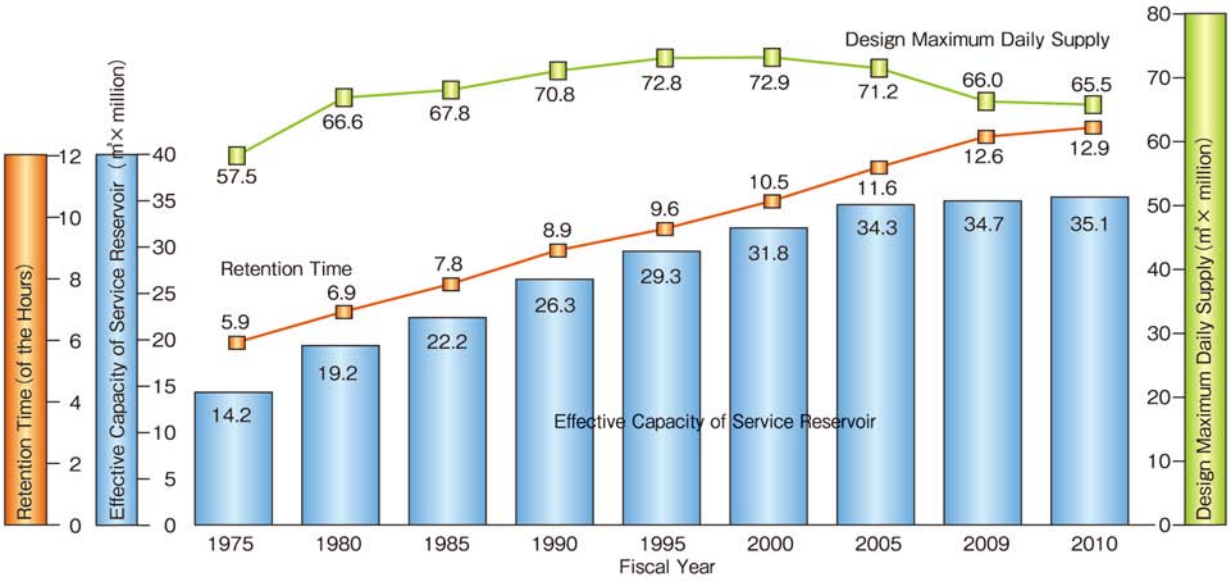
Served Population (1,000 person)		Number of Supplies	Population Served (1,000 person)	Volume of WaterSupplied in annual (100 million m³/year)	Daily Demand per Capita (ℓ)		
					Maximum	Average	Capacity of Facility
Public Water Supply	More than 1,000	14	3,851	47.2	376	336	564
	Less than 500 ~1,000	11	757	9.3	378	337	552
	〃 250 ~ 500	56	1,956	24.2	392	340	534
	〃 100 ~ 250	143	2,139	26.7	394	342	538
	〃 50 ~ 100	213	1,468	18.9	420	353	588
	〃 30 ~ 50	197	757	10.1	444	364	623
	〃 20 ~ 30	156	386	5.0	439	354	629
	〃 10 ~ 20	277	406	5.8	494	392	705
	〃 5 ~ 10	273	198	2.9	530	399	758
	〃 5	97	32	0.7	770	510	1,201
	Under Construction	3	0.5	—	—	—	—
	Total	1,440	11,950	150.8	401	346	572
Small Public Water Supply		6,687	488	6.8	531	386	—
Private Water Supply		7,950	43	0.3	—	—	—
Total		16,178	12,481	157.9	—	—	—

● Number of Waterworks in FY2009

3. Qualitative Upgrading of Water Supply Facilities

Human industry and daily life act on the premise that stable water will always be available. Our industry is therefore making positive steps towards future stability by building plural distribution systems, reconstructing old facilities and ensuring water works are resilient to earthquakes.

The total capacity of service reservoirs owned by water suppliers is increasing annually. It has grown from 14.2 million cubic meters in FY 1975 to 35.2 million cubic meters in FY 2010. Retention time of service reservoirs: [(Effective Capacity of Service Reservoir / Maximum Daily Support of Model) X 24 hours] has also increased from 5.9 hours in FY 1975 to 12.9 hours in FY 2010.



■ Effective Capacity, Retention Time and Maximum Daily Supply

The total length of water mains in Japan comes up to 632,865km. Accoding to the aged pipe-renewal project, gray cast iron pipes and asbestos cement ones are decreasing. These replacements follow on the basis of long term plan which facilitates introdution of the quake-resistant pipes.

Type \ Fiscal Year	1975	1980	1985	1990	1995	2000	2005	2009	2010
Ductile Iron Pipe (Seismic Type ※)	–	141.35	181.36	179.13	240.45 (6.65)	289.10 (19.67)	327.38 (29.77)	351.52 (44.38)	356.28 (48.43)
Steel Pipe	–	13.78	16.02	16.28	18.25	19.34	19.26	18.61	18.60
Hard-type PVC Pipe	–	83.65	109.64	132.15	155.42	174.35	189.23	199.31	201.75
Cast-iron Pipe	–	–	–	46.99	33.25	29.79	25.90	20.50	18.76
Asbestos Cement Pipe	–	86.87	82.49	67.73	47.51	26.79	14.72	8.87	7.92
Others	–	14.59	12.32	13.44	11.45	14.76	20.19	26.89	29.55
Total	262.18	340.24	401.83	455.72	506.33	554.13	596.68	625.70	632.86

● Length of Pipelines by its Type (unit : 1,000 ㎞) (Length of Pipelines are included for Bulk Water Supplies.)

※No data for the FY pre-1995.

4. A Clean and Safe Drinking Water Supply

The Ministry of Health, Labour and Welfare established the drinking water quality standards containing 50 items, to ensure the sanitation and safety of drinking water. In response to these standards, all water utilities have started renovation works on their water quality facilities. They also regularly examine the water quality of tap water, to see if it meets these regulations.

No	Item	Standard Value
1	Common Bacteria	100 per 1 ml
2	E. coli	Not to be detected
3	Cadmium	0.003 mg/L
4	Mercury	0.0005 mg/L
5	Selenium	0.01 mg/L
6	Lead	0.01 mg/L
7	Arsenic	0.01 mg/L
8	Chromium (VI)	0.05 mg/L
9	Cyanide ion and Cyanogens chloride	0.01mg/L as Cyanide
10	Nitrate and Nitrite	10mg/L as Nitrogen
11	Fluoide	0.8 mg/L
12	Boron	1.0 mg/L
13	Carbon Tetrachloride	0.002 mg/L
14	1,4-dioxane	0.05 mg/L
15	cis-1,2-Dichloroethylene & Trans-1,2-Dichloroethylene	0.04 mg/L
16	Dichloromethane	0.02 mg/L
17	Tetrachloroethylene	0.01 mg/L
18	Trichloroethylene	0.01 mg/L
19	Benzene	0.01 mg/L
20	Chlorate	0.6mg/L
21	Chloroacetic acid	0.02mg/L
22	Chloroform	0.06mg/L
23	Dichloroacetic acid	0.04mg/L
24	Dibromochloromethane	0.1mg/L
25	Bromate	0.01mg/L

No	Item	Standard Value
26	Total Trihalomethanes (Total of Chloroform, Dibromochloromethane, Bromodichloromethane and Bromoform)	0.1 mg/L
27	Trichloroacetic acid	0.2 mg/L
28	Bromodichloromethane	0.03 mg/L
29	Bromoform	0.09 mg/L
30	Formaldehyde	0.08 mg/L
31	Zinc	1.0 mg/L
32	Aluminium	0.2 mg/L
33	Iron	0.3 mg/L
34	Copper	1.0 mg/L
35	Sodium	200 mg/L
36	Manganese	0.05 mg/L
37	Chloride	200 mg/L
38	Calcium, Magnesium (Hardness)	300 mg/L
39	Total residue	500 mg/L
40	Anionic surface active agent	0.2 mg/L
41	(4S, 4aS, 8aR)-Octahydro-4,8a-Dimethylenaphtalene-4a(2H)-ol	0.00001 mg/L
42	1,2,7,7 - Tetramethylbicyclo[2,2,1]Heptane-2-ol	0.00001 mg/L
43	Nonionic surface active agent	0.02 mg/L
44	Phenols	0.005mg/L in terms of Phenol
45	Organic substances (Total Organic Carbon)	3 mg/L
46	pH Value	5.8-8.6
47	Taste	Not abnormal
48	Odor	Not abnormal
49	Color	5 degree
50	Turbidity	2 degree

■ Water Quality Standards of Drinking Water

When concentrations exceed those set out by the standards, it is necessary to ascertain the causes and hence take preventative action; modifying operation management of the treatment plant is usually a good solution as is renovating the water purification facilities. All these measures are necessary to supply a constant, stable and safe service.

○ Water Quality Management

It is vital to make prudent managerial decisions regarding water quality in order to ensure the future safety of tap water. A guideline has therefore been established, identifying 27 items to look for when examining water. Pesticides that are used in agriculture and other such are activities are also included in a 102-item list. Local pesticide usage is accordingly monitored.

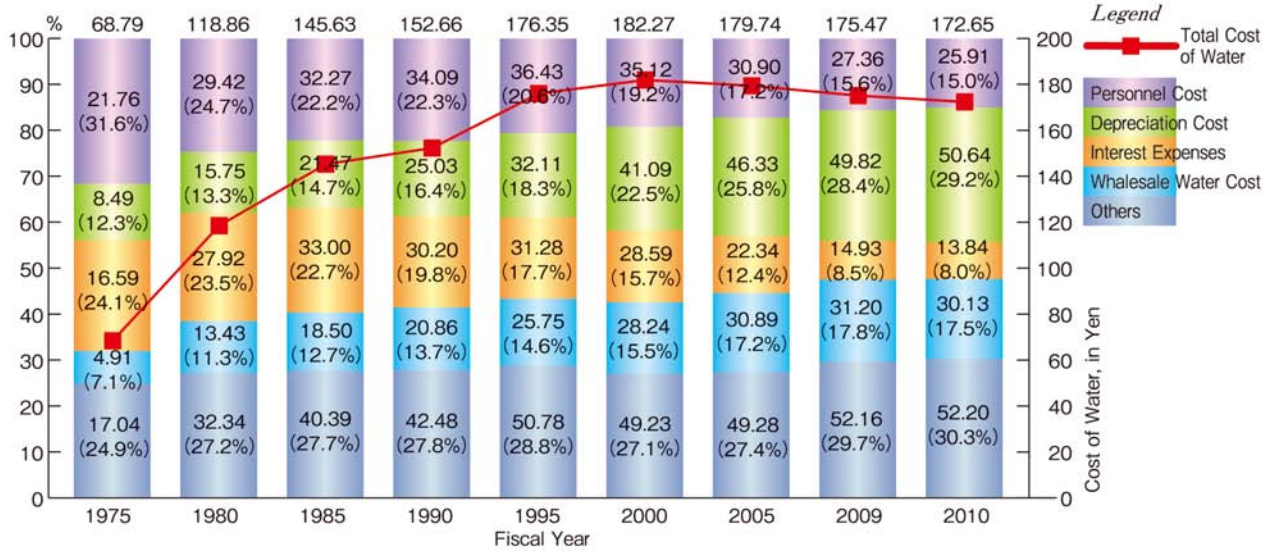
○ Revision of Drinking Water Quality Standards and Improvement to Water Supply

Drinking water quality standards are constantly updated by integrating the latest scientific approaches (eg. toxicity information). Water works facilities are encouraged to match new drinking water quality standards so as to supply good quality, safe tap water for the future.

5. Cost of Water : Capital Cost Plus Operation Cost

Depreciation costs and interest expenses account for about 37% of the total cost of water. This is especially true in cases of bulk water supply, where, the cost rises by about 53%.

Production costs of water per cubic meter increase annually relative to the individual charges, despite decreasing staff costs and interest paid. The reason for this is the renovation of the old water supply facilities as well as increasing of water reservoirs' capacity; these are measure implemented to improve our service, securing a safe and stable water supply.



Trend and Composition of Cost of water per cubic meter

Pipeline renewal projects, one of the key developments to operate water supply, require 924.6 billion yen annually. These projects account for about 34 % of the capital expenditure in the fiscal year of 2010, which increased from 13 % in the fiscal year of 1975.

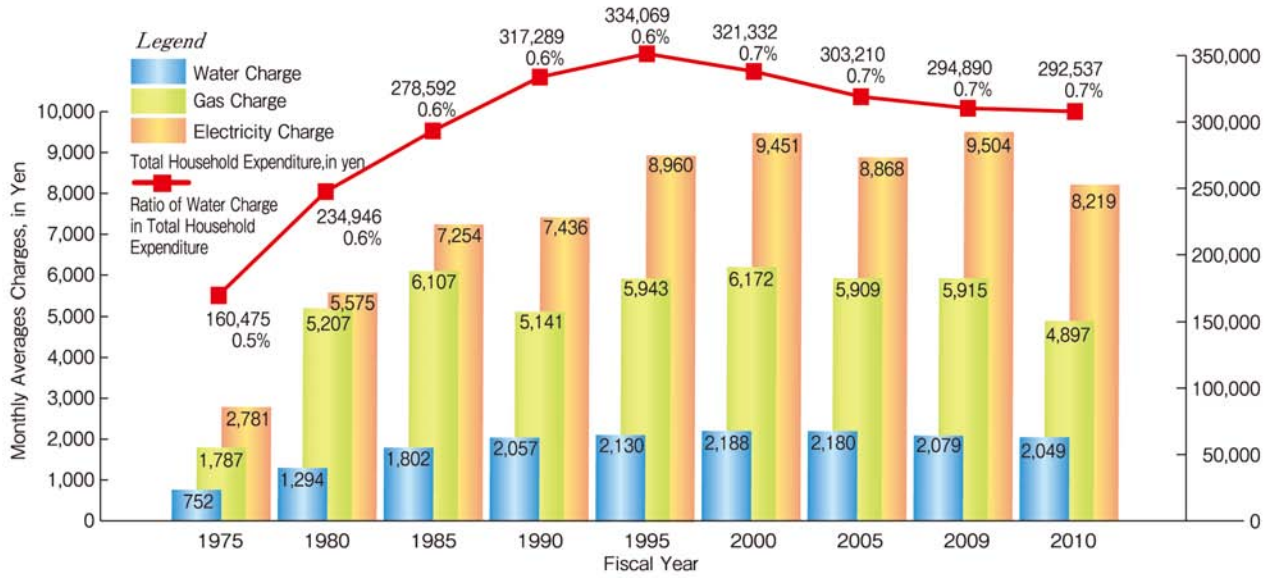
Item \ Fiscal Year	1975	1980	1985	1990	1995	2000	2005	2009	2010
New & Expansion Works	6,388	6,318	6,096	5,886	7,863	6,576	4,257	3,710	3,357
Improvement Works	1,154	2,373	3,209	5,810	8,644	7,635	6,263	6,176	5,889
Redemption Cost on Revenue Bond	876	1,390	2,812	2,827	4,195	5,021	7,710	7,919	6,941
Redemption Cost on Long-term Loan	52	85	83	90	97	106	63	95	62
Others	166	333	232	514	590	517	696	844	784
Total	8,636	10,499	12,432	15,127	21,389	19,855	18,989	18,744	17,033

Trend of Capital Expenditure (unit : 100million yen)

6. Water Charges

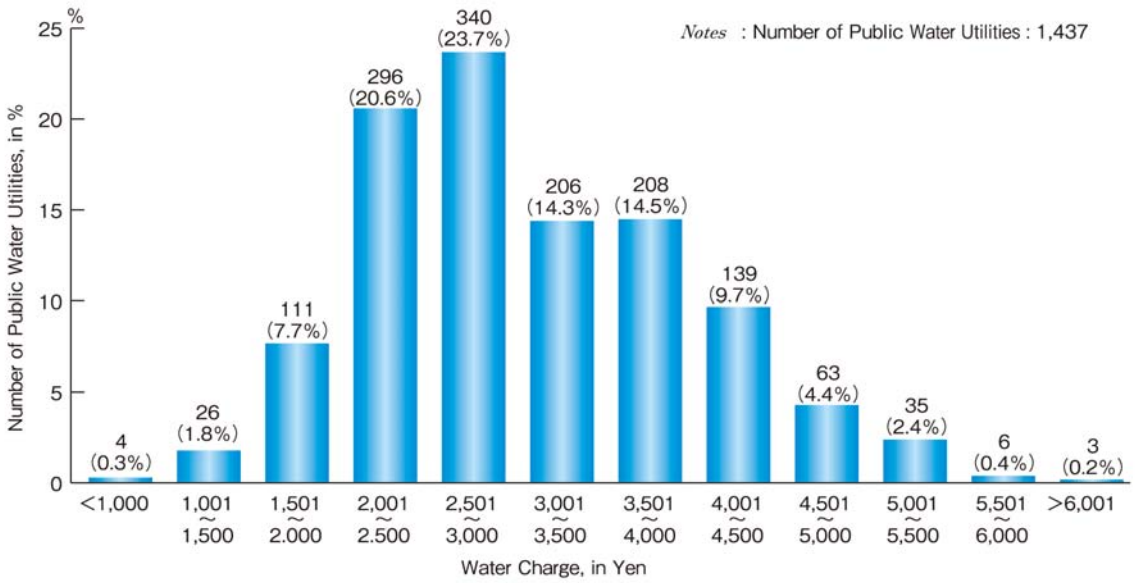
Most water supply utilities in Japan are established by prefecture or municipality and are operated on a self-sufficient basis. The water charge is set separately by each water supply utility; for an average household, it takes up about 0.7% (2,049 yen per month) of the household income.

The average monthly water sales decline in the past few years. Water consumption expenses account for about 0.7 % in the total domestic expenses.



■ Trend if Total Household Expenditure and Water Charge in Monthly Average for the cities with Population over 50,000

Water suppliers are deemed to be self-sufficient, such that they are expected to meet their own costs of construction and facility operation through customer charges. Charges differ depending on region because there are differences in condition, distance from source, construction year, scale, staff costs, maintenance costs, etc.



■ Number of Water Supplies and Water Charge for Domestic Usage of 20 m^3／month for a Family Living in a House Consuming（as of April 1, 2011）

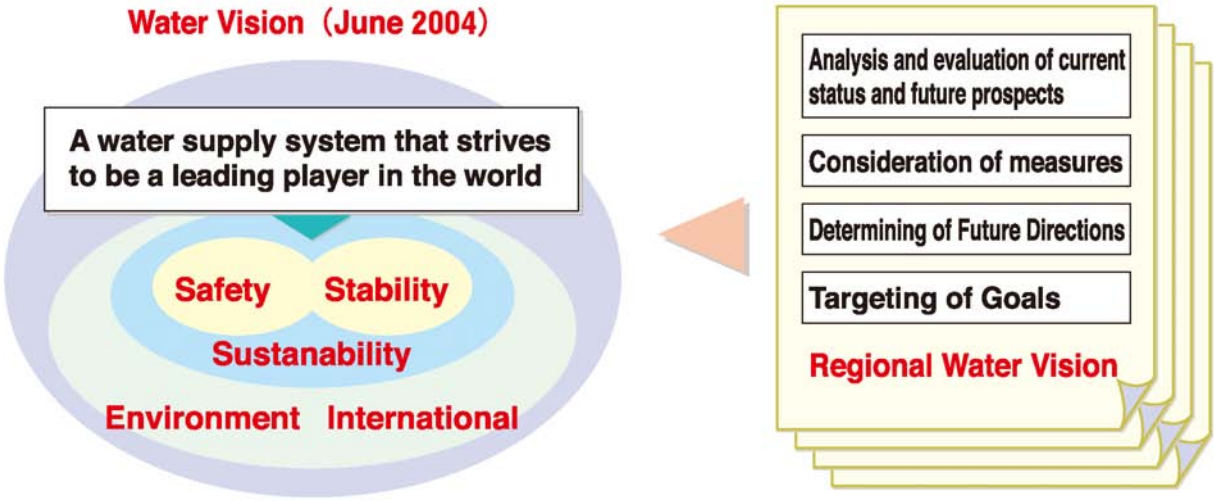
Future Water supply service

Water works are indispensable necessity for society. But there are still some problems facing our industry, such as the need for anti-seismic devices, the renovation of old facilities etc. For our future, it is important to resolve these issues quickly by enhancing the information disclosure, ensuring user understanding and participation.

■ *"Waterworks Vision" and "Regional Waterworks Vision"*

The Ministry of Health, Labour and Welfare released 'Waterworks Vision' in June 2004 (Revised in July 2008), which outlines desirable directions for the future, long-term policy and related measures. Water supply utilities will formulate their own 'Regional Waterworks Vision', setting their own targets by determining the current issues and problems that face their areas.

7 years passed since Water Vision started. These years, water supply conditions face social changes for instance, population goes declining and the Great East Japan Earthquake damaged their facilities. Now that, "New Water Vision" is under studying to formulate in 2012.



Waterworks Vision (June 2004)
Desirable Goals of Water Supply at middle of this century

Regional Waterworks Vision
Desirable Goals of each water supply utility

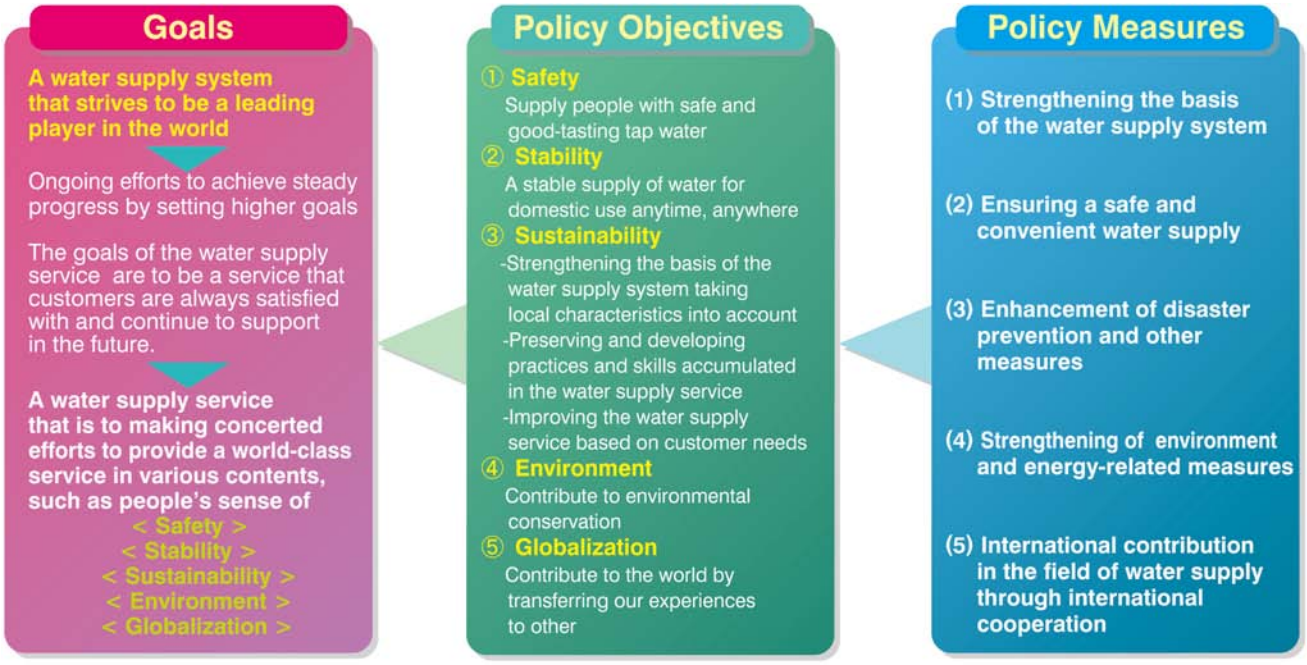


Figure: Desirable Future Directions of Water Supply, Long-term Policy Goals and Related Policy Measures Shown in "Water Vision"