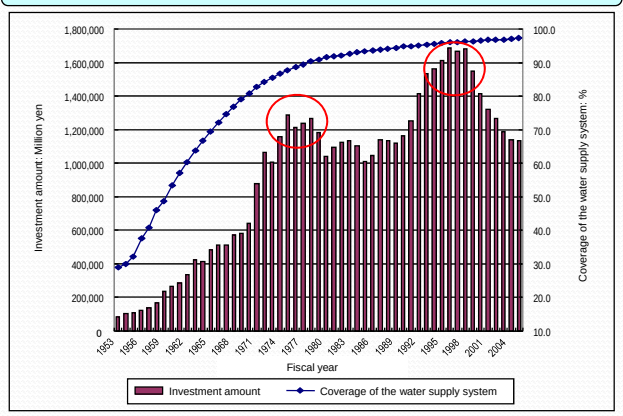
Circumstances Surrounding the Waterworks Facilities Renewed in Japan

- Japan's waterworks facilities have been developed, peaking around 1975 and 1998. The coverage of the water supply system is approximately 97% (FY 2007).
- The current waterworks facility assets are estimated 40 trillion yen or more as the accumulated investment amount (at the end of FY 2005).

Changes in Investment in Waterworks Facilities (Values in 2005)



Source: Materials from the Waterworks Vision Follow-up Panel

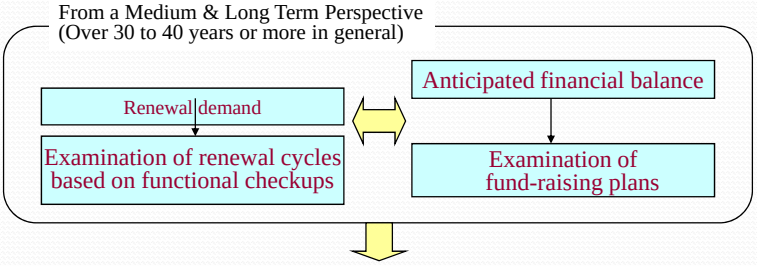
Asset Management in Water Utility

<Definition>

"Asset management" in water utility provides a practice lesson to realize a sustainable waterworks project as stated in the waterworks vision. This activity is systematized from the medium and long term standpoint to manage and operate the waterworks facilities in an effective and streamlined manner over their life time, indentifying the characteristics of waterworks facilities.

<Basic Concept>

From a Medium & Long Term Perspective
(Over 30 to 40 years or more in general)



Formulate and implement financially supported renewal plans based on technical platforms.

Formulation of "the Guideline on Asset Management in Water Utility"

Practice of asset management is indispensable for preparations for major renewals to come.

Revised Waterworks Vision (July 2008)

With introduced asset management approaches, planned rebuilding or renewal of waterworks facilities, as well as their efficient maintenance and operation, should be promoted based on the technical platforms from a medium and long term perspective. To obtain consumers' understanding for burdens shared for reconstruction and renewal, how to provide information properly should be studied in details, while funds raising will be conducted through renewal reserves and other means.

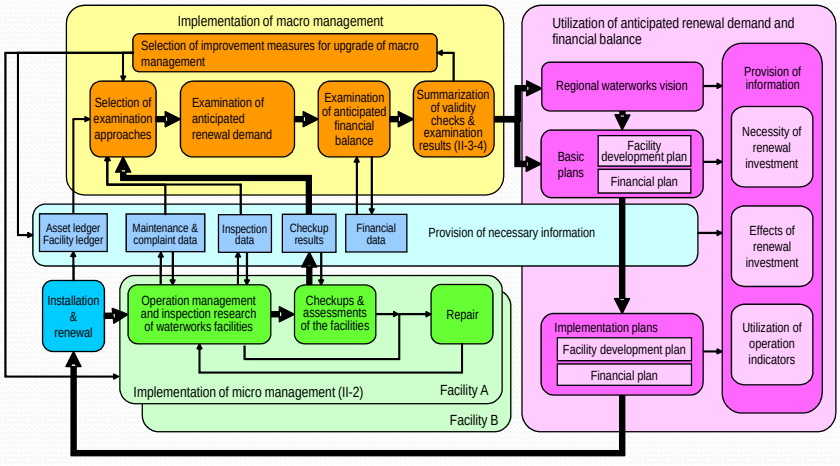
At present, only part of the water utility entities are prepared for renewals to come from a medium and long term perspective.

Start formulating "the guideline," expecting all water utility entities to practice asset management after urging each entity to fully recognize the importance of asset management.

"The guideline" released on July 7, 2009 has been delivered to all prefectural governments and the water utility entities authorized by the minister.

Asset Management Practice Cycles

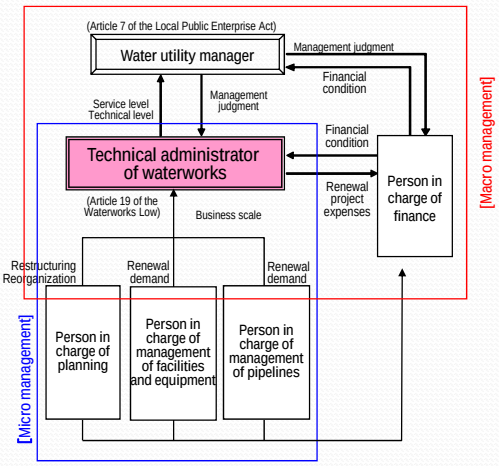
In water utility, asset management is composed of the following four elements: (1) Provision of necessary information; (2) implementation of micro management; (3) implementation of macro management; and (4) utilization of anticipated renewal demand and financial balance.



System to Implement Asset Management

Since asset management is an activity that is involved in water utility in general, it is necessary for the entire organization to tackle the activity.

Particularly, the technical administrator of waterworks, whose key role is specified in Article 19 of the Waterworks Low, should lead asset management with a focus on well-disciplined activities by the entire organization.



Key Points in Practice of Asset Management

Collection of Facility Data	・Regard the data in ledgers as basic information ・Cover unavailable data with proper assumptions ・Creation of a database
Checkups & Assessments	・Securely accumulate daily management data ・Understand the conditions of the facilities ・Assessment of soundness and evaluation of seismic capacity
Renewal Demand	・It is essential to determine renewal cycles ・Prioritize key facilities in determining renewal cycles ・Implement seismic retrofitting and other urgent issues as soon as possible
Anticipated Financial Balance	・Do not cause shortage of funds ・Maintain funds required for renewals ・Level of dependence in bond issuance, charge setup, cost reduction, etc. ・Renewal planning with a balance between technique and costs

Provision of Necessary Information

＜Key Points in Collecting Necessary Information＞

- **Collect data on all facilities, including those for water intake, storage, conveyance, purification and distribution.**
- **Classify information into two categories of "structures & facilities" and "pipelines."**
- **It is acceptable to cover unknown data with assumptions. However, file the detailed assumptions as records.**
- **Update the information timely. Continue to make improvements for enhancement of accuracy and reliability.**

Table Types of Information Required

Item	Major Information
Ledgers and specifications of the applicable facilities	Names & identification codes, years of acquisition, acquisition prices (book cost prices), locations, structure types & materials, shape sizes/capacities/ performances/diameters, number of units/fundamental numbers/extensions, etc.
Data on inspection research	Drawings, facility conditions (troubles and their levels), aging history (repair, accident records, and checkup results in the past) etc.
Information required for facility checkups and assessments	Inspection research results, ground information, materials on estimated earthquake damages, hazard maps, levels of facility importance, levels of effect in breakdowns, etc.
Information required for anticipating renewal demand	Passed years, statutory useful lives, facility conditions (troubles and their levels), levels of facility importance, facility checkup results, soundness level prediction results, renewal priority assessment results, laying unit prices, deflators, etc.
Information required for anticipating financial balance	Profit balance, capital balance, financial statements, issuance & redemption of bonds, etc.
Information required for organization of macro management	Total assets, level of asset soundness, service level, rate level, etc.

Provision of necessary information (Creation of a Database)

＜Key Points in Creating a Database＞

- **Collection of waterworks facility data is essential to asset management**

- **Water supply system is composed of so many assets.**
- **Paper-based data management requires increasing labor year by year due to expanded facilities and accumulated data amounts.**
- **In addition, securement of filing spaces and deterioration of paper quality (loss of scattered data) are also problems to be settled.**

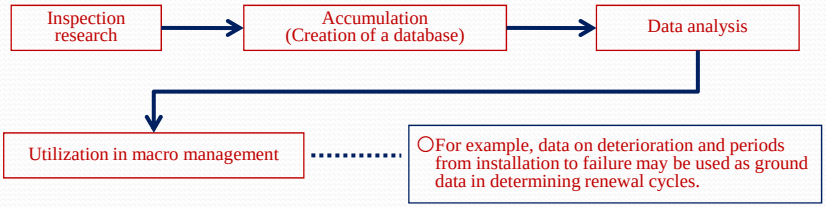
Creation of a database

- **Labor required for data management is saved**
- **Useful for retrieval, secondary processing, etc.**
- **There are a variety of applications, in addition to asset management**
- **Pay attention to user-friendliness, operation rules to be prescribed, and other factors**

Micro Management (Operation Management & Inspection Research)

Operation Management & Inspection Research of Waterworks Facilities

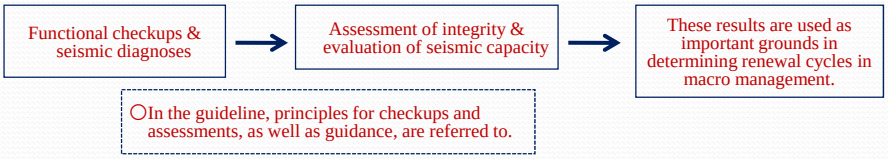
- Understand the waterworks facility conditions through daily operation management. Check ongoing deterioration through periodic inspection.
- Such inspection research is essential to detect signs of accidents and failures, as well as to confirm the operating conditions of the waterworks facilities.
- Utilize inspection data accumulated for a long period as basic data to know tendencies in soundness, failures and accidents of the waterworks facilities.
- Repair the facilities remarkably deteriorated, which are identified through inspection research, with emergency measures to normalize their functions.



Micro Management (Checkups & Assessments)

Checkups & Assessments of Waterworks Facilities

- In general, the lives of facilities, which differ depending on locational conditions and usage environments, should not be determined uniformly.
- Therefore, it is important to determine optimal renewal cycles based on the integrity levels assessed through functional and other checkups.
- Under the ministry ordinance revised in March 2008 (“the Ministry Ordinance Specifying the Technical Standards for Waterworks Facilities”), the seismic capacity criteria applied to the waterworks facilities are given a clear-cut definition.
- On the other hand, the seismic capacity of the existing waterworks facilities supposedly differ depending on when they were built. Examine the urgency of their renewal and proper points of time for renewing individual facilities (when to make seismic retrofitting) through comparison between their seismic capacity assessed by seismic diagnosis and the performance required under the ordinance.



○In the guideline, principles for checkups and assessments, as well as guidance, are referred to.

Macro Management (Anticipated Renewal Demand and Financial Balance)

(1) Examination of renewal demand

- Determine renewal cycles
- Set reinvestment values
- Consider the importance, priority, level of integrity, and seismic capacity of the facilities

(2) Examination of the anticipated financial balance

- Reflect the examined renewal demand
- Examine renewal financial sources, including bond issuance and charge revision to prevent fund shortage, through simple simulation.

※ Check the current asset management level in waterworks facilities by yourself before studying macro management about available approaches.

Renewal Demand (Renewal Cycles & Reinvestment Values)

(1) Determination of renewal cycles

- Regarding the periods from acquisition of assets to their renewal (called **"renewal standards"** in the guideline) as parameters, determine renewal cycles (years) by setting up a renewal standard, which is established based on **monitored maintenance** or **time schedule maintenance** for each facility category (civil engineering structures, pipelines, machinery & facilities, etc.), applying the said standard starting in the year of acquisition of that facility.

○ Status-monitoring maintenance

- **Individual renewal cycles are determined** based on **inspection research** and **checkup results.**
- It **would be better** to determine the renewal cycles of the waterworks facilities, of which lives differ depending on their locational conditions and usage environments, **based on status-monitoring maintenanc**e.

○Time schedule maintenance

- Renewal cycles are determined based on **statutory useful lives and passed years (in-service periods).**
- Classified in the same category with other assets, **key facilities** should be renewed from a perspective of **preventive maintenance**.

(2) Determination of reinvestment values

- **As for structures and facilities**, regard the prices calculated by **correcting book cost prices** shown in the fixed asset ledger with **deflators** for price increases (current prices) as reinvestment values.
- With regard to **pipelines**, their reinvestment price is calculated with the following steps; determine the **total length** of the pipeline **to be renewed**, referring to the lengths constructed year to year, and then multiply the total length thus determined **by the installation unit price**.
- In addition, for the plan to **improve** aseismic performance and other **functions**, such **functional improvements should be reflected** in the reinvestment values.

Renewal Demand Examination Flow

(1) Organize the reinvestment value by facility.

(2) Examine the cases with no renewals. (Understand how the integrity of the facilities changes without renewals).

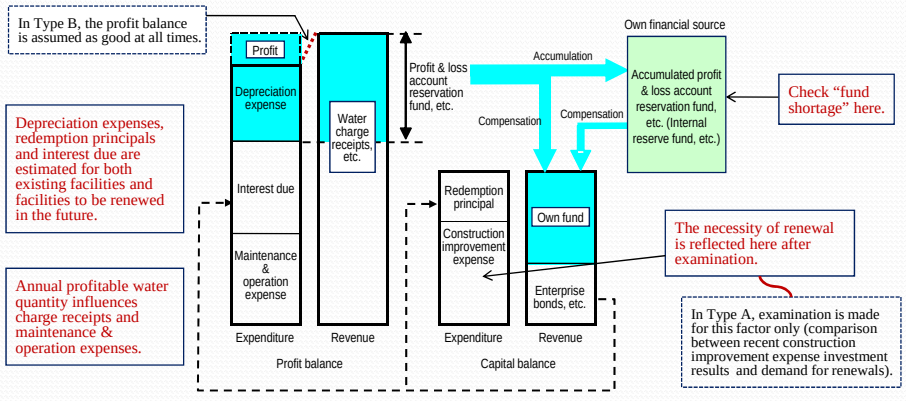
(3) Examine the cases with renewals in statutory useful lives for all facilities. (Roughly understand the total investment amount required for renewal projects over a period subject to examination (30 to 40 years)).

(4) For examination of renewals based on time schedule maintenance (facilities of greater importance and higher priority such as key facilities including purification plants and distribution reservoirs, major pipelines including main conveyance, supply and distribution pipes, and distribution pipes to important facilities), set renewal cycles on a preventive maintenance basis. As for other facilities, it is possible to extend the renewal cycles (renewal standards) longer than the facilities of greater importance and higher priority based on micro management

(5) Examine the renewal cases based on status-monitoring maintenance. (Study earlier renewal of the facilities of which seismic retrofitting is needed early. Shorten the renewal cycles of the facilities of which replacement urgency is identified through functional checkups (asbestos-cement pipes, etc.). Examine the extension of renewal cycles for the facilities of which life prolongation is possible under the premise that necessary measures should be taken.)

Examination of the Anticipated Financial Balance

○Simulate each renewal case roughly to examine the necessity.



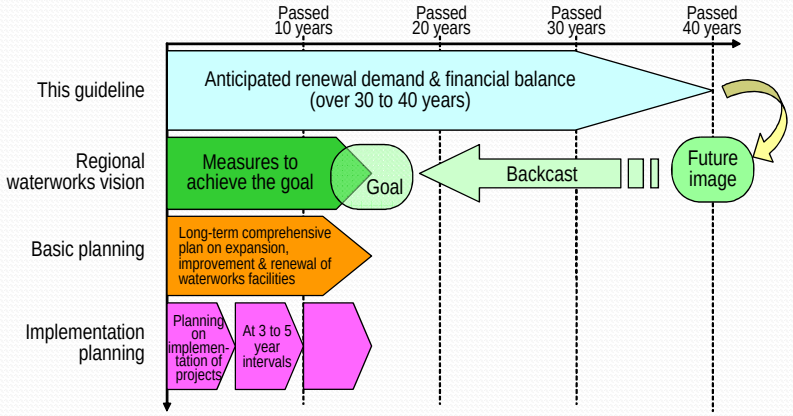
○ Through calculation of the fund balance, check the accumulated profit & loss account reservation fund, etc. (Internal reserve fund, etc.).

○ For fund raising by issuing enterprise bonds, also check the bond issuance rate.

Reflection in Regional Waterworks Visions

Reflect the future images and tasks to be performed in business, which are examined based on the renewal demand and financial balance anticipated through asset management, in regional waterworks visions.

In addition, materialize renewal plans as projects through basic and implementation plans.

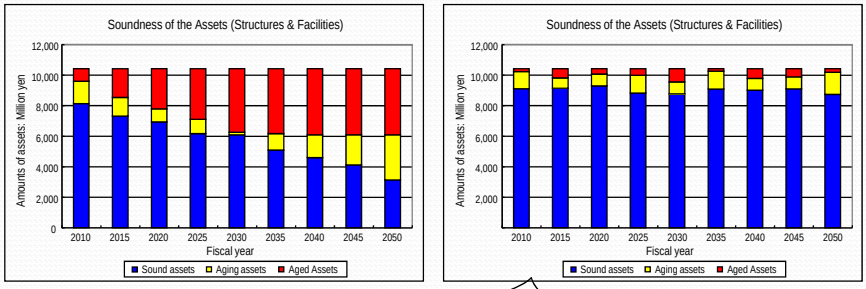


Utilization in Communication with Users

For smooth implementation, it is important to gain users' understanding by explaining the necessity and effects of the projects. It is favorable to provide users with the information with easy-to-follow indicators showing expected results.

<Example Images>

Without renewal projects → With renewals based on the criteria



The rates of aging and aged assets fluctuate from 5 to 10%.
However, 12.5 billion yen should be invested to maintain soundness.