Promotion of Research and Technology in Water Supply Field

水道分野における科学技術の振興

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Promotion of Research and Technology in Water Supply Field

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Abstract

Japanese Government is strongly promoting Science and Technology. The Council for Science and Technology Policy (CSTP) of the Cabinet Office is playing a great role in promotion of science and technology in especially in health science field. Promotion of research in water in environment is one of very important issue. Trend of research projects especially in water supply field are described. In addition, effective way of promotion of water supply engineering is discussed.

1. Promotion of Science and Technologies in Japan

The Japanese government has set out seven priority areas on the basis that advances in these areas should help the nation prosper in the 21st century:

1. *Provide solutions to environmental problems*
2. *Provide solutions to the problem of there being fewer children and an aging society*
3. *Revitalize the regions*
4. *Restructure the cities*
5. *Advance Science and Technology (S&T)*
6. *Nurture human resources and promote education and culture*
7. *Bring into realization a nation that is led by the world's most advanced IT*

As is seen from the above, S&T is included in the list of priority areas that Japan intends to focus on, because it is widely recognized that the nation cannot survive without a heavy reliance on the advancement of S&T. The most recently published White Paper (2001) bears the title: "Creativity of Japan's Science and Technology" and this report characterize the key objectives of Japan's S&T agenda. The Council for Science and Technology Policy (CSTP) of the Cabinet Office (April 1, 2001), implemented the second phase of the S&T Basic Plan to work towards that goal. To accomplish these objectives the CSTP has set the goal for the country to spend 24 trillion yen on S&T for the coming 5

years, commencing April, 2001 (FY'01). This amount is 7 trillion yen more (over 40% higher) than that allocated for the first 5-year phase of the S&T Basic Plan. The total draft budget request this year for S&T- related items is 3.6 trillion yen in FY'04, reflecting an increase of 2.0% over the previous Fiscal Year, even though there was an overall decrease of 17% in the General Account. This level of funding is the clearest possible indication that the Government of Japan has placed strong emphasis on its perceived importance of the promotion of S&T, even though the Japanese economy now is in a very serious situation.

- Reform of the S&T system to generate excellent outcomes
- Strategic approach to areas and fields expected to grow in the future
- Internationalization of S&T activities in Japan

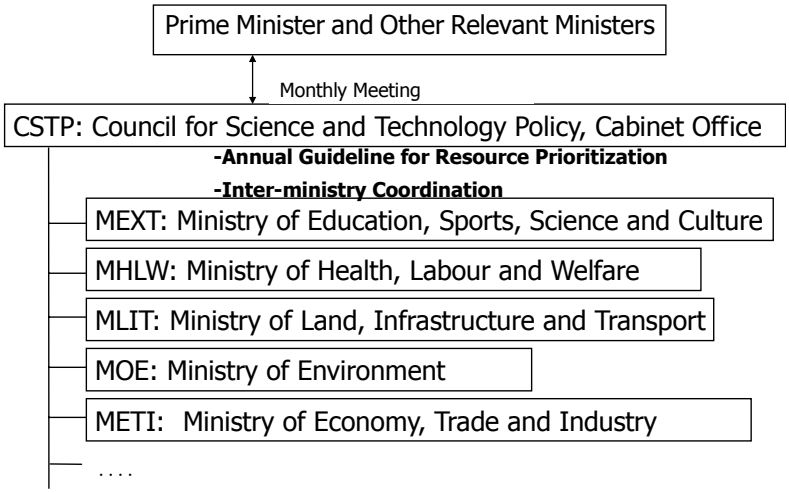


Fig. 1 Scheme of Promotion of Science and Technology in Japanese Government

Following the administrative reform begun in January 2001, 59 national research laboratories out of 89 underwent reform and were transformed into Independent Administrative Institutions (IAIs). As well, the Council for Science and Technology Policy (CSTP) of the Cabinet Office was formed by the reorganization of the old Council for Science & Technology (CST), which had belonged to the old Prime Minister's Office. Another reform, all 98 of the national universities have been now an "agency" status.

The CSTP is the central advisory body of the Japanese government tasked with the formulation of S&T policy; it must guide the direction which the country takes in research. One significant change

occurring as a result of the reform is that a general CSTP meeting is now held once per month so as to discuss, in the presence of the Prime Minister, a wide range of S&T issues. CSTP guides the future direction of Japan's S&T agenda and budget.

On behalf of the Japanese Government, CSTP promotes research and technology with key-focus on these subjects.

- Life Science
- Nano-technology
- Information Technology
- Environment
- Social Infrastructure
- Materials

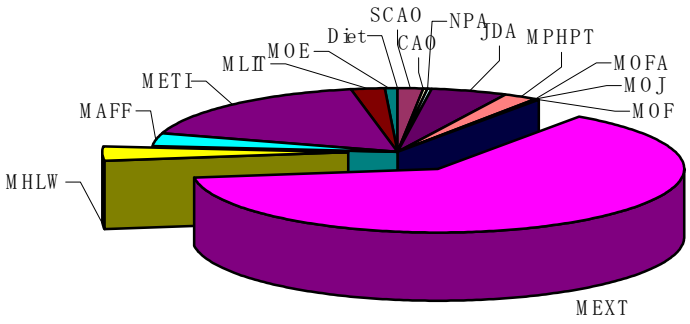


Fig.2 S&T-related budget request for FY '04 by Ministry/Agency

Abbreviations:

SCAO: Secretariat of Cabinet Office
CAO: Cabinet Office
JDA: Japan Defense Agency
NPA: National Police Agency
MPHPT: Ministry of Public Management, Home Affairs, Posts and Telecommunications
MOJ: Ministry of Justice
MFA: Ministry of Foreign Affairs
MEXT: Ministry of Education, Culture, Sports, Science and Technology
MHLW: Ministry of Health, Labour and Welfare
MAFF: Ministry of Agriculture, Forestry and Fisheries
METI: Ministry of Economy, Trade and Industry
MLIT: Ministry of Land, Infrastructure and Transport
MOE: Ministry of Environment

Trend of governmental budget relating on Science and Technology is shown in Fig.3. Budget for researches relating to Life Science and Environment are improving in amount.

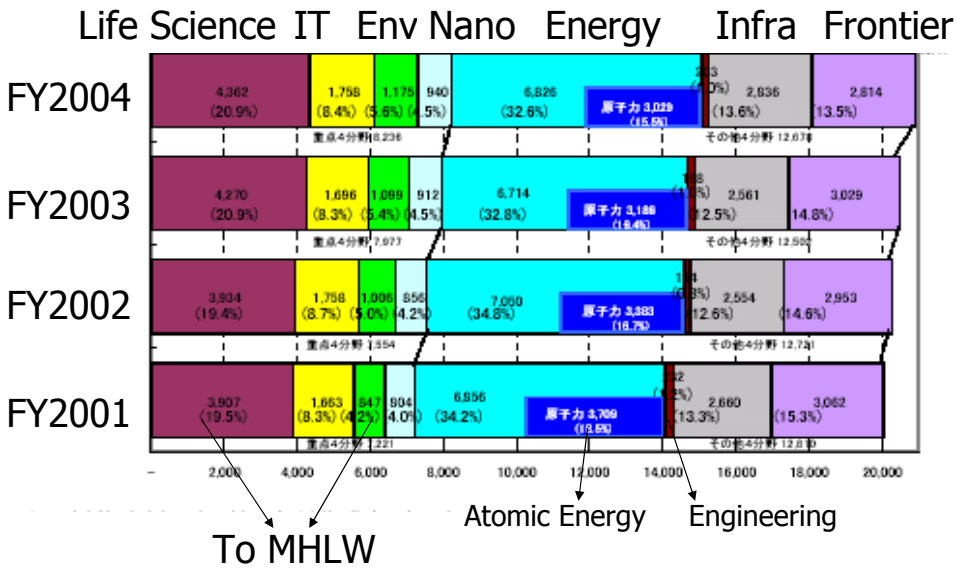


Fig.3 Trend of governmental budget relating to S&T in Japan

Other trials are being made in many organizations. Establishment of TLO (Technology Licensing Organization) and supporting organization is being encouraged to promote practical application of research.

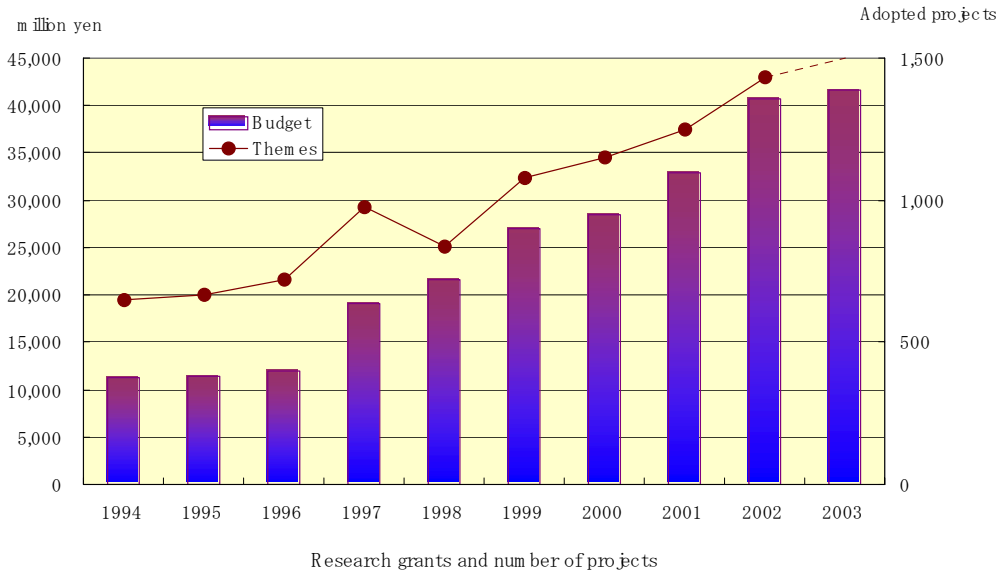


Fig.4 Trends in research budget and projects, Health and Labour Research Grants

The increase of competitive research fund is also an indicator of promotion of science and technology. Fig.4 shows the increase of Health and Labour Sciences Research Grants by the Ministry of Health, Labour and Welfare.

Health and Labour Science Research Grants is offered to researchers who conduct researches that may be considered to contribute to the enhancement of health sciences to answer people's needs in health, welfare and life sanitation fields. Applicants are publicly gathered through the Web pages, and they are selected based on evaluations made by the review committee.

Research budget for water supply promoted by Water Supply Division, Bureau of Health Services, MHLW, is included in this research budget.

CSTP especially takes initiative on research with key focus on the theme below in environmental studies;

- Global warming
- Gavages-to-zero Project and Resource Cycle
- Environmentally Sound Water-Cycle in Watershed and City Revitalization
- Total Management of Chemical Risk
- Water Cycle in Global Scale

2. Researches in Water Cycle Management

MHLW is promoting the Environmentally Sound Water-Cycle Project, under the supervision by CSTP. The Project is aiming at 1) Sustainability in Watershed to improve efficiency of water, and 2) Decrease of water discharge and contamination to realize harmonious coexistence of human and other creatures to meet the aim of the Initiative of CSTP.

The Environmentally Sound Water-Cycle Project consists of 6 Study Objectives (projects) and each promoting organization;

- Sound Water Cycle in watershed *->e-water project, JWRC*
- Sound Water Cycle in town *->epoch project, JWRC*
- Sound Water Cycle in house
  -> Japan Water Pluming Engineering Promotion Foundation, JWRC
- Control of infectious disease via water *-> Setsunan Univ.*
- Dissolved Organic Substances in Source Water
  -> National Institute of Environmental Studies
- GIS assisted water source control *->NIPH*

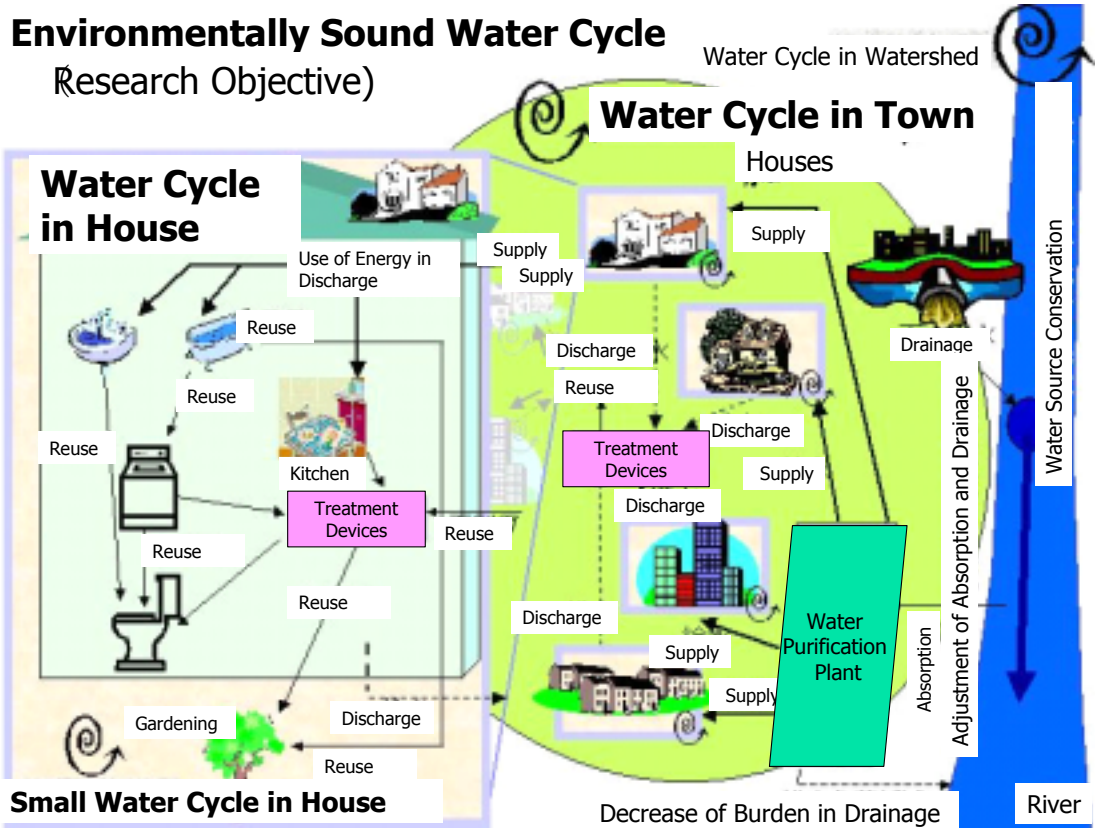


Fig.5 Environmentally Sound Water Cycle (Research Objective)

3. Investment in Water Supply

Water Supply is facing a big challenge in reforming water facilities and composition waterworks engineers in water works are rapidly changing. Fig. 6 shows Annual Investment to Water Supply and Water Supply Prevalence in Japan which clearly presents the change or decrease of annual investment to water supply in whole country.

Fig.7 shows the trend of annual investment and retirement costs and stock for water supply in whole country. The retirement cost is estimated to exceed the investment cost after 2025, and the total stock of the facilities is estimated to decay after the year by the estimation by every five years.

This change is going to affect on the key research objective in water supply field.

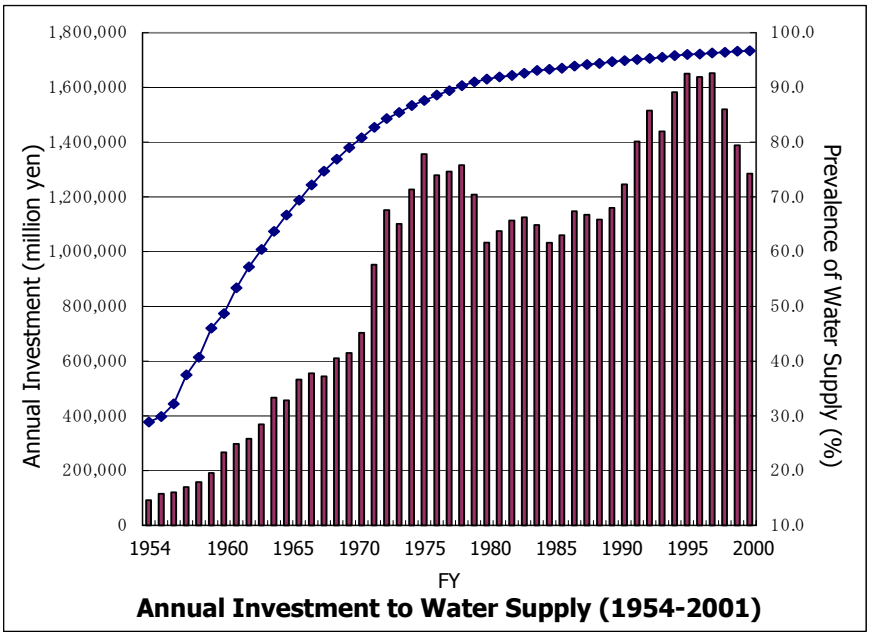


Fig. 6 Annual Investment to Water Supply and its Prevalence in Japan

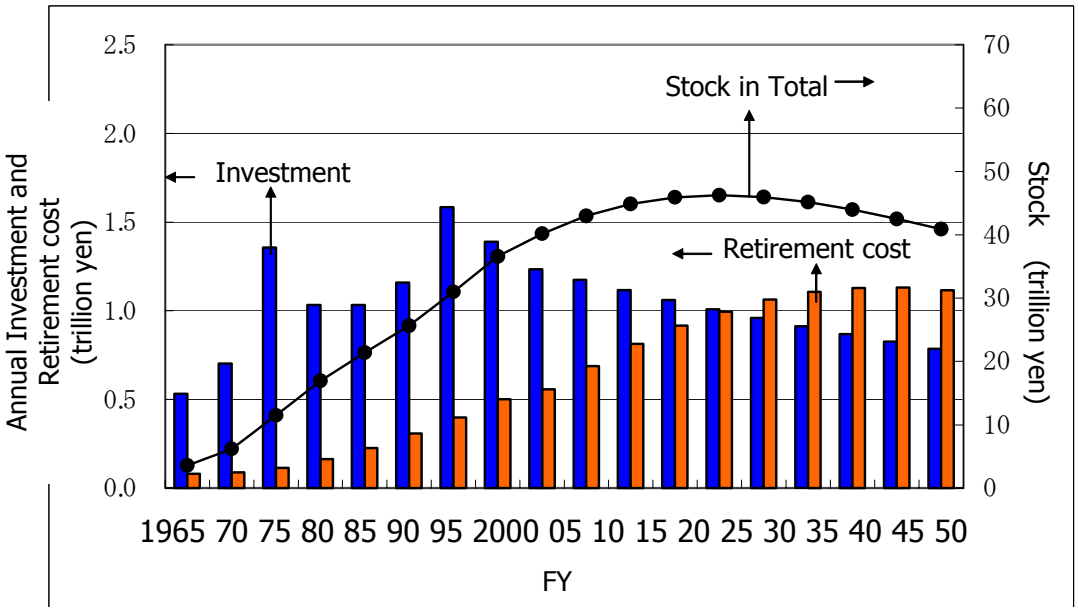


Fig.7 Annual Investment, Retirement Cost and Stock in Total in Water Supply Facilities

Cost for research investment and its proportion to total sales in all industries is shown in Fig.8. The proportion has gradually increased in these 10 years and changed from 2.5% in 1991 to 3.3% in 2000. The proportion of research investment varies between industries. Fig. 9 shows its difference among industries relating to water supply field. Electric devices and chemical industries have high proportion of research investment. High proportion of research investment seems to encourage industrial development.

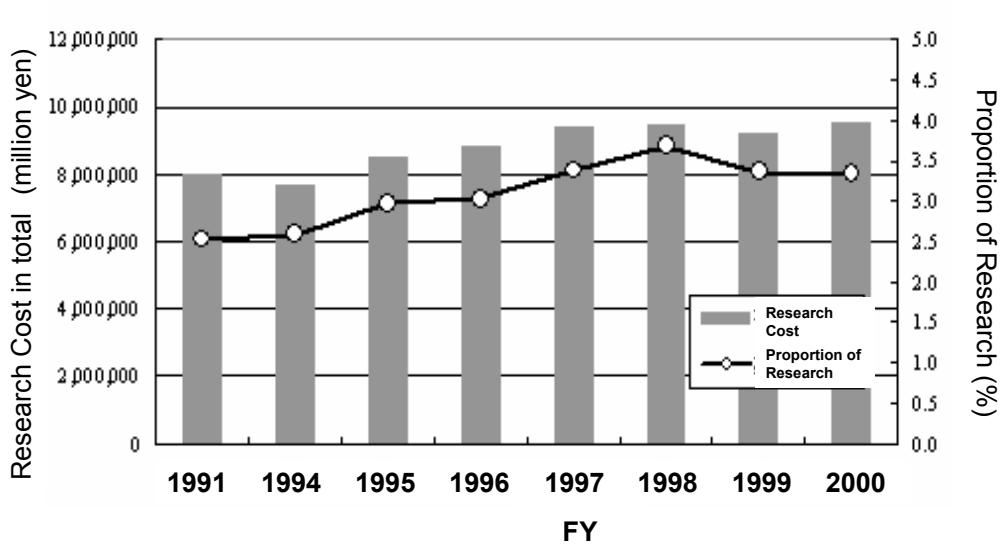


Fig.8 Research Investment and its Proportion to Total Sales in all Industries

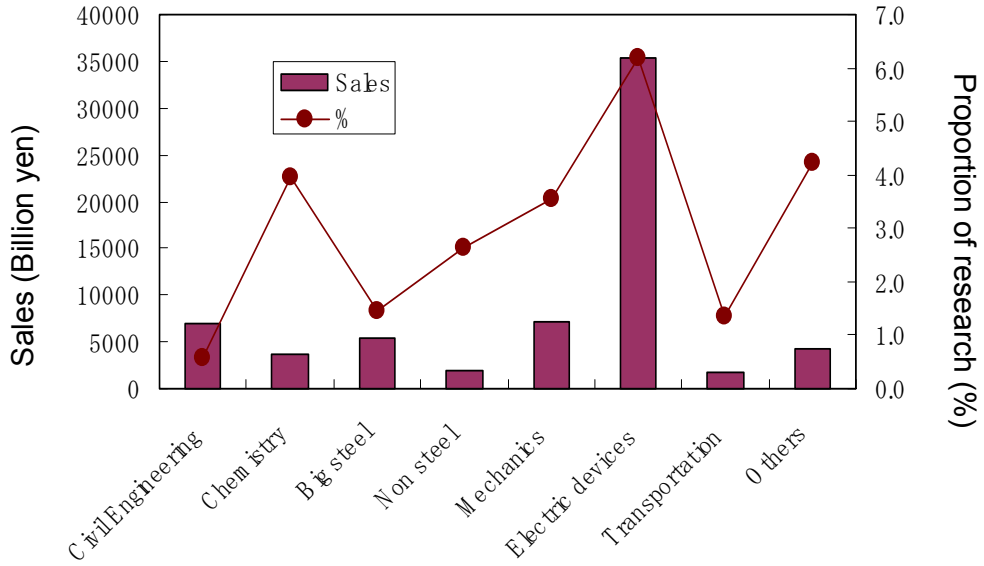


Fig. 9 Sales and Proportion of Research Investment in Fields of Relevant Industries to Water Supply (upper 45 companies)

Trend of research topic and key issues can be caught by looking into the number of presentations in Annual Research Meeting of Japan Water Works Association. Fig. 10 shows the trend of topics presented at the Annual Research Meeting of Japan Water Works Association. The number of presentations is increased and doubled in these 20 years. Presentations on 'Purification' and 'Water Quality' are especially increasing.

Fig.11 shows changes in research theme followed by MHLW, especially on water quality. Target of research has been gradually changed; however, it is clear we are always facing emerging contaminants.

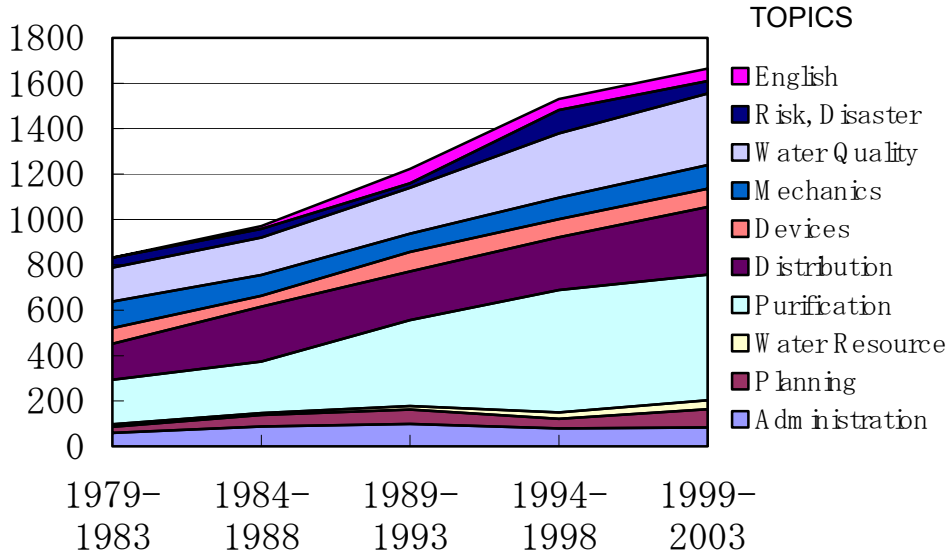


Fig.10 Trend of presentations in Annual Research Meeting of Japan Water Works Association

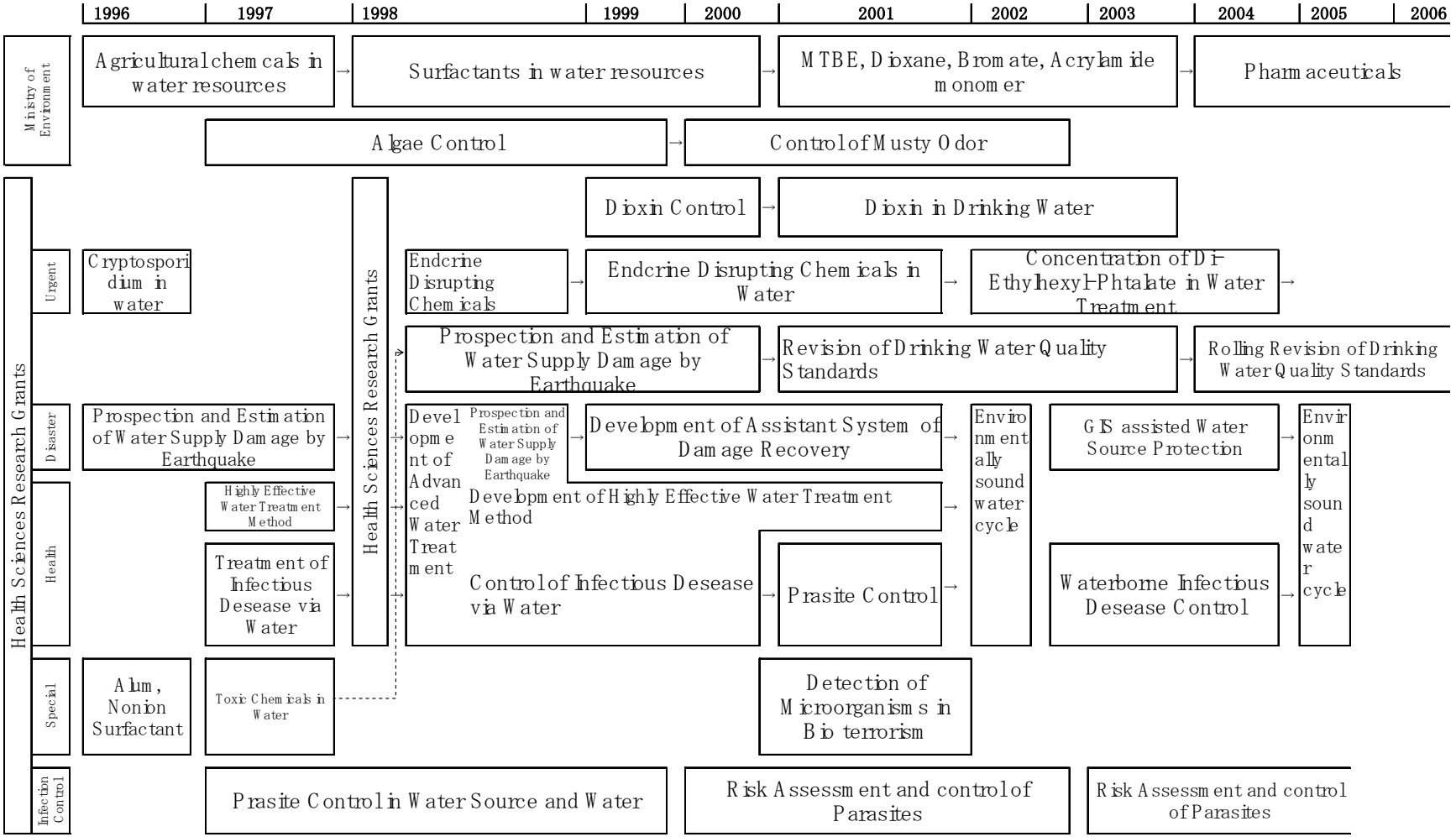
4. The 'e-water' Project and the 'Epoch' Project

Two big projects are being conducted by Japan Water Research Center, JWRC, by the Health and Labour Research Grant described before. Both started from 2002 FY under the 'Environmentally Sound Water-Cycle' project.

E-water

- Establishment of energy-saving water purification systems.
- Reduction in the amount of sludge in water purification systems.
- Observation of water sources for safe water supplies.
- Efficient use of water in water purification systems.
- Reduction in project costs.

Fig.11 Researches in Water Supply Field promoted by MHLW since 1996



Epoch project

- Research on the technology for water quality management inside of pipeline
- Counter measures for maintaining safe tasteful water, increasing the effective water ratio and fulfill effective use of energy

5. Promotion of research

Final goal of research is to improve quality and stability of water supply. Promotion of research and practice is very important. To overcome the so-called 'death-valley', MHLW is going to develop method of promoting research into practice. That may include; Prioritization of Research Policies, Promotion and Introduction of New Technology, Allocation of Subsidy to Small Water Supply based on Water Supply, Accumulation of Case Study that may contribute speed-up examination by MHLW and External Review.

Fig. 11 Promotion and Introduction of Research for Water Supply

References

1. Report of the Council for Science and Technology Policy, the Cabinet Office (2001-2004) (http://www8.cao.go.jp/cstp/)
2. Outline of Health and Labour Sciences Research Grant, Division of Health Sciences, Minister's Secretariat, Ministry of Health, Labour and Welfare, 2004
3. Nagata, R., Asami, M., Takagai, E. and Nakatani, H., Scientific communication in science and technology, Health and Labour Research Grants (HLSRG): Reports of Researches Supported by HLSRG., *Information Science and Technology*, Vol.54, No.6, pp.289-293 (2004)
4. Report of 'Water Vision', Division of Water Supply, Health Service Bureau, Ministry of Health, Labour and Welfare (http://www.mhlw.go.jp/topics/bukyoku/kenkou/suido/vision.html)

Promotion of Research in Water Supply

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1. Promotion of Science and Technologies in Japan

History of Health Science Promotion

- 1994 The first basic plan for promotion of S&T (Science and Technology)
- 2000 The second basic plan for promotion of S&T
- 2000 Start of Millennium Project, MHLW
- 2001 Reform of the Ministries
- 2001 Water Supply Division moved to Bureau of Health Services
- 2001 Medical Frontier Project, MHLW
- 2002 Guidelines for Health Science and Technology
  - Guidelines for evaluation and science and technology,
  - Epidemiological studies, Human genome and gene therapy, Life and ethics
- 2003 Guidelines for Clinical Studies

Relationship among CSTP and Ministries

CSTP: Council for Science and Technology Policy, Cabinet Office
-Annual Guideline for Resource Prioritization
-Inter-ministry Coordination

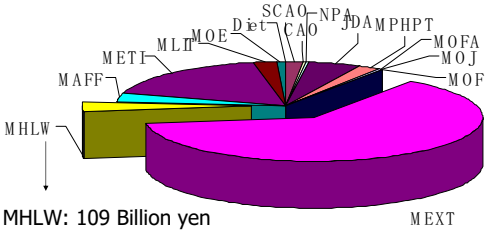
- MEXT: Ministry of Education, Sports, Science and Culture
- MHLW: Ministry of Health, Labour and Welfare
- MLIT: Ministry of Land, Infrastructure and Transport
- MOE: Ministry of Environment
- METI: Ministry of Economy, Trade and Industry
- …

Emphasis of Science Policy, Japanese Government

- Life Science
- Nano-technology
- Information Technology
- Environment
- Social Infrastructure
- Material Science

CSTP(2001)

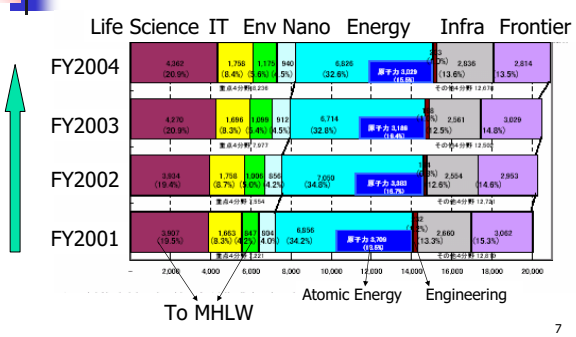
S&T-related budget request for FY '04 by Ministry/Agency



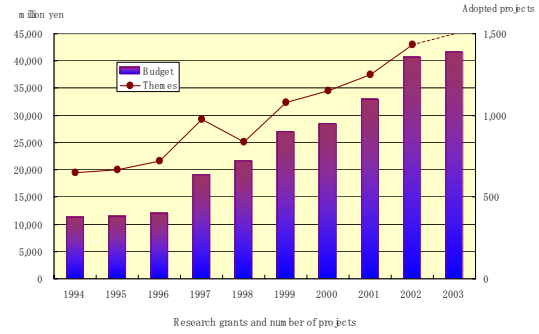
MHLW: 109 Billion yen (4%)

Total: 3626 Billion yen

Trend of S&T Budget



Trends in research budget and projects, Health and Labour Research Grants



2. Environmentally Sound Water-Cycle Project

9

Emphasis on Environmental Research

- Global warming
- Gavages-to-zero and Resource Cycle
- Environmentally Sound Water-Cycle in Watershed and City Revitalization
- Total Management of Chemical Risk
- Water Cycle in Global Scale

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Environment (Water)

Environmentally Sound Water-Cycle

- Sustainability in Watershed
  ->Improvement of efficiency of water
- Decrease of water discharge and contamination

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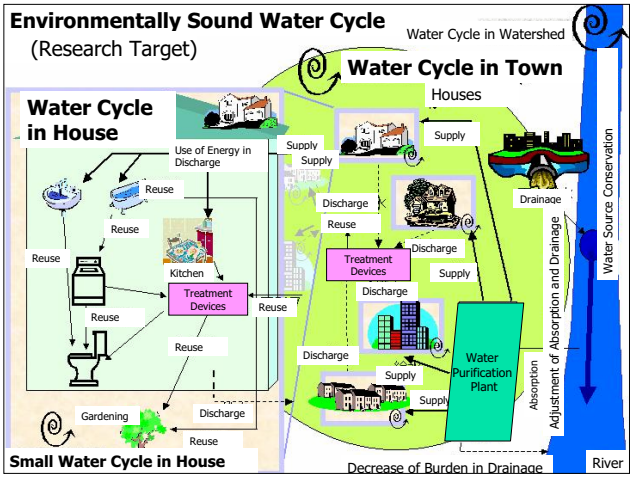

Sound Water Cycle Project

- Sound Water Cycle in watershed ->*e-water project, JWRC*
- Sound Water Cycle in town ->*epoch project, JWRC*
- Sound Water Cycle in house
  -> *Japan Water Pluming Engineering Promotion Foundation and JWRC*
- Control of infectious disease via water -> *Setsunan Univ.*
- Dissolved Organic Substances in Source Water
  -> *National Institute of Environmental Studies*
- GIS assisted water source control ->*NIPH*

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3. Research in Water Supply

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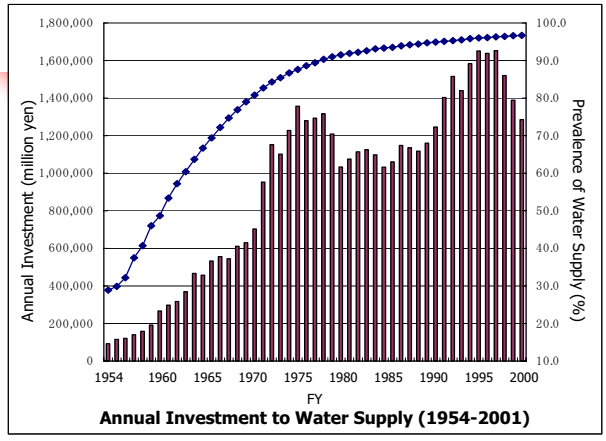
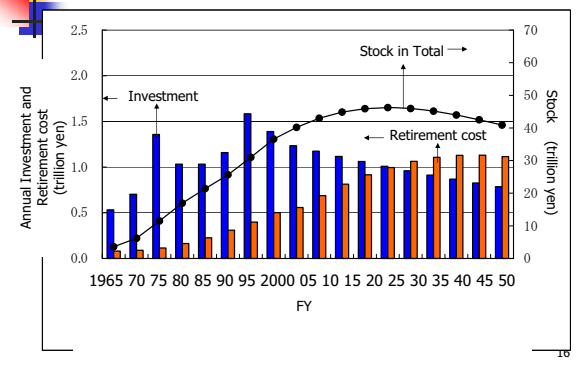


Trend of Annual Investment and Retirement Cost and Stock for Water Supply in Japan



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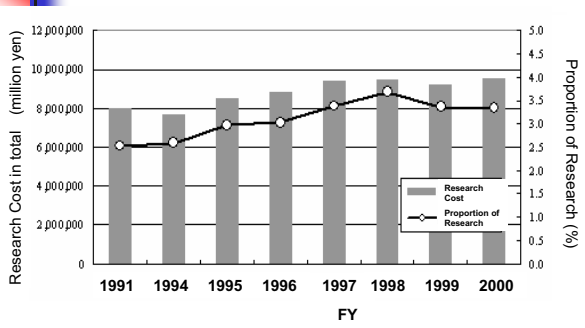
Research Investment and its proportion to total sales in all industries



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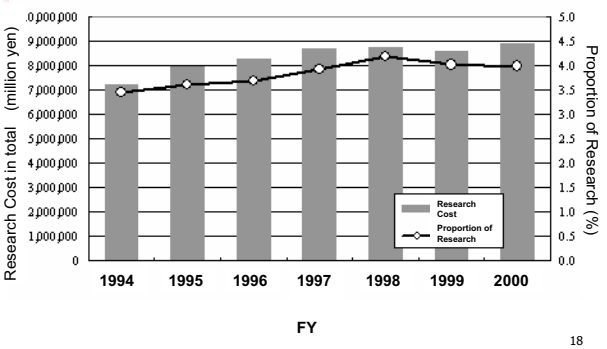
Research Investment and its proportion to total sales in product industries



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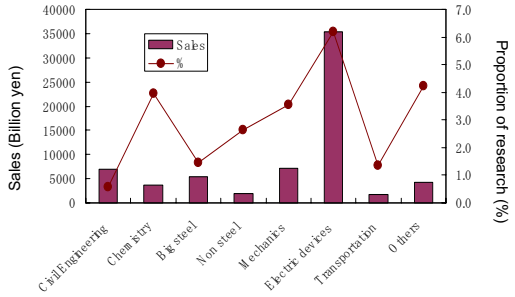
Sales and proportion of research investment in relating industries (upper 45 companies)



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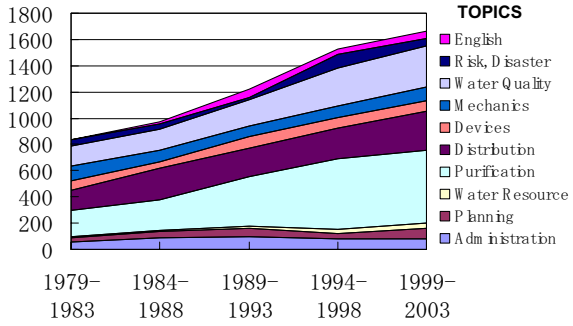
Trends of presentations in Japan Water Works Association Annual Meeting



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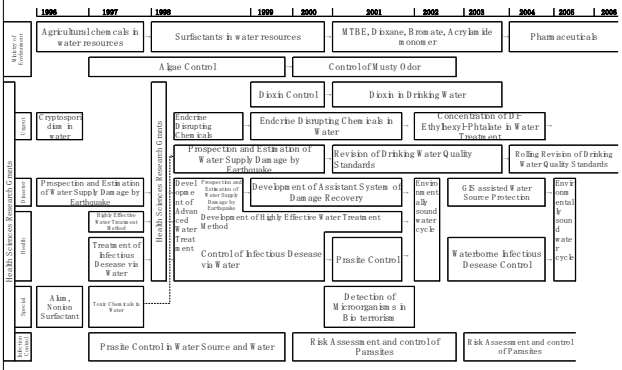
Researches Promoted by MHLW



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4. e-water and EPOCH Project

22

e-Water Objectives

- Establishment of energy-saving water purification systems.
- Reduction in the amount of sludge in water purification systems.
- Observation of water sources for safe water supplies.
- Efficient use of water in water purification systems.
- Reduction in project costs.

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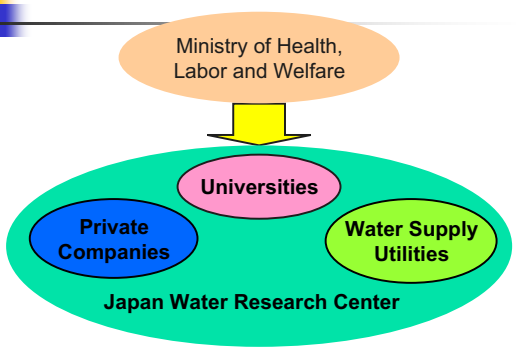
e-water project



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Water Treatment R&D Projects

Year	Project Name
1991 - 1993	MAC21
1994 - 1996	New-MAC21
1997 – 2001	ACT21
2002 - 2004	*e-Water*

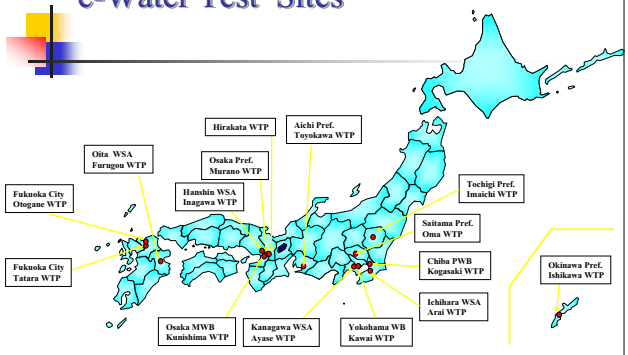
25

Joint Experimental Treatment Plants

(Ayase Water Treatment Plant)

26

e-Water Test Sites



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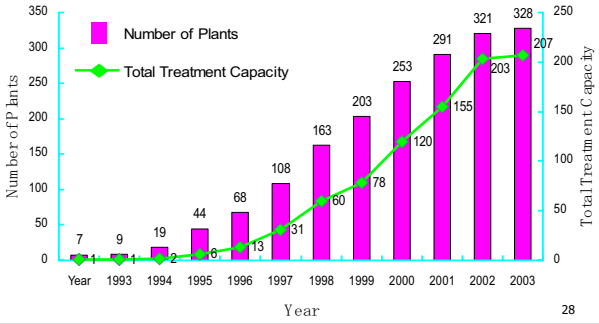
Membrane Treatment Plant in Japan



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Epoch Project

Research on the Technology for Water Quality Management Inside of Pipeline.

29

Epoch Objectives

1 Maintain safe tasteful water

2 Increase the effective water ratio

3 Aiming at effective use of energy

30

Research Subjects

Research Group 1

Prevent deterioration of water quality.

Research Group 2

Minimizing the volume of the water to clean pipeline and leakage.

Research Group 3

Fundamental research on the use of unused energy.

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5. Promotion of Research and Introduction to Facilities

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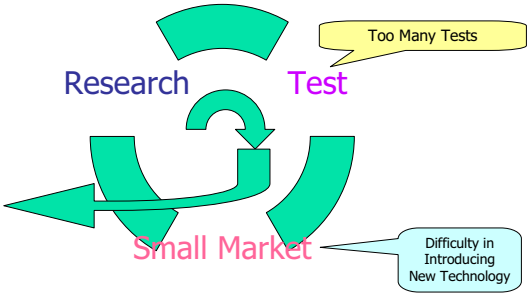
In case of Vicious Cycle of Research and Practice....



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Promotion of Research and Practice

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Our laboratory

Experimental apparatus for treatment experiment

Test for microorganisms

Concentration machine for trace chemicals

Chemical analysis

Test equipment for water supply devices

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NIPH relocates to Wako-city in October. (Next to Tokyo)