

Korea Environmental Policy Bulletin

Development of Experts in the Water Sector through the Integrated Operation of the Local Water Supply and Sanitation System

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Summary

The Korean government finalized the water industry development plan (Feb. 2006) focusing on restructuring and building up the competitiveness of the water and sanitation sector and developing the water industry to transform it into one of the nation's strategic industries in the future. This policy seeks to improve the inefficient, non - competitive structure of water supply and sanitation(WSS) services currently provided by municipalities based on administrative districts in an endeavor to enhance efficiency and ultimately hone the global competitiveness of the water industry.

The integrated operation of WSS system is being pushed as a part of efforts to reshuffle the water service structure, with the objective of enhancing the efficiency and competitiveness of WSS system.

Under the plan for integrated WSS system operations, the reach of operations will be significantly extended from the current small administrative districts toward river basin regions. The operation is commissioned to large water service providers or public corporations, departing from direct operation of municipalities to ensure the professional

management of the water service. For sanitation system, operation will be integrated based on the basin area while increasing the efficiency of sanitation system operation and strengthening the link with water quality preservation plans. Parallel to this, organizations, such as sanitation system corporation, SPCs and entrusted private-sector companies for integrated operations will be set up in the respective basin areas in a bid to increase operation efficiency and foster expert companies specialized in the sanitation system.

Ultimately, WSS system operation will be carried out based on basin regions; the integrated operation of the WSS system will be undertaken by expert organizations. Furthermore, water service providers will be assisted in their entry

into international markets based on track record and experience accumulated in Korea.

For strengthening the competitiveness of the WSS system, the governance system will be restructured for guaranteed effective performance management regarding the integrated operation of the water supply and sanitation system.

The expected effects of the integrated operation of WSS system are; i) improved management through high efficiency by achieving the economy of scale, ii) energy saving and reduction of greenhouse gas emissions in the water sector, iii) better quality of water service for residents and iv) developing expert organizations and laying the cornerstone for entry into global markets.

I. Background

In February 2006, the Korean government finalized the water industry development plan focusing on restructuring and building up the competitiveness of the water and sanitation sector and developing the water industry to transform it into one of the nation's strategic industries in the future; this was followed by the government's announcement of the "5 - year detailed action plan for water industry development" in July 2007.

This policy seeks to improve the inefficient, non-competitive structure of water supply and sanitation services currently provided by municipalities based on administrative districts in an endeavor to enhance efficiency and ultimately hone the global competitiveness of the water industry.

This paper provides an overview of the integrated operation of local water supply systems - which is being pushed at the policy level to beef up the competitiveness of the water supply and sanitation sector - and the plan for the development of expert companies in water sector.

1. Necessity to Restructure the Water Supply & Sanitation Sector and Direction of Integrated Operation

Water supply and sanitation systems are being operated based on 164 administrative districts. Many water/sanitation system operators are small in their business scale. Furthermore, the gap in

water supply services is wide reflecting the different regional conditions. The non - competitive structure of the service mainly provided by the public sector (municipalities) is another contributor to the structural inefficiency, hampering the improvement of operation efficiency.

1.1. Small Water Service Providers

Small water service providers supplying water to 300,000 people or less make up 82% (134 municipalities/operators) of a total of 164 municipalities/operators nationwide. The minimum supply population for securing economic efficiency is believed to be 500,000 or more (according to the data published in 2004 by the Korean Association for Public Enterprises).

Population served	100,000 or less	100,000 ~ 300,000	300,000 ~ 500,000	Over 500,000
164 water service providers	98 (60%)	35 (21%)	13 (8%)	18 (11%)

Small water service providers serve a small number of customers and have an extensive network of water mains, and this hikes up the production cost. However, they face difficulties in raising the rates due to the government policy

that suppresses the hikes in public utility rates. As a result, they have suffered from chronic deficits and relied on financial resources transferred from other accounts such as general account.

Type		Nationwide	Metropolitan cities (7)	Cities (76)	Counties (81)
Water	Average population served (unit: 1,000 persons)	288.6	3,320.2	281.8	33.1
	Length of pipes per capita (m/person)	3.1	2.0	3.4	12.6
	Cost coverage rate	80.1	87.2	85.7	53.8
Sanitation service	Average sanitation treatment population (unit: 1,000 persons)	275.9	3,294.1	264.5	25.8
	Length of pipes per capita (m/person)	2.4	1.6	2.7	8.1
	Cost coverage rate	38.3	46.5	31.4	24.1

1.2. Gap in the Water Supply and Sanitation Service among Regions

There has been a wide gap in terms of supply

rate, leakage rate, degree of decrepitness, supply cost, tariff level, etc. among provinces, rural areas, and regions depending on the population served, density of housing, availability of water source, etc.

Supply rate	Metropolitan cities	Cities	Eups (sub-districts)	Myeons (sub-counties)
Water supply system ('09)	99.4%	98.6%	88.8%	51.0%
Sanitation system('09)	98.5%	93.4%	73.5%	29.3%

(2009)	Water supply system		Sanitation system	
Type	Rate (KRW/ m ³)	Cost (KRW/ m ³)	Rate (KRW/ m ³)	Cost (KRW/ m ³)
Top 5 cities and counties	Jeongseon 1,348.5	Jangsu 2,978.8	Yeoncheon 566.8	Shinan 13,853.4
	Pyeongchang 1,120.5	Imsil 2,657.0	Hamcheong 437.2	Seongju 3,425.5
	Tongyeong 1,089.0	Yeongwol 2,739.0	Namyangju 409.0	Pocheon 3,252.1
	Gapyeong 1,076.3	Jeongseon 2,503.0	Goseong 397.5	Cheongwon 3,048.6
	Inje 1,064.2	Yangpyeong 2,459.1	Gyeongju 395.2	Jeongeup 2,856.4
Bottom 5 cities and counties	Gunwi 367.9	Seongnam 448.0	Yeosu 71.4	Yeosu 78.8
	Gwacheon 420.7	Ansan 453.0	Hanam 74.8	Donghae 101.6
	Jinju 428.6	Jinju 499.9	Sancheong 76.2	Mungyeong 132.8
	Chuncheon 431.9	Daejeon 527.0	Goseong 97.5	Haenam 195.1
	Jinan 432.2	Cheongju 532.4	Namhae 99.2	Inje 202.0

Table 1 : Water supply operations by size of company (2009)

Size	Number of operators	Supply rate(%)	Average cost (KRW/ m ³)	Full cost (KRW/ m ³)	Cost coverage rate (%)
Nationwide	164	93.5	609.9	761.6	80.1
1 million or more	8	99.4	559.8	639.7	87.5
500,000 ~ 1 million	10	98.8	575.1	589.5	97.6
300,000 ~ 500,000	13	94.2	650.8	730.7	89.1
100,000 ~ 300,000	35	88.8	729.7	895.8	81.5
Below 100,000	98	66.8	748.2	1392.1	53.7

Table 2 : Sanitation projects by size of company (2009)

Size	Number of operators	Sanitation treatment population ratio (%)	Tariff rate (KRW/ton)	Full cost (KRW/ton)	Cost coverage rate (%)	Labor productivity (1,000tons/ person, day)
Nationwide	164	89.4	273.9	715.7	38.3	3.4
1 million or more	8	98.6	303.7	651.3	46.6	5.7
500,000 ~ 1 million	8	96.3	257.2	607.9	42.3	5.5
300,000 ~ 500,000	14	88.6	256.4	762.8	33.6	3.3
100,000 ~ 300,000	31	83.1	210.3	905.1	23.2	2.1
Below 100,000	103	55.7	218.3	1038.4	21.0	1.0

2. Necessity of Enhancing the Professional Management

Since water supply and sanitation systems are operated mainly by municipalities, the professionalism in management has remained low. In addition, the incentive structure of municipalities' administrative system has hindered the enhancement of operation efficiency.

Ensuring high - quality water services that meet both domestic and global standards entails restructuring water service systems to reorganize

the business structure and increase professionalism in operation. That way, safer, better quality water can be provided by modernizing the water service, upgrading the service quality, increasing fairness, and boosting competitiveness across the country. At the international level, such endeavor will be vital in coping with establishment of international service standards and the pressure from WTO and FTA to open up the water market, and fostering organizations specialized in water system operation; thus helping water service providers make inroads into foreign markets.

II. Plan for the Integrated Operation of Water Supply and Sanitation System and Current Progress

The integrated operation of water supply and sanitation system is being pushed as a part of efforts to reshuffle the water service structure, with the objective of enhancing the efficiency and competitiveness of water supply and sanitation system.

Under the plan for integrated water supply and sanitation system operations, the reach of operations will be significantly extended from the current small administrative districts toward river basin regions. From the short-term perspective, the range of operations will expand to cover wide areas by consolidating the respective medium-sized districts (3~7 cities and counties) and then enlarge the range by river basin regions. The operation is commissioned to large water service providers or public corporations, departing from

direct operation of municipalities to ensure the professional management of the water service.

For sanitation system operation, installation and operation/management will be integrated based on the basin area while increasing the efficiency of sanitation system operation and strengthening the link with water quality preservation plans. Parallel to this, organizations, such as sanitation system corporation, special-purpose companies (SPCs) and entrusted private-sector companies for integrated operations, for installation and operation/management of sanitation treatment facilities will be set up in the respective basin areas in a bid to increase operation efficiency and foster expert companies specialized in installation/operation of the sanitation system.

Table 3 : Sanitation projects by size of company (2009)

	Water supply system operation	Sanitation system operation
Span/scope of integration	The area of operation is reorganized based on the basin region: The regional districts are integrated by consolidating the respective medium-sized districts (3-7 cities and counties) and then enlarging the area by basin regions. * Area of operation: 164 areas (2009) → 39 areas (2020) → About 5 areas (2030)	Regional districts will be integrated by considering the drainage basins, scale of integrated operation, dam upstream sanitation facility installation projects, etc. * Area of operation: 43 areas (2011) → 20 areas (2020) → About 10 areas (2030)
Model of operation after integration	<ul style="list-style-type: none"> • Entrust to public corporations. • Local public corporation • Water supply association • Direct operation in the province 	<ul style="list-style-type: none"> • Entrust to private-sector firms • Local public corporation • Joint consignment (public corporation-private sector SPC)
Method for implementation	Discretionary, progressive integration through role-sharing between the central government and municipalities - Municipalities: Playing a leading role in making decisions on the method of operation, etc. as the main entity for integration - Central government: Providing administrative and financial support to stimulate integration	
Financial incentive for integration	<ul style="list-style-type: none"> - Financial support for the project that aims at optimizing the water supply pipe networks - Supported with a priority by the budget for the existing ancillary projects carried out by the Ministry of Environment, including water supply and sanitation system operation - Additional support for the budget for pipe networks (Metropolitan municipalities), support for upgrading the tax money allocated to local governments (Ministry of Public Administration and Security), decrease in the price of raw water & purified water of regional water system (K-Water), etc. may be implemented in parallel. 	<ul style="list-style-type: none"> - The budget for the sanitation sector is given with priority - Differential financial support for establishment and operation cost from watershed fund in the region for integrated operation

1. Regional Districts Covered by Integrated Operation

The area of water supply system operation will cover 39 regional districts, beyond existing administrative district, by taking into account the water source, size of population served, regional characteristics, and integration of administrative

districts. On the other hand, the area for sanitation system operation will be expanded to cover 43 regional districts considering the size of sanitation systems in line with the integrated operation and installation of sanitation facilities at the dam upstream, which will be built on condition of integrated operation and management.

Table 4 : Sanitation projects by size of company (2009)

	Type	Method of operation	Considerations
Water supply system	Ordinary cities and counties (30)	Integrated operation	Ability to integrate, utilization of facility (conditions of water supply system adjustment)
	Metropolitan cities (7)	Individual operation	Scale of service, expertise in water supply operation
	Islands (2)	Individual operation	Geographic condition (Jeju Special Self-governing Province, Ulleungdo)
Sanitation system	Ordinary cities and counties (25)	Integrated operation	Drainage basin, size of existing sanitation facilities, etc.
	Dam upstream(10)	Integrated operation	Maintaining the integrated system that is currently being established (dam upstream: 9; Yongdam Dam: 1)
	Metropolitan cities, Jeju (8)	Individual operation	The operation of most sanitation facilities is entrusted to private-sector firms (except for 2 facilities in Seoul).

Finally, the area of operation will be expanded based on the river basin area in view of the water circulation and utilization within the basin area and considering integrated operation of water supply and sanitation system in the period ahead.

2. Operation and Management System after Integration

In relation to the method of operation after integration, 4 models were presented for the water supply system: entrusting the operation to public corporations, operation by local public corporations, operation by water supply association, and direct operation by the province government. On the other hand, 3 models were put forth for the sanitation system - entrusting to private-sector companies, operation by local public corporations, and joint consignment.

Type	Characteristics
Entrusting the operation to public corporations	The right to the operation and management of the facility is transferred in whole or in part to a public corporation or other operator. The municipality's financial burden is relieved if a public corporation pre-invests the cost required in facility improvement.
Operation by local public corporation	- Established through the joint investment of municipalities; both efficiency of management and public interest can be pursued - Shift of status is unavoidable for public servants, and accomplishing the long-term objective is difficult if the financial resources are inadequate.
Operation by water supply association	Established through the investment of each municipal authority and county. The equity and decision-making right of each municipality is determined and exercised depending on the size of facility in the related municipality. Determining reasonable share of equity is difficult although discretionary integration is practicable.
Direct operation by the province government	The operation of water facilities in cities and counties can be transferred to the province for integrated operation. Although fairness in service can be ensured between the related cities and counties, transfer of ownership to the facility requires a revision of the law.
Joint consignment	A public corporation and a private-sector firm undertake the operation and management of the water supply and sanitation system by establishing a separate corporation (SPC: special-purpose company).
Commissioning private-sector firms	The right to operation is transferred in whole or in part to a private-sector firm. The municipality's financial burden is alleviated if a private-sector firm pre-invests the cost required in facility improvement.

The mode of operation after integration is, based on discretionary shift, to be determined through negotiation among municipalities by taking into account the regional conditions. However, the option of commissioning public corporations - deemed the most competent in practical terms based on the ability to carry out the operation within the existing legal framework, ability of municipality to bear the cost of operation, and other factors - will be primarily considered. Under the plan, K - Water, Korea Environment Corporation, and water supply/sanitation divisions of metropolitan governments will be transformed into expert organizations in water supply and sanitation system operations to retain the elements of competition in the operation system.

3. Mid- and Long-term Plan: Integration in Phases and Establishment of Competitive System

At least 2~4 regional districts will be integrated based on the cases of integration carried out in the pilot region. The professionalism in management will be enhanced through the separation of ownership and management.

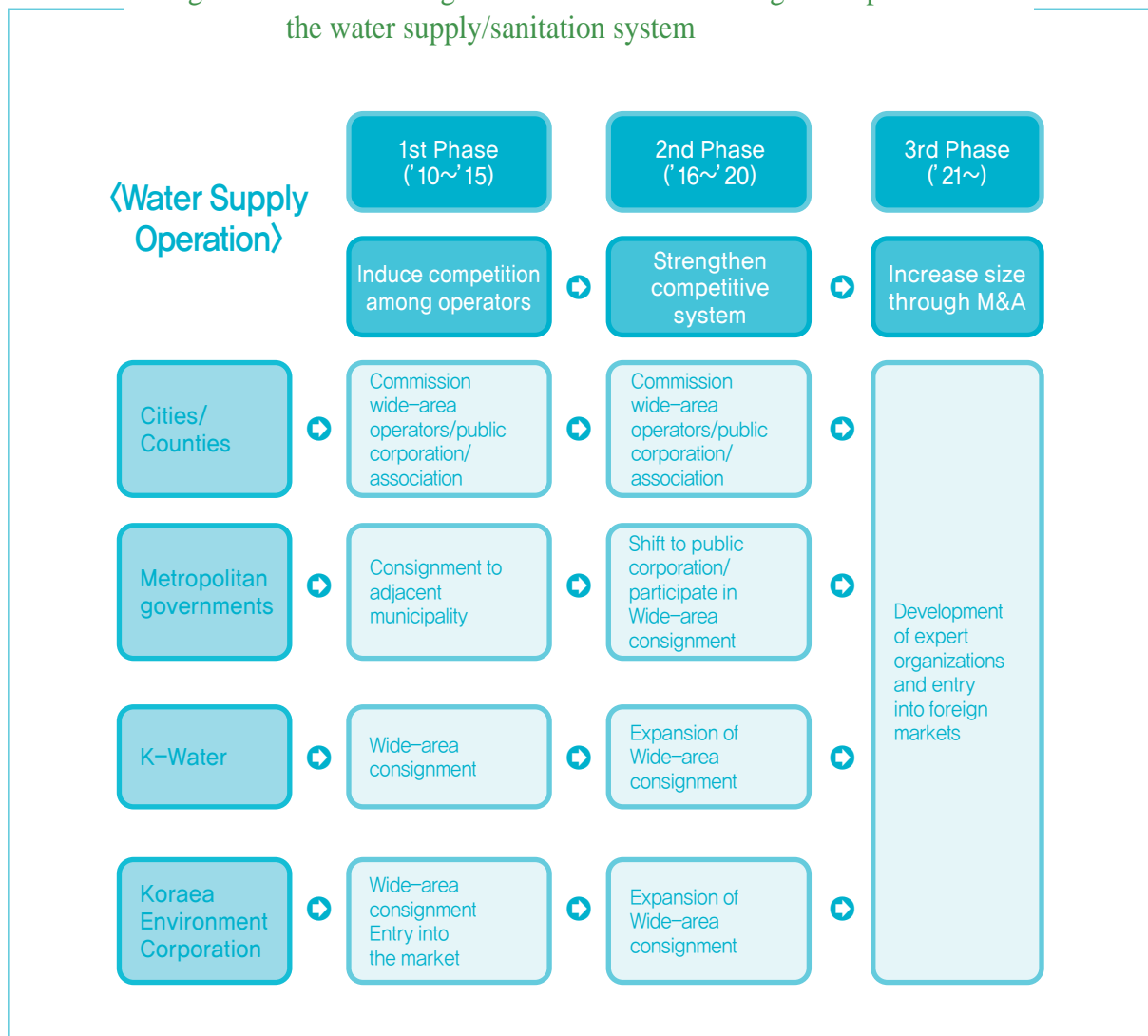
The regional districts will be integrated and expanded based on river basin regions from the long - term perspective. The area of water supply system operation will be expanded considerably by consolidating the respective medium - sized districts (39 areas by 2020) and then enlarged by

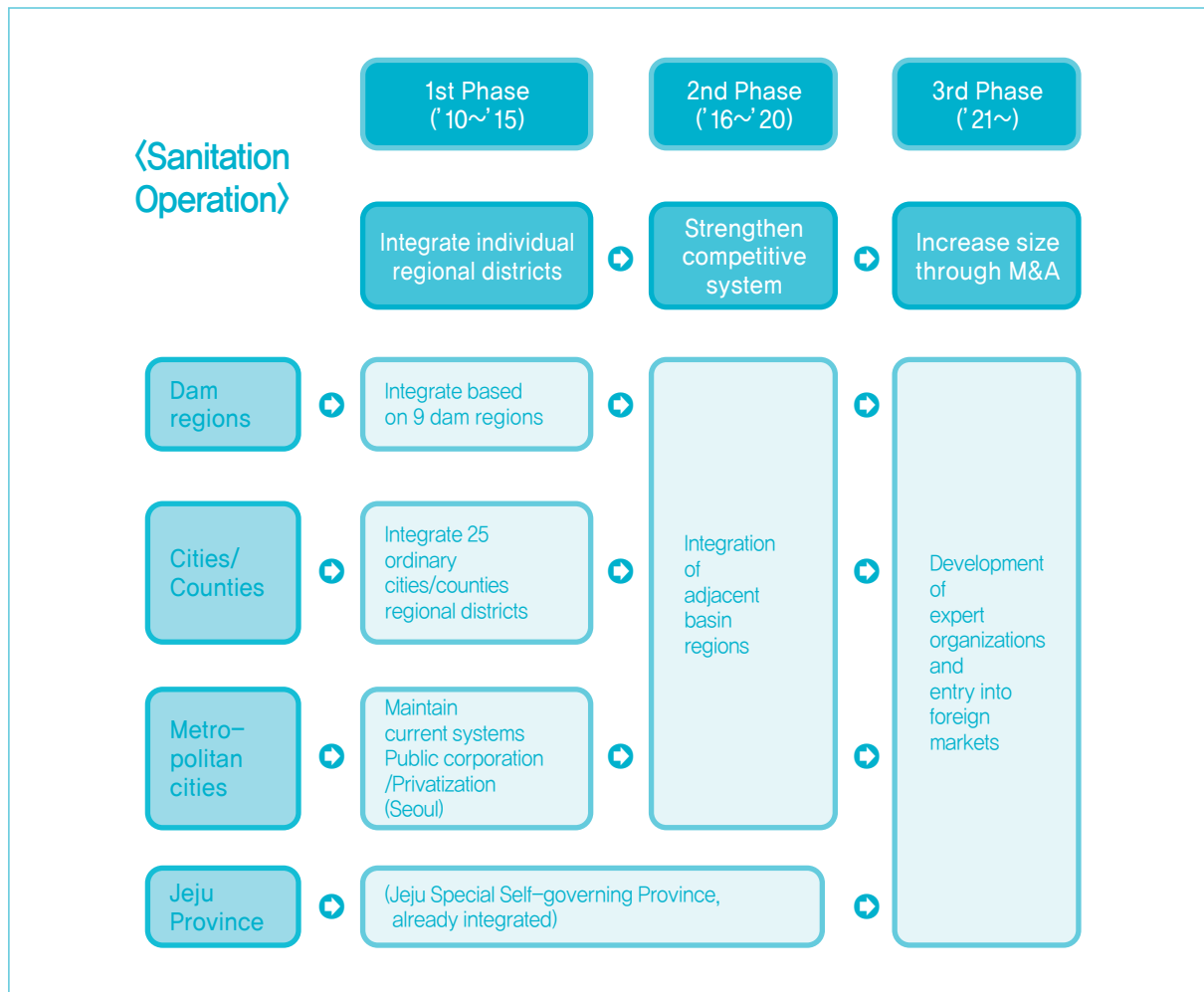
river basins (about 5 areas by 2030). The area of sanitation system operation will be integrated in phases based on drainage basin regions (from 20 areas by 2020 to about 10 areas by 2030).

Additionally, existing contractors in the public sector considered meeting certain requirements with regard to size and expertise will be developed into expert organizations in the water supply and sanitation sector so that the elements of competition in the operation system can be

retained. In the public sector, K - Water or Korea Environment Corporation - which are currently implementing projects that aim at optimizing pipe networks or undertaking the commissioned projects - will be fostered as expert companies in the water supply and sanitation sector. In metropolitan cities, municipality in the vicinity that has the source of water supply will be considered as primary candidates for undertaking the water supply operation.

Figure 1 : Mid- and long-term direction for the integrated operation of the water supply/sanitation system





Ultimately, water supply and sanitation system operation will be carried out based on basin regions; the integrated operation of the water supply and sanitation system will be undertaken by expert organizations. Furthermore, water service providers will be assisted in their entry into international markets based on track record and experience accumulated in Korea.

4. Policies to Beef up the Competitiveness of the Water Supply and Sanitation System with Integrated Operation

4.1. Establishment of Governance Structure

The governance system will be restructured and operated to ensure the application of the index for evaluating the overall water services of all water service providers countrywide - both objectively and quantitatively - including the facilities, operation, quality of service, environment, financial conditions, etc. for guaranteed effective performance management regarding the integrated operation of the water supply and sanitation system.

By disclosing the results of evaluation and linking

them with incentives, water service providers will be motivated further to realize improvement in the management of water supply/sanitation system operation and service quality. Water service providers with poor performance will be ordered to improve their operational structure and/or integrated operation. Those with excellent performance will be offered incentives (priority financial assistance from the government coffers, reward, etc.), etc.

Separated processes of water supply and sanitation system governance - which are currently carried out by many different government departments and organizations - will be unified to ensure consistent, effective governance.

4.2. Water Supply/Sanitation System Operation with Transparency, Benefitting the Public

Elements of unfairness will be removed from the water supply and sanitation system operation by creating an environment for fair contract between the client and contractor of water supply and sanitation services and strengthening the monitoring function of the people.

Reference guidelines will be established for the execution of contracts - such as the standard consignment contract - in an attempt to ensure that

the consignment system serves public interest and prevent contract service organizations from creating undue profit and acting against public interest.

Currently, the status of public corporation is determined by the production capacity per day (15,000 tons). Different types of accounting methods are applied to public corporations and direct operation by municipalities. Currently, the account settlement guidelines for local public corporations are applied to public corporations (112 units), and the ordinances of each municipality to direct operation of municipalities (52 units). To address this problem, the same accounting standards will be applied to all businesses to ensure financial transparency and improve comparisons regarding the water supply and sanitation business. Moreover, an institutional mechanism that can promote the sharing of information and allow local residents to be involved in the decision - making process (Integrated Management Committee) will be introduced, so that the monitoring function of the people can be strengthened to increase transparency in management.

* Integrated Management Committee (tentative name): Consisting of local residents, private - sector experts, local public servants, and representatives, it is dedicated to evaluating the performance of operators and supervising their works.

III. Expected Results

1. Expected Effect of the Integrated Operation of the Water Supply/sanitation System and Policies to Increase Integration Efficiency

1.1. Improved Management through High Efficiency by Achieving the Economy of Scale

The economic impact of integration is projected to be worth approximately KRW 5.8 trillion.

The financial conditions of businesses can improve as a result of the integration of overlapping functions within regional districts, reduced leakage thanks to the early implementation of pipe network projects, and increased efficiency in operation with the integrated system established. The connected operation of

facilities among different regions will optimize the water transfer (capacity of about 4,534 tons per day does not need to be installed additionally) and enable the stable supply of water to regions plagued by water shortages during dry seasons or in case of disaster.

(Unit: 100 million KRW)

Net effect(A+B+C-D)	Impact of integrated operation (A)	Improvement in water mains (B)	Adjustment in the water supply system (C)	Operation cost (D)
58,348	33,224	19,260	30,565	24,701

Note: The improvement in water mains is based on an estimate of the impact on the 19 regional districts with validity, and the operation cost considered only the cost necessary to enhance the water mains.

1.2. Energy Saving and Reduction of Greenhouse Gas Emissions in the Water Sector

With the rate of revenue water - which is expected to reach 80% by 2020 - and the resulting reduction in production (about 2,640,000 m³), approximately 807 million kWh is projected to be saved, and, consequently, CO₂ emissions can be reduced by about 1,743,000 tons.

1.3. Better Quality of Water Service for Residents

The reliability of the water service is expected to increase along with the upgrade of the water supply and sanitation service quality as a result of the early improvement of old pipe networks, modernization of facilities, systematic maintenance, etc.

1.4. Developing Expert Organizations and Laying the Cornerstone for Entry into Global Markets

Companies, specifically public corporations, are expected to gain stronger competitive position as they accumulate expertise in the operation and management of water supply and sanitation system, and they will be able to make inroads into global markets based on their performance and experience accumulated in Korea.

2. Development of Expert Water Service Providers through Integrated Water Supply/Sanitation System Operation

2.1. Fostering Expert Water Service Companies by Helping Expand their Capability to Provide Total Solutions

A cornerstone for fostering water service experts can be laid by entrusting water supply and sanitation system operations to public corporations (Korea Environment Corporation, K-Water, etc.) - which are considered to meet certain requirements with regard to the size and technological level - while proceeding with the integration of water supply and sanitation system operations.

For the water supply sector, water supply operations will be commissioned in phases after securing a bridgehead through the establishment of a consortium with public corporations. For the sanitation sector, large -

scale integrated sanitation projects will be commissioned to private-sector companies to ensure operation efficiency and foster experts with competitiveness in the water sector.

In other words, expert companies specialized in water supply and sanitation system operation having the capability to offer total solutions can be developed by helping private-sector companies expand their capability to operate and manage the water supply and sanitation system.

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- **Ministry of Environment**
Government Complex Gwacheon, Jungangdong 1, Gwacheon-si,
Gyeonggi-do, 427-729, Republic of Korea
Tel. (822) 2110-6552 Fax. (822) 504-9206
- **Korea Environment Institute**
290 Jinheungno, Eunpyeong-gu, Seoul, 122-706, Republic of Korea
Tel. (822) 380-7777 Fax. (822) 380-7799
- **Written by Dr.Hyum-Joo Moon (KEI)**

