

Korea Environmental Policy Bulletin

Issue 1, Volume III, 2005

Integrated Management System for Sewerage Facilities and BTL Project for Sewage Pipe in Korea

1. Introduction

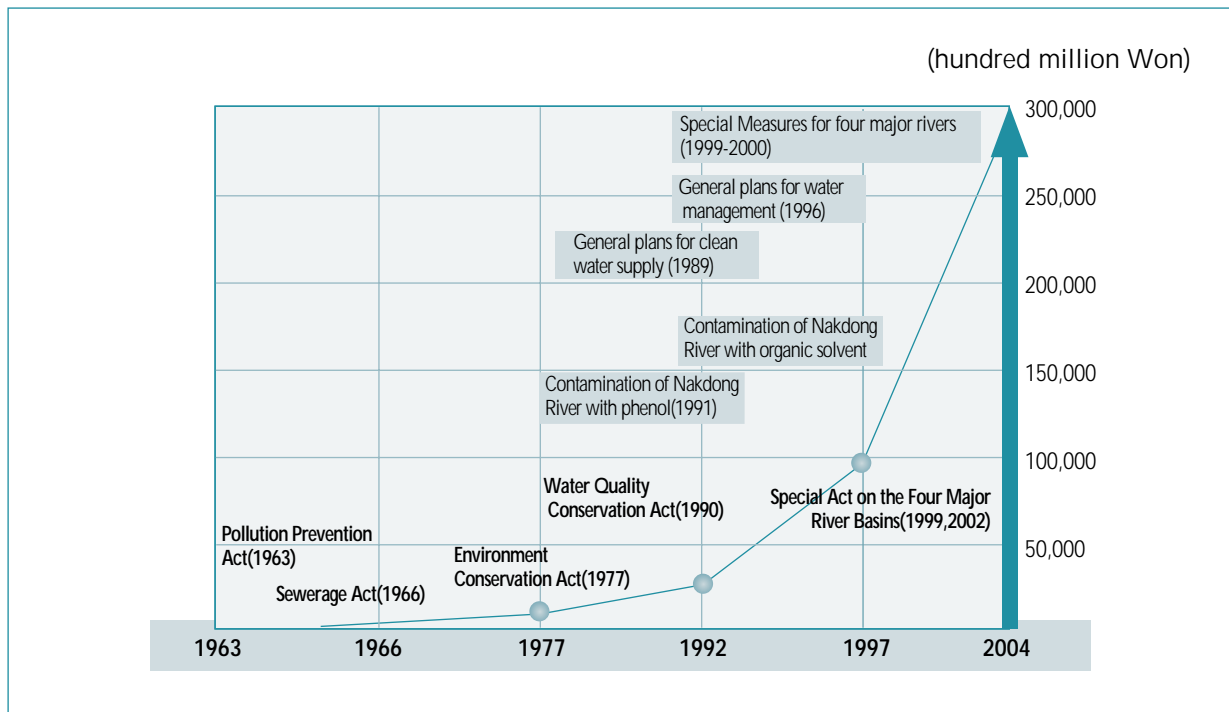
In last a few decades since 1960s, the economic growth and national development of Korea are rapidly achieved, however these have resulted in a number of environmental problems. For example, the high growth of industrialization and urbanization has caused the overuse of water and its contamination especially in four major rivers and their basins. On the other hand, the demand of clean water has been raised, as the living standards and environmental consciousness of people have increased.

As one of efforts to address this issue, the expansion of sewerage facilities was launched in mid 1980s and it has been enhanced whenever environmental accidents have occurred such as phenol spill in 1991 causing odor of tap water and death of fish. Six general plans of water resource management to improve water quality were made and 10.6 trillion Korean won (US\$ 10.5 billion) was invested by the government from 1989 to 1997. As a result, 60.9% of sewage was treated by facilities in 1997.

Despite the steady investment in sewerage facilities and significant efforts made by the government, water quality grew worse in water supply sources. Moreover, local developments interfered the water quality improvement and created social problems between upper and lower reaches of river. Consequently, the government began to promote 'the improvement of water quality in water supply sources as a major national policy from 1998. In order to consider the various characteristics of each water basin, as special acts measuring user charges and creating riparian buffer

C O N T E N T S

1. Introduction	1
2. Integrated management system for sewerage facilities	3
2.1 A case of the integrated management system for sewerage facilities	4
2.2 Dissemination of the integrated management system for sewerage facilities	8
3. BTL(Build-Transfer-Lease) project for improving sewage pipes	9
3.1 Process of promoting BTL project for sewage pipes	10
3.2 Size of investment in BTL projects for sewage pipes	10
3.3 Selection of BTL projects for sewage pipes	10
3.4 Scope and promotion of BTL projects for sewage pipes	12
3.5 Plans to finance the BTL project for sewage pipes and to expand private participation	13
4. Conclusion	15



<Figure 1> Measures and investments in water quality control

zone, TWPLMS (Total Water Pollution Load Management System) were made to improve water quality in the four major river systems: the Han River (November 1998), the Nakdong River (December 1999), the Geum River (October 2000) and the Yeongsan & Seomjin River (October 2000). In addition, their special acts were enacted with legal support

The government had invested 26.1 trillion Won (US\$ 26 billion) to expand basic environmental facilities from 1993 to 2004, and about 70% of total investment (18.4 trillion Won) had been invested after the special acts in 1998. During the period of special acts, the investment for each river and its basin were made for as follow:

- Han River and its basin with 6.2 trillion Won
- Nakdong River and its basin with 6.2 trillion Won
- Geum River and its basin with 3.2 trillion Won
- Yeongsan & Seomjin River and its basin with 2.8 trillion Won

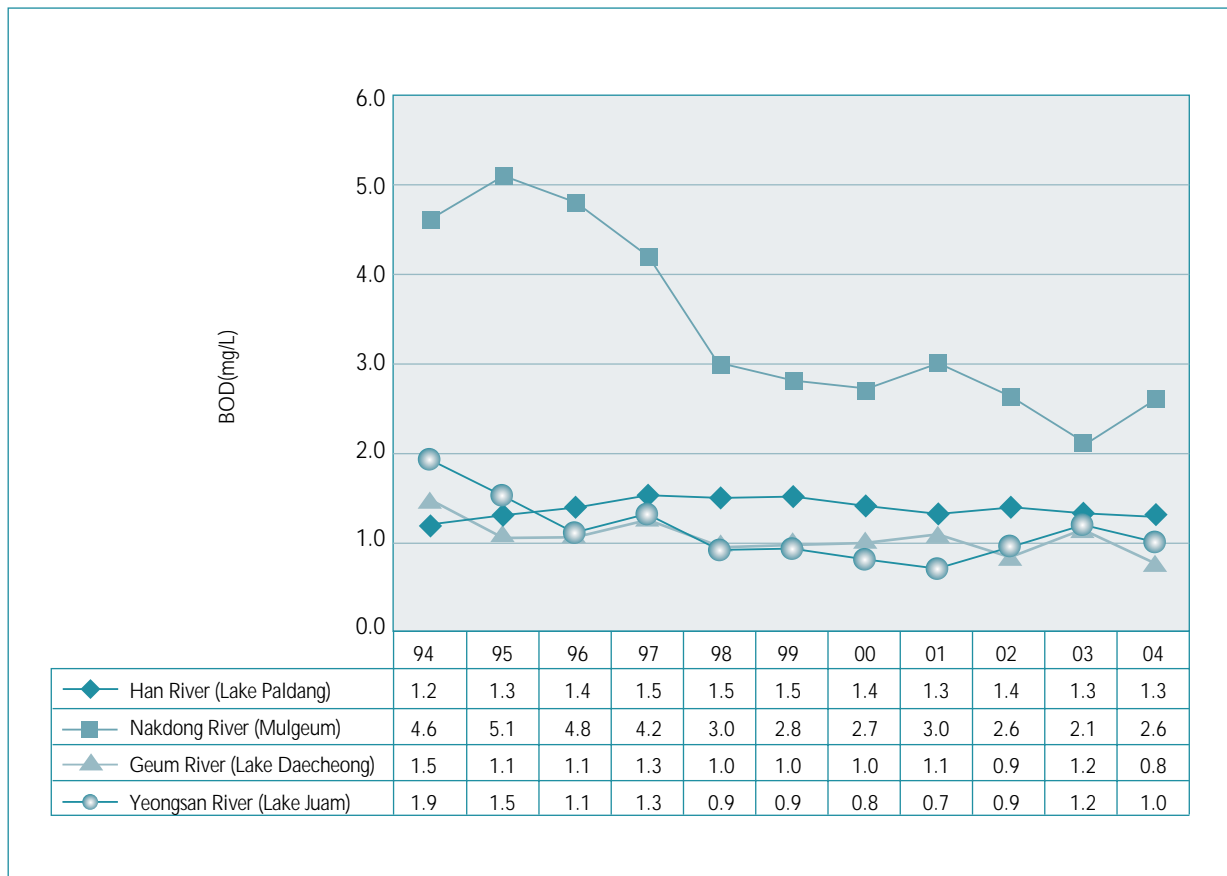
Using these investments, water quality was improved steadily throughout the country and major streams in urban areas, were restored.

As a consequence of these investments, the

sewerage treatment rate is 84% in 2004, which was calculated by dividing the number of population using sewerage treatment facilities by the number of registered residents in administrative districts. In addition, these acquired 268 of sewerage treatment facilities in operation having 21,534,745 m³/day of their total capacity and 1,153 of village sewerages having 83,035 m³/day of their total capacity.

In 2004, the total length of sewage pipes is 82,214km, which is 68.1% of 120,814km in the basic plan for sewerage improvement. Among this, the length of combined sewage pipes of drain rainwater and sewage, is 47,255km (57.5%) and the length of uncombined sewage pipes, is 34,959km (42.5%).

The sewerage treatment rate was increased from 52.6% in 1996 to 81.4% in 2004 by the promotion of the general plans for water management. As a result of intensive investment in sewerage facilities, the construction of large-size sewerage treatment plants has been almost completed and that of medium-size ones is in the final stage. There are the significant gaps of sewerage treatment rates by locations, as the investment has been concentrated on large cities



<Figure 2> BOD trend of four major rivers

and inland areas.

For example, while the sewage treatment rate of urban area is 86.5%, that of rural areas is 31.9%, and while the rate of inland areas is 77% (special areas excluding Seoul and other metropolitan cities) that of coastal areas is 68.5%. In particular, the rate of the upper reaches of multi-purpose dams used as water supply sources is 32%, so it is urgent to expand their small-size sewage treatment plants. Thus, the government plans to continue the installation of sewage treatment facilities for small sewage sources in the upper reaches of dams and coastal areas, in order to enhance the sewerage treatment rate up to 90% until 2015.

2. Integrated management system for sewerage facilities

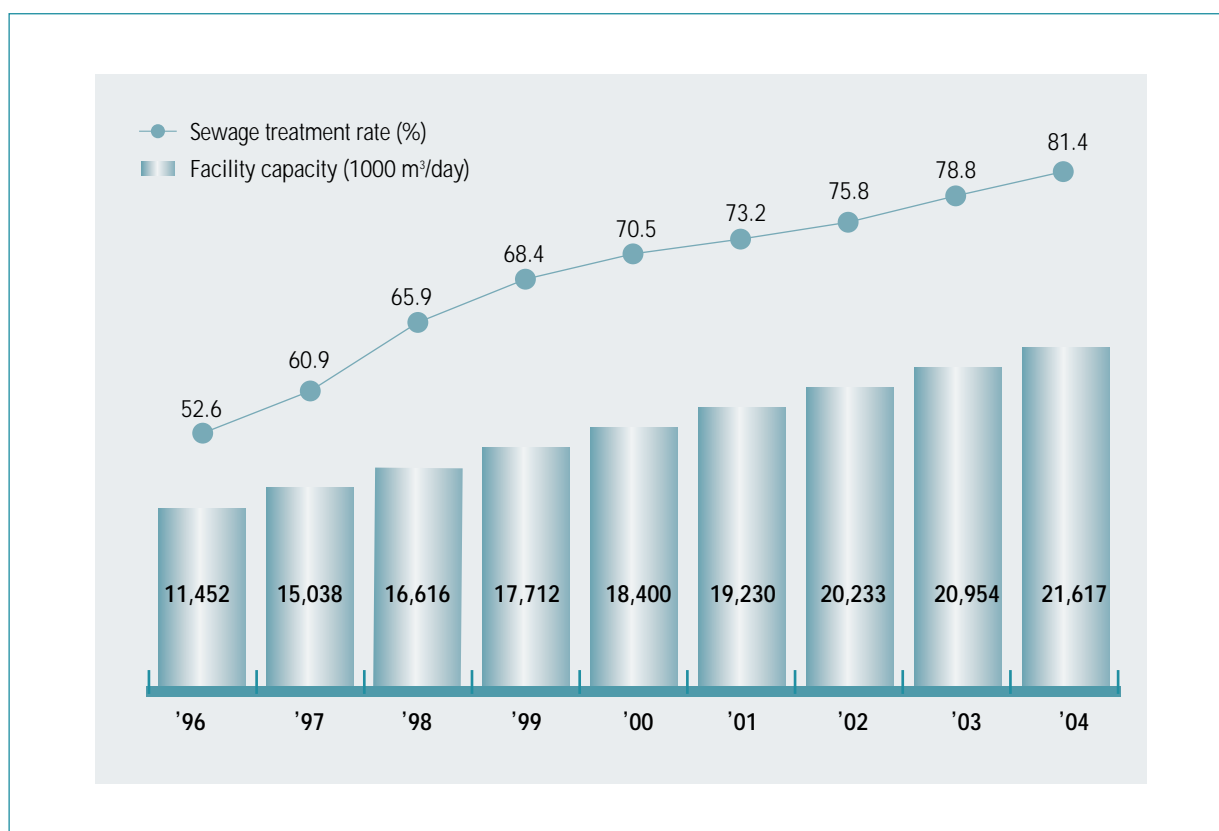
According to the investment plan for the sewage

treatment facilities, 492 sewage treatment plants and thousands of small-size village sewerage will be installed until the end of 2005. The Ministry of Environment (MOE) developed an idea of integrated sewerage management system to control the whole facilities, in order to operate and manage them efficiently. The outline of the integrated system designed a central sewage treatment plant to operate and manage other sewage treatment plants such as village sewerages in the basin with remote automatic operating and monitoring system. As mentioned before, the system was developed to save management expenses and improve efficiency in sewerage projects. Its application is extended to the upper reaches of dams. It is also expected that the system will encourage not only higher efficiency of sewerage projects but also development of relevant technologies such as IT(information technology) and ET(environment technology).

<Table 1> Trend of sewerage supply

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Total population (1000)	45,974	46,426	46,878	47,174	47,543	47,977	48,289	48,518	48,824	49,053
Served population (1000)	20,908	24,420	28,559	31,099	32,539	33,843	35,369	36,760	38,449	39,924
No. of treatment plants	71	79	93	114	150	172	184	207	242 (878)	268 (1,153)
Treatment rate (%)	45.4	52.6	60.9	65.9	68.4	70.5	73.2	75.8	78.8	81.4
Facility capacity (1000m ³ /day)	9,653	11,452	15,038	16,616	17,712	18,400	19,230	20,233	20,954	21,618

※ () is the number of village sewerage facilities



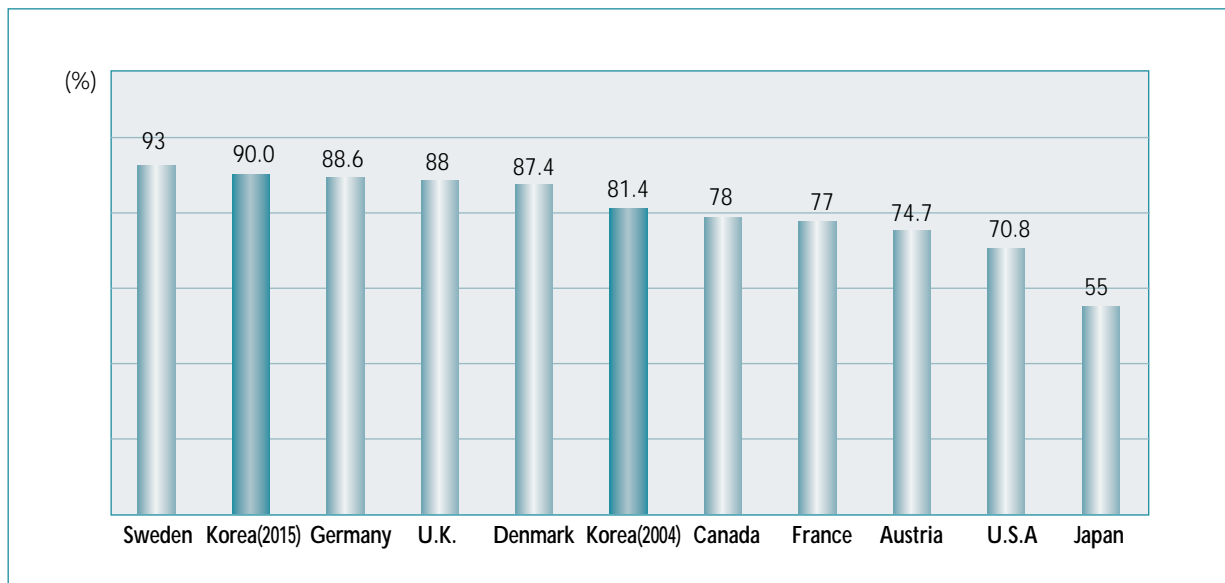
<Figure 3> Trend of sewerage supply

2.1. A Case of the integrated management system for sewerage facilities

The MOE, local government, and related agencies determined to develop a model of integrated management system to manage small-size sewage treatment facilities scattered around dam area, while the plans to install sewage

<Table 2> Sewage pipe supply

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Planned length (km)	85,742	89,119	92,391	96,728	103,280	107,623	112,567	116,141	119,521	120,814
Length of sewage pipes	Total	52,784	55,830	58,671	62,330	64,741	68,195	71,839	75,859	78,605
	Combined	35,760	36,591	38,148	40,160	41,437	42,878	44,534	45,680	46,167
	Separated	17,024	19,239	20,523	22,170	23,304	25,317	27,305	30,179	32,438
Sewage pipe supply rate (%)	61.6	62.6	63.5	64.4	62.7	63.4	63.8	65.3	65.8	68.1



※ SOURCE: OECD ENVIRONMENTAL DATA COMPENDIUM 1999

<Figure 4> Sewerage treatment rates of some OECD countries

treatment plants in the upper reaches of dams were made. The area selected for the case was the upper reach of the Yongdam Dam of the Guem River. With a basic plan to establish the integrated operation management system for the basin of the Yongdam Dam, a sewage treatment plant equipped with integrated automatic monitoring and control system has been built. The purposes of developing 'an integrated operation management system for environmental facilities in the upper reaches of the Yongdam Dam' are as follows.

- Improve the efficiency of installation and operation through the integrated operation of scattered basic environmental facilities

- Save costs by building the integrated operation system for basic environmental facilities
- Preserve the water quality of the Yongdam Dam reservoir

(1) Building integrated automatic monitoring and control system

Basic directions for building the integrated automatic monitoring and control system are as follows.

- Select a central sewage treatment plants considering facility size and geographical condition

<Table 3> Target sewerage treatment rate

Year	2004	2010	2015
- Sewerage treatment rate (%)	81.4	84.2	90
· Total population (1000)	49,053	49,594	49,803
· Served population (1000)	39,924	41,758	44,822

<Table 4> Current state of target facilities

Type	Total	Jinan-gun	Jangsu-gun	Muju-gun
Total	44	11	19	14
Sewage treatment plants	12	6	2	4
Village sewerages	25	3	15	7
Livestock waste water treatment plants	7	2	2	3

<Table 5> Operation and management method

Facility	Operation method
· Central sewage treatment plant	<ul style="list-style-type: none"> ○ Integrated monitoring and control system to operate and manage treatment plants in the basin - Responsibilities: water quality analysis, process management (shift operation), maintenance and repair maintenance and repair, other administrative works
· Medium-size sewage treatment plant	<ul style="list-style-type: none"> ○ Daytime remote monitoring and control of small- and medium-size sewage treatment plants - Process management (daytime: manned operation, night: unmanned operation) - Process slurry from small- and medium-size sewage treatment plants ※ If necessary, function as integrated center for the county
· Small-size sewage treatment plant · Pump station	<ul style="list-style-type: none"> ○ Unmanned operation in principle, circular inspection

- Operate and manage small-size basic environmental facilities scattered around the basin in an integrated way
- Target facilities: Sewage treatment plants, livestock waste water treatment plants, night soil treatment plants, village sewerages
- Minimize the size of integrated utilization

- facility of treatment plants under construction or planned
- Manned operation of medium-size sewage treatment plants with the least number of persons only during daytime
- Maximize the saving of operation and management expenses by reducing personnel

- Unmanned operation and circular inspection of small-size sewage treatment plants and village sewerages
- Establish protection and security system for night and holiday unmanned operation
- Save the cost of construction by minimizing office buildings, dewatering facilities, experimental equipment, etc.

Facilities to be managed under the integrated automatic monitoring and control system for the upper reach basin of the Yongdam Dam are 12 sewage treatment plants, 25 village sewerages and 7 livestock waste water treatment plants, so which made a total of 44 facilities as shown in table 4.

The central sewage treatment plant for integrated monitoring was selected by the

capacity of the treatment plant, the density of basic environmental facilities, water quality test, maintenance and repair, circular inspection, etc. The methods of operation and management are different by the size of sewage treatment plant (central, medium-size and small-size).

(2) Expected effects of the integrated automatic monitoring and control system for the Yongdam Dam

Integrated operation and management of basic environmental facilities in the upper reach basin of the Yongdam Dam using the integrated automatic monitoring and control system can save 1,600 million won a year of construction cost from

<Table 6> Improvements of operation management through the integrated management system

Area	Existing system	Improvement
<ul style="list-style-type: none"> - Facility installation plan 	<ul style="list-style-type: none"> ○ Install large-size facilities for each administrative district - Dry nearby streams - Difficult to manage sewage pipes 	<ul style="list-style-type: none"> ○ Install small and medium-size facilities at the sources of sewage - Install a sewage treatment plant or village sewerage for each town and village
	<ul style="list-style-type: none"> ○ Install and operate dewatering, management and experimental facilities for each treatment plant - Increase the sources of bad smell (dewatering facilities) and, consequently, public complaints - Redundant investment in facilities and operation/management - Redundant personnel and excessive maintenance and management expenses 	<ul style="list-style-type: none"> ○ Integrated installation and operation by the central treatment plant - Process small-size sewage sludge at the central treatment plant - Share management and experimental facilities and operating personnel
<ul style="list-style-type: none"> - Operation system 	<ul style="list-style-type: none"> ○ Monitoring and control operation for each treatment plant - Low operation and management efficiency ○ Direct operation and management by the local government - Stiffened operation and management and difficulty in accumulating technologies 	<ul style="list-style-type: none"> ○ Integrated management by administrative district or basin - Integrated automatic monitoring and control at the central treatment plant - Unmanned automatic operation of small-size treatment plants ○ Commissioned operation and management by private companies

sharing dewatering facilities, office buildings, experimental equipment, and 550 million won of operating expenses by from centralizing water quality test, maintenance and repair, process management, administrative works.

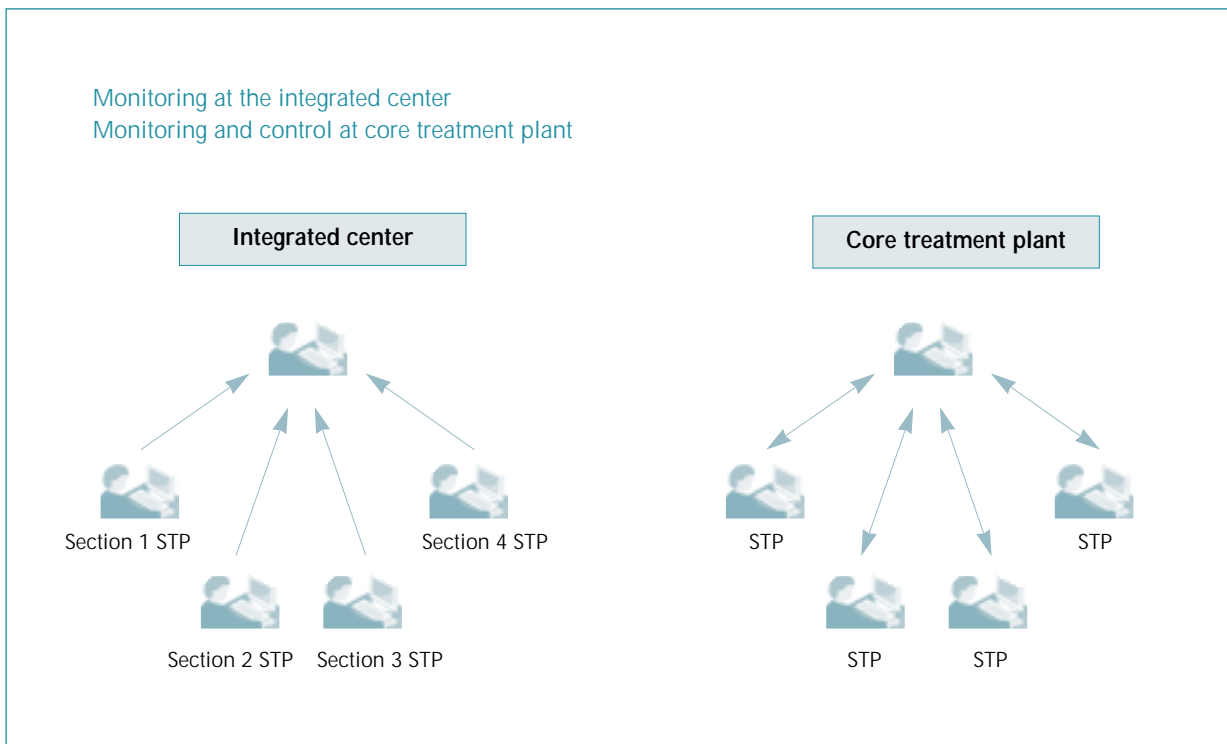
2.2. Dissemination of the integrated management system for sewerage facilities

In order to make a wide use of the integrated management system for sewerage facilities developed by the model system for the upper reaches of the Yongdam Dam, the general principles for the development of integrated management system has been established. The followings are essential points to be improved in the existing sewerage facility management system by the integrated management system.

The integrated management system for sewerage facilities is composed of a central treatment plant, core treatment plants and unit treatment plants:

The central treatment plant is a wide-area integrated operation center, monitoring the condition of treatment plants and providing policy supports, the core treatment plants are in charge of automatic operation and management of basic environmental facilities, and the unit treatment plants are operated by unmanned or the least number of persons. Small-size sewage treatment plants under integrated management do not have an office building and dewatering facility, so its sludge is transported and treated in the integrated treatment plant once a week.

To distribute the integrated management system for sewerage facilities, the MOE revised relevant guidelines for work process. Current sewage treatment plants under construction are obliged to adopt the management system, and particularly the system is spurred to be built earlier in the upper reaches of multi-purpose dams that require special management to preserve the water quality of water supply sources. In addition, additional support is considered to be provided by raising the portion of governmental support in installing integrated management system, as the installation



<Figure 5> Structure of integrated management system

<Table 7> Structure and main functions of integrated management system

Type	System	Main functions
Wide-area integrated operation center (central treatment plant of the basin)	Operation analysis	<ul style="list-style-type: none"> Analyze the condition and efficiency of treatment plant operation Establish plans to improve treatment plant operation
	Policy support	<ul style="list-style-type: none"> Produce various policy support materials and make management plans Make plans to improve water quality and utilize water resources
Core treatment plants (central treatment plant for each town and village)	Automatic operation, remote monitoring and control	<ul style="list-style-type: none"> Automatic operation of basic environmental facilities including sewage treatment plants Remote monitoring and control of unit basic environmental facilities Facility control based on the results of system analysis by specialists
	Information management	<ul style="list-style-type: none"> Maintain databases for various operation data Manage the history of maintenance and repair for each facility Analyze operation information and make plans to improve efficiency
Unit treatment plant)	Automatic operation, remote monitoring and control	<ul style="list-style-type: none"> Automatic operation of basic environmental facilities including sewage treatment plants Transmit operating condition and execute remote control commands

cost of sewage treatment plants is expected to be saved by the adoption of unmanned centralized automatic remote monitoring and control system in the basin.

3. BTL (Build-Transfer-Lease) project for improving sewage pipes

As the domestic sewage treatment projects were applied to generally established urban areas, the improvement of sewage pipes has fallen behind the construction of sewage treatment plants. Thus, for the successful promotion of sewage pipe projects, the Ministry of Environment formed 'the sewerage improvement special support team' composed of the Ministry of Environment, local Environmental Office and Environmental Management Corporation in 2002, which is 'the first year of sewage pipe special improvement'.

Its general plans are also established to improve sewage pipes.

BTL project is a method of business operation, in which private sectors build social overhead capitals with their own funds and transfer the ownership to the government or local self-governing bodies or lease them to recover the investment. It is a new investment method for efficient execution of governmental budgets. By using this, the government can maintain the size of government-financing projects continuously to prevent disorders in the market. Considerable sewage pipe improvement is required to preserve the water quality of water supply source and to prevent floods but it takes a long time due to lack of governmental funds. Thus, a BTL project was launched to improve sewage pipes in a short term using private capitals, to enhance the efficiency of sewage treatment plant operation, and to create pleasant environment earlier with improved river water quality

The promotion of the BTL project is expected to

<Table 8> Investment plan of BTL projects for sewage pipes

	Total	Investment size by year			2008 ~ 2010
		2005	2006	2007	
Volume (km)	882.4	157	351.1	374.3	-
Contract amount (billion Won)	5,614	1,000	2,307	2,307	-
Executed amount (billion Won)	5,614	50	465.4	1,322.9	3,775.7

hasten sewage pipe improvement, prevent defective construction, and reinforce responsible operation by applying the creativity and efficiency of private sectors to the project of sewage pipe improvement. The BTL project for sewage pipes invests 5.6 trillion Won(US\$ 5.5 billion) from 2005 to 2007 for new installation, replacement, repair, and improvement of sewage pipes to extend a total of 8,824km. When the project is completed in 2007, the sewage pipe supply rate will be raised up to 75% and water quality environment will be improved significantly.

3.1. Process of promoting BTL project for sewage pipes

The BTL project for sewage pipes was launched as one of sector projects to construct social infrastructure facilities under the contract with government and rest them on a long-term basis, until the construction cost is reimbursed before turing them public as in tollgate expressways. In 2004, there was a meeting of economy-related ministers to discuss the directions for investment plans including BTL projects.

The BTL project for sewage pipes was decided by the following processes:

- the MOE submit the sewage pipe investment plan to the Ministry of Finance and Economy
- the MOE asked local self-governing bodies of their opinions
- the BTL T/F(task force) discussed investment size and made detailed promotion plans including their difficulties
- the cabinet meeting finalized the volume and budget of the projects
- the MOE decided project for sewage pipes,

announced basic plans for facility projects, and selected operators

3.2. Size of investment in BTL projects for sewage pipes

The period of the BTL project is from 2005 to 2009, which is divided into stage 1 and 2. Stage 1 is from 2005 to 2007, and stage 2 is from 2008 and afterward. The total amount of budget is 10,228 billion Won and the total length of sewage pipes to be improved is 16,078km. In stage 1, 5,614 billion Won is invested and 8,824km of sewage pipes is improved, and in stage 2, 4,614 billion Won is invested and 7,254km of sewage pipes is newly installed, replaced, repaired, or improved.

After projects in stage 1 are finalized and executed, those in stage 2 are planned in 2006 in connection to national fund operation plans. During the period from 2005 to 2007, a total of 5,614 billion Won of private capitals is invested to improve 8,824km of sewage pipes, increasing the sewage pipe supply rate from 68% in 2004 and 75% in 2007. For this, BTL projects with 2,300 billion Won will be launched in 2006 and completed until 2010, and they will be run by private operators for 20 years.

3.3. Selection of BTL projects for sewage pipes

The targets of the BTL projects for sewage pipes are selected in urgent need of improving sewage treatment plant operation and water quality of public waters and in consideration of balance among cities and provinces. Potential targeted areas are as follows.

- Areas having low-concentration sewage flows into the treatment plant, as sewage treatment plants are under construction or the condition of sewage pipes is poor
 - Areas where a sewage treatment plant is under construction and sewage pipes have been improved in advance, so high operation efficiency is expected after completion of the sewage treatment plant
 - Areas in urgent need of water quality improvement including Daecheong Special Zone, areas under the total water pollution load systems, Saemangeum Basin, and coastal areas under special management
 - Areas in urgent need of improvement for maintaining regional balance in 2005
 - Areas in urgent need of improving sewage pipes in old districts being rapidly expanded
- A government-financing project has included the small size projects to improve the sewage pipes in each area, in order to execute the BTL projects for sewage pipes efficiently

(1) Process of selecting the target areas of BTL projects for sewage pipes

Seventeen areas were selected as the targets of

2005 BTL projects for sewage pipes in urgent need of improving the operation of sewage treatment plants, such as the areas under the total pollution load system applied by governmental policies, the Saemangeum Special Zone, and the low-concentration and low-capacity areas. The provisionally selected cities and counties for the project in 2005 will be finalized by the intention of the cities and counties and approvals of their local assemblies. the recommendation of the corresponding cities and provinces will determine if the project is abandoned or considered inappropriate.

Target areas of 2006 projects were selected after they were:

- Surveyed their intentions to promote 2006 BTL projects for sewage pipes except the selected ones for the 2005 project
- Scored the areas of sewage treatment plants, planned areas based on criteria for select, and decided the priority of projects
- Discussed and adjusted the total amount of investment by studying the necessity for executing the project and the appropriateness of the target areas and required budgets
- Finalized the target areas based on priority within the budget of 2006, excluding projects

<Table 9> Criteria for selecting target areas of BTL projects for sewage pipes

Item	Full mark	Detailed scores by item					Remarks
		Less than 40%	40~50%	50~60%	60~70%	Over 70%	
Pipe supply rate (%)	10	10	7.5	5	2.5	0	
Inflow volume to planned volume (%)	20	20	15	10	5	0	
Inflow concentration (mg/ℓ)	20	20	15	10	5	0	
Year of completion of sewage treatment plant	20	2005	2006	2007	2008	2009 and afterward	
		20	15	10	5	0	
Continued project in '05~'06	10						Area of 2005 project in need of additional work
Area of urgent improvement	20						Areas of total pollution load system, Saemangeum, coastal areas under special management, areas under special plan

found inappropriate in field survey

(2) Selection criteria of BTL projects for sewage pipe

The BTL projects for Sewage pipe were selected according to criteria listed below, which were set using criteria for 2005 projects and reinforcing items related to the improvement of the operation of sewage treatment plants. They:

- Adjusted the differentiated marking from 20~50 points to fixed 20 points for areas under total pollution load system, Saemangeum Special Zone, coastal areas under special management, and areas under special plan
- Increased points (20) for sewage treatment plants where sewage inflow is not complete due to lack of sewage pipes and for new sewage treatment plants under construction
- Allotted additional points (10) to cities and counties where additional work is required to enhance the effect of 2005 projects

3.4. Scope and promotion of BTL projects for sewage pipes

According to the result of selecting target areas of 2006 BTL projects for sewage pipes, 61 sewage treatment areas under 29 local self-governing bodies (3 metropolitan cities and 26 cities and counties) were chosen. In preliminary survey, 70 cities and counties wanted to promote the project and the total amount of funds required was 4,700 billion Won. Priority was set with the criteria for selecting target areas, and target areas and the size of investment were decided by field survey. Planned BTL projects for sewage pipes were launched after investigating the feasibility of the projects in the target areas, surveying the fields, and examining the readiness of the cities and counties to promote the projects.

(1) Scope of the BTL project for sewage pipe

The scope of the BTL project for sewage pipes is as follows and the size of investment and project volume will be finalized by additional

process of verification.

- New installation, replacement, repair, and improvement of sewage pipes
- Volume of stage 1 and 2 (2003~2010) in 'nationwide survey of the feasibility of sewage pipe improvement (2003~2020)'
- Volume according to basic and construction designs
- Draining facilities and management monitoring systems

(2) Method of promoting the BTL project for sewage pipes and criteria for budget support

The BTL project for sewage pipes is executed by the announcement of government and investment of private sectors. That is, private operators execute the projects in the BTL formula with their principals and interests are repaid by the National Treasury and the local treasury for 20 years after the completion of the project. During the term of lease, local self-governing bodies pay the operators the total amount of investment including construction costs, interests and management expenses in equal installments.

As projects are performed in group by basin (province), high quality of sewage pipes and high efficiency in sewage treatment plant operation are expected. In addition, fast-track method¹⁾ will be introduced for the urgency of the projects.

Budgets for the BTL project for sewage pipes are supported as follows.

- Money to cover the groundwork cost is supported with the budget of 2006.
- Preparations preformed including sewage pipe field survey, basic planning, investigation of the quality of private capitals, and preliminary evaluation of environmental effects.
- If government-financing projects are promoted, criteria for support from the National Treasury are applied and financial support is made in equal installations during the period of operation.
- The costs of new construction, repair, and improvement are financed at the corresponding government-financing rate, and other costs are at the average government-financing rate for the project.

¹ Fast-track is a method of executing the stages of design, purchase, contract and construction so that these stages partially overlap with one another.

<Table 10> Criteria of financial support to the BTL project for sewage pipes

Area	New construction, replacement (%)	Repair and improvement (%)
Metropolitan cities	30	10
Provincial seats	50	20
Ordinary cities and counties	70	30

* If criteria for supporting government-financing projects from the National Treasury change, the changed criteria are applied to governmental supports to the BTL project.

(3) Process of promoting the BTL project for sewage pipes

The BTL project for sewage pipes is promoted under the Act on Private Participation in Infrastructure, relevant rules, and regulations. The limit of the total amount of investment is reported to the Cabinet meeting and finalized at the National Assembly.

3.5. Plans to finance the BTL project for sewage pipes and to expand private participation

If 2,307 billion Won (US\$ 2.3 billion) of private capital is raised in 2006, the government's total payment shall be 3,861 billion Won (US\$ 3.8 billion). For this, 193 billion Won (US\$ 192 million) shall be paid by the government each year for 20 years and 121.6 billion Won (US\$ 121 million) shall be paid by the National Treasury. This is around 22% of the volume of government-financing sewage pipe projects in 2006. Budgets for the projects are planned until a contract is made with the operator of each project by city and county, and governmental support is made from the budget for sewage pipe improvement according to government-financing rate.

As the BTL projects for sewage pipes are executed in a large scale, private participants are expected to be distributed among the projects. This may weaken competition among the participants.

- As 17 BTL projects for sewage pipes are

announced, participants' competition is distributed. The average competition rate for 15 received proposals is 2.2:1.

- Large construction companies have problems in preparing several projects due to lack of manpower, while small and medium companies are not qualified to take charge of the projects due to lack of capital and technology.
- Because the cost of proposal preparation (around 3% of the total investment) should not be compensated in case the proposal is declined, it is not easy to encourage active participation.
- The feasibility of sewage pipe improvement was surveyed by city and county (2002-2004) but the results were not utilized with the limited cost of proposal.
- BTL is executed with private capitals by the government's announcement. Therefore, as it does not make any compensation for proposal, private companies hesitate to participate in projects having high competition.

In order to solve the problem of low participation and competition, the following measures are planned:

- Survey the readiness of each city and country so that the announcements of projects may be distributed evenly among areas
- Announce small-size projects less than 50 billion won that are prepared in basic design and basic survey during the first half of following year
- Give preferential financial support for sewage pipe improvement in 2007 to cities and counties that finish projects earlier than

<Table 11> Investments required for the BTL project for sewage pipes in 2006

	Total rent (billion Won)	Annual rent (2010 ~ 2029) (billion Won)
Total	3,861	193
National Treasury (63%)	2,432.4	121.6
Local Treasury (37%)	1,428.6	71.4

* Calculated by assuming the investment earning rate 5.5% and the average government-financing rate 63%

planned

- Reduce and support expenses for participating the projects
 - Prepare a system to compensate eliminated participants for the cost of design in order to enhance participation and competition (discuss with relevant departments including the Ministry of Planning and Budget)
 - Minimize the cost of proposal preparation by conducting comprehensive surveys of sewage pipes in target areas before announcing and providing data to participants
 - Expand opportunities to small and medium companies with low financial capacities

As the BTL projects for sewage pipes are executed in large scale, large construction companies take charge of the projects and intrude into the business area of small and medium constructors. Thus the following measures are considered to expand the participation of local small and medium constructors in sewage pipe improvement, while the effect of sewage pipe improvement is guaranteed by the supervision of the BTL project for sewage pipes of large constructors.

- The private capital examination committee composed of the project heads of local self-governing bodies decides the participate rate of local construction companies.
- Between 30% compulsory participation and 40% preferential evaluation, the former was chosen by vote.
- The participation rate of local constructors for 13 projects with completed evaluation is 48% and 67% of their participation rate shall be carried out by small and medium constructors.

Local small and medium constructors

demanded a participation rate of over 40% from the Ministry of Environment and local governments because of the intrusion of their business area. According to their argument, sewage pipe improvement was exclusive for local small and medium companies and their participation was restricted, as government-financing projects were changed to BTL projects. The Ministry of Environment examined their requests and prepared measures to activate local economy and guarantee the effect of BTL projects for sewage pipes.

■ Examination of requests

- Although restriction of participants lowers the efficiency of private capital projects, the participation of local small and medium constructors should be considered to activate local economy.
- The improvement of small and medium constructors' revenues is helpful to local economy, but it hinders the participation of large constructors and investors and limits the improvement of construction quality.
- The relevant authority should induce small and medium companies' active participation in making the basic plans of facility projects (Article 11 of the Private Investment Act).
- However, the level and method of inducing participation should be decided by the local governments promoting the projects based on the condition of the localities.
- The relevant authority should consider the necessity of improving conditions for local companies' participation and the urgency to activate local economy.

■ Planned measures

- Cities and counties decide an appropriate

<Table 12> Level of guarantee for the participation of local small and medium companies by project type

- ▶ Elementary and secondary schools (the Ministry of Education): 40% compulsory participation + 41 ~ 49% preferential evaluation (1%)
- ▶ University dormitories: Preferential evaluation when participating up to 20% (2% of the full mark)
- ▶ Military apartments (the Ministry of Defense): Preferential evaluation when participating up to 30 ~ 40% (2%)
- ▶ Functional universities (the Ministry of Labor): Preferential evaluation when participating up to 20% (2%)
- ▶ Art centers (the Ministry of Culture and Tourism): Preferential evaluation when participating up to 30% (2%)

method of inducing participation and execute it based on opinions of specialists in sewerage, private investment projects, finance and accounting, and other relevant areas.

- The private investment examination committee of each city and county makes decisions.
- "BTL project inspection team" is formed and operated to prevent defective construction and operation
- an inspection team is composed of the Ministry of Environment and Environmental Management Corporation, the inspection of construction sites and the evaluation of the appropriateness of operation are intensified.
- a plan is prepared and executed to reduce governmental support for projects of defective construction

4. Conclusion

Korea has made efforts to construct sewage treatment plants. Consequently, the sewerage treatment rate has been raised up to 81% and the water quality of major rivers has been steadily improved. The sewerage treatment rate will be enhanced up to 90% within 10 years and governmental policies on sewage control shall be switched from the construction of large-size sewage treatment facilities to the construction of small-size sewage treatment facilities and the operation and management of existing plants. Therefore, the additional efforts are required to improve pollutant removal efficiency in sewage treatment systems and reduce the cost of operation and management of sewage treatment

plants by improving sewage pipes.

For early completion of the sewerage pipe improvement project requiring a huge amount of investment, the BTL projects for sewage pipes are being promoted to utilize private capitals, hasten the improvement, enhance the efficiency of sewage treatment plant operation, and provide pleasant environment with high river water quality. In addition, an integrated operation management system has been developed and spreaded for saving the cost of facility management and operation by the integrated management of sewage treatment facilities within a specific area. economic growth as well as high water quality are expected in a short period by enhancing the efficiency of sewerage system with improved sewage pipe installation and adopting the integrated management system for sewerage facilities.

Bibliographical References

1. The Ministry of Environment, The Environmental White Paper, 2005
2. The Ministry of Environment, The Integrated Management Plan for Sewerage System in the Upper Reaches of Multi-purpose Dams, 2003
3. The Ministry of Environment, The Efficient Promotion Plan for the Integrated Management for Sewerage Facilities in the Upper Reaches of Multi-purpose Dams, The Sewerage Forum, 2003
4. The Ministry of Environment, The Plan of BTL Projects for Sewerage Pipes in 2006, 2005
5. Ministry of Planning & Budget, Private Investment Management & Research Division, Press release, 2005.05.14, <http://www.mpb.go.kr/english.html>

Published by

Ministry of Environment

Government Complex Gwacheon, Jungangdong 1, Gwacheon-si,
Gyeonggi-do, 427-729, Republic of Korea
Tel. (822) 2110-6550 Fax. (822) 504-9206

Korea Environment Institute

613-2 Bulgwang-Dong, Eunpyeong-Gu, Seoul, 122-706 Korea
Tel. (822) 380-7777 Fax. (822) 380-7799

Written by Dr. Byung-Kook Lee(KEI), Dr. Young-il Song(KEI)



9 788984 641594

ISBN 89-8464-159-6

2005 W0-06(1)