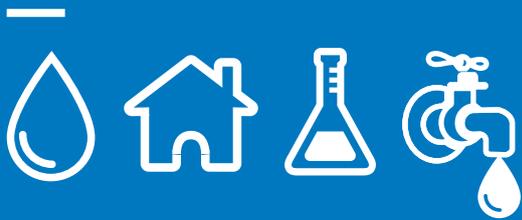

Seoul, ready to share with the world!

Seoul Tap Water Arisu



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*Made in Seoul,
Recognized Around the World!*



What is Arisu?

“Arisu” is the old name for the Han River and the current name of Seoul’s brand of tap water. It is a combination of *Ari*, a Korean traditional word meaning ‘big’ and *Su*, meaning ‘water.’



Arisu!

The safest, most refreshing water for more than 10 million citizens of Seoul.



Overview of Arisu

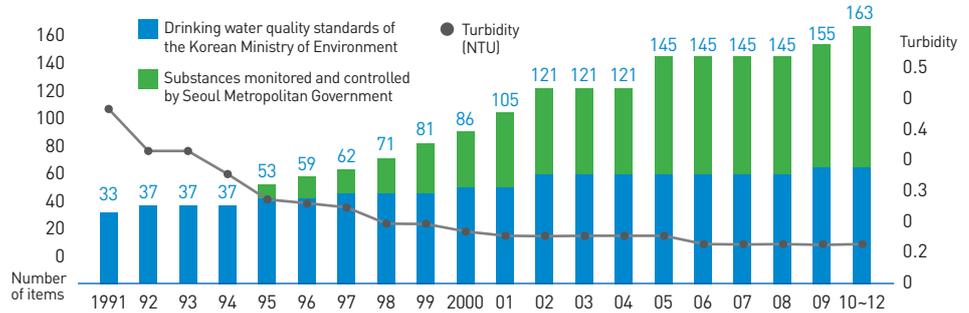
Production & Supply

Daily average production of 3.19 million m³ and daily production capacity of 4.35 million m³! Seoul Arisu serves more than ten million people living in Seoul and the metropolitan region. Every year, low-income households around the capital area are provided with 21 million bottles of Arisu.

Water Quality

Seoul Arisu guarantees the safest and best quality drinking water. Seoul Arisu undergoes tap water quality tests for 163 substances as recommended by the WHO including direct tests on 5 major substances such as residual chlorine, turbidity, hydrogen ion concentration, iron and copper.

Water Quality Test Graph



Comparison of Water Quality Test Items in Major Cities

Major City	Seoul	Korea	WHO	U.S.A	Japan	Australia	Canada	France	U.K	Germany
Number of Total Item	163	83	163	102	121	199	163	63	54	51

Arisu is not only safe but refreshing. Seoul Metropolitan Government has established separate guidelines for the strict review and management of the nine key components of its tap water.

Guidelines for Safe and Refreshing Water

Items	Substances	Unit	Drinking water quality standards	Guidelines	Description
Health related items	Minerals (Ca,Mg,Na,K)	mg/L	-	20-100	Essential elements for the human body
	Total organic carbons	mg/L	5.0 (a surveillance item)	1.0 or less	Beneficial for health thanks to tightened standards for by-products of antiseptics
	Turbidity	NTU	0.5	0.3 or less	Beneficial for health due to elimination of microorganisms (e.g., protozoans, viruses)
Taste related items	Residual chlorine	mg/L	4.0	0.1-0.3	Disinfection (of) odors
	2-MIB	ng/L	20 (a surveillance item)	8.0 or less	Substances that cause
	Geosmin	ng/L	20 (a surveillance item)	8.0 or less	Substances that cause soil-like odor
	Copper	mg/L	1.0	0.05 or less	Pure water producing substance
	Iron	mg/L	0.3	0.05 or less	Red water producing; brass
	Temperature	°C	-	-	4-15



Seoul's citizens have not always been able to enjoy safe and refreshing water.

Only 50 years ago, Seoul lacked the infrastructure to supply decent tap water to its citizens.





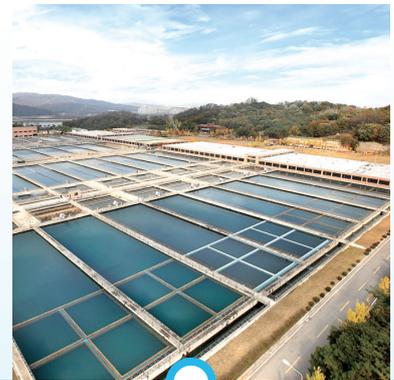
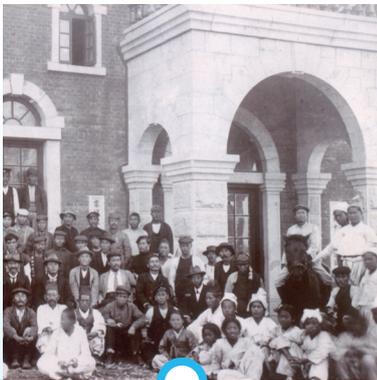
In the old days, there were people who sold water they brought from far away. These people were called *Bukcheong Muljangsu*. Until the 1950s, Seoul was unable to provide clean tap water for its citizens, hence leading to the proliferation of drinking-water peddlers.



The Past and Present

Rapid Urbanization and Population Growth!

The top priority in creating a sustainable city was to provide safe and clean tap water.



1900

Introduction of water supply technologies

- 1908
 - Supplied tap water to Seoul citizens for the first time in the city's history
- 1941
 - Constructed Guui Arisu Water Purification Center
- 1948
 - Established Seoul Tap Water Bureau

1960

Expansion of tap water facilities

- 1961
 - Established five water supply offices
- 1962~67
 - Expanded the Ttukdo, Noryangjin and Guui Arisu Water Purification Centers; Constructed Bogwang Arisu Water Purification Center
- 1971
 - Constructed Yeongdeungpo Arisu Water Purification Center
- 1972
 - Established civil service departments in each water supply office
- 1978~79
 - Started water supply to Seonyu, Paldang and Sinwol Water Purification Centers

1980

Stabilization of tap water supply system

- 1981
 - Launched Seoul Office of Waterworks
- 1981~89
 - Expanded the capacity of Paldang, Guui, Yeongdeungpo, Amsa, Ttukdo Arisu Water Purification Centers
- 1986
 - Constructed Amsa Arisu Water Purification Center



1989 

Launch of the Seoul Waterworks Authority

- 1991
 - Accomplished 100% water supply ratio
- 1996
 - Conducted the 1st phase of Advanced Water Treatment Research
- 1998
 - Constructed Gangbuk Arisu Water Purification Center; conducted water quality examinations for each Purification Center
- 1999
 - Conducted the 2nd phase of Advanced Water Treatment Research



2000 

High quality of tap water

- 2001
 - Launched the production of Arisu bottled water
- 2004
 - Registered the "Arisu" trademark
- 2006
 - Established one-stop, tap-water customer service
- 2007
 - Adopted the Arisu Quality Conformance Test
- 2008
 - Began the auto-measurement of water quality
 - Online disclosure of data in real time
 - Opened the Tap Water Museum
- 2009
 - Awarded the UN Public Service Awards



2010 

Enhancement of international competitiveness

- 2010
 - Constructed the Yeongdeungpo Water Treatment Center
 - Awarded the "Water Innovation Prize" by the Tap Water Association
- 2012
 - Expanded the scope of water quality testing (153 ▶ 163)
 - Acquired the NSF Certification for bottled tap water for the first time in the world
 - Won the consulting project to build the infrastructure in PMB Island

Arisu 



Vision

The safest,
most refreshing water

Mission

Always

Arisu is available, wherever and whenever you need it

Reliable Arisu is trustworthy and reliable

Innovative

Arisu continues to innovate

Smart Arisu uses smart technologies

User-friendly Arisu is customer-oriented

Goal

Production Safe and refreshing Arisu

Supply Stable optimized supply of Arisu

Maintenance

Convenient and smart maintenance

International Competitiveness

Enhancement of international competitiveness through improved management and innovation



Systematic management of water flow rate and strict water quality control, constant expansion of the capacity of Purification Centers and water piping network! This is how Seoul can supply the world's best tap water to its citizens.

Arisu, clean and safe tap water!
How is this possible?

Solution 1

Comprehensive Tap Water Source Management
and Cutting-edge Purification Technologies

Tap water source protection laws

- Framework Act on Environmental Policy, Article 22
(Designation of Paldang Lake as a special protection zone)
- Water Supply and Waterworks Installation Act, Article 5
(Maintenance of Paldang tap water protection zone)
- Han River Basin Management Law, Article 4
(Designated special riverside zones)
- Act on the Improvement of Water Quality and Support for Residents of the Riverhead of the Han River System
(Operation of environmental infrastructures)

01 Management of Water Sources

What matters most in securing clean and safe tap water is the management of water sources. Since Seoul has four distinct seasons, precipitation gap between the different seasons leads to significant differences in the quality of water sources. Furthermore, the Han River is subject to numerous sources of pollution from Seoul and the metropolitan region. To tackle these issues, the city strictly manages the water quality from the water sources by applying scientific pollution control and measurement methods.

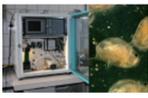
Han River water source protection and water quality improvement projects

- <Han River Environment Watchdog> for water source quality control
- Regulation-based control of pollutants discharging and water source exploitation
- Subsidies for water source quality improvement programs

Scientific source water condition measurement systems

- Biological alarming system utilizing microorganisms, algae and water fleas in intake stations
- Oil-inflow prevention systems around intake stations
- Odor alert system: An alert is issued when the water temperature reaches 20°C or when a strange taste or odor (geosmin-2-MIB) of 10ng/L or higher is detected. ► In each case, appropriate chemicals are automatically injected to maintain the optimal quality of the purified water.

Installation of bio-alarm devices

Type	Green algae	Microorganisms	Water fleas
Species			
Measurement mechanism	Changes in fluorescence by photosynthesis	Changes in current amount	Changes in swimming behavior

Continuous water-quality measurement and automated water quality monitoring system

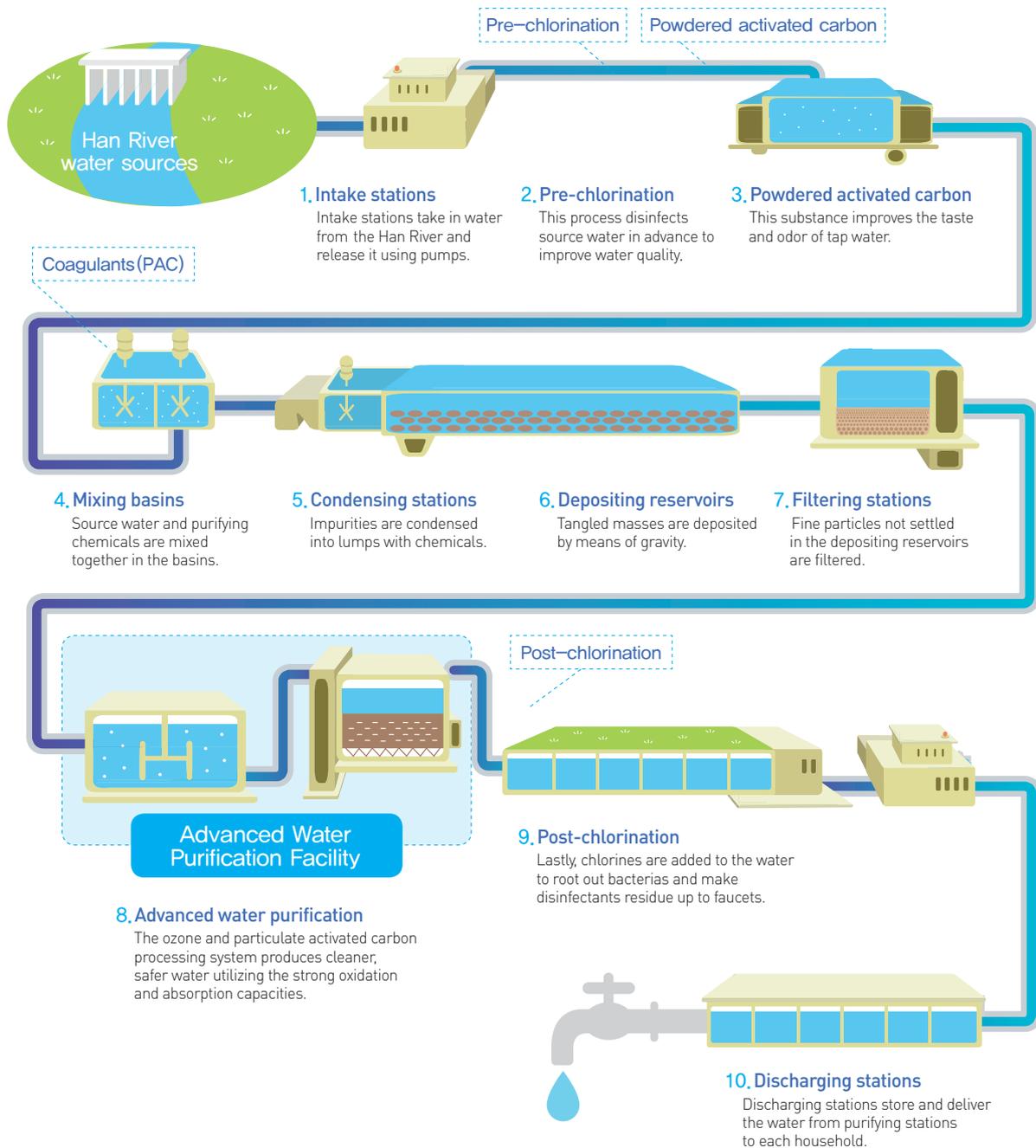
- Regular water quality tests are conducted on 42 items at 33 water source points and 142 items at 6 intake points.
- Automated water quality monitoring system performs round-the-clock monitoring of 8 substances including algae (chlorophyll-a) and phenol.

Comparison of source water and purified water by season

Items	Spring (March-May)		Summer (June-August)		Rainy season (July-August)		Autumn (September-November)		Winter (December-February)	
	Source water	Purified water	Source water	Purified water	Source water	Purified water	Source water	Purified water	Source water	Purified water
Turbidity(NTU)	6.5	0.05	18.8	0.05	25.7 (Max.870)	0.05	9.2	0.05	2.9	0.05
pH	8.4	7.2	7.7	7.1	7.7	7.1	7.8	7.1	7.6	7.2
Ammoniac quality(mg/L)	0.04	Not detected	0.04	Not	0.04	Not	0.03	Not	0.19	Not
Total colon bacillus groups (Number of groups/100ml)	218	Not detected	1,042	Not	1,550	Not	1,663	Not	293	Not

02 Purification Technology

Arisu is free of odor. It has no chemical odor or soil-like taste and contains none of the environmental hormones (such as antibiotics) commonly found in tap water. We produce top-quality water through our own membrane filtering, advanced purification, and chlorine re-dispersion systems, all of which are designed to eliminate strange odors and hormones.

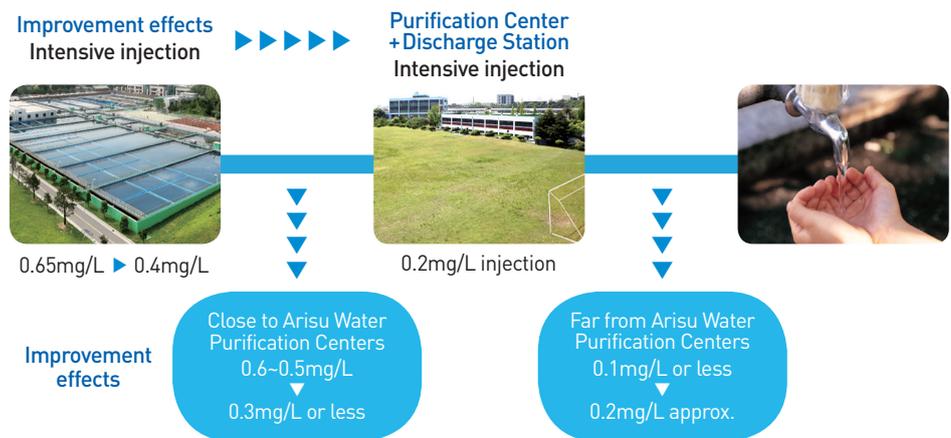


Advanced purification system

- The advanced purification system eliminates the usual unpleasant tastes and odors of tap water as well as environmental pollutants.
- The system completely removes 2-MIB and Geosmin by an ozone and particulate activated carbon treatment steps and by adding environmental hormones such as antibiotics to the standard purifying process.
- This system is recognized as the best of its kind for its additional ozone treatment process, which makes it easy to control ozone density in the event of a drastic change in the source water and entails a relatively small risk of cost increase.

Chlorine re-dispersion/ injection system

- This system reduces the odor of chlorine, the biggest obstacle to the consumption of tap water.
- This system uses a technology that sterilizes the source water at the purification station before it is treated at discharging and pressurizing stations, with minimal dispersion and injection of chlorine.

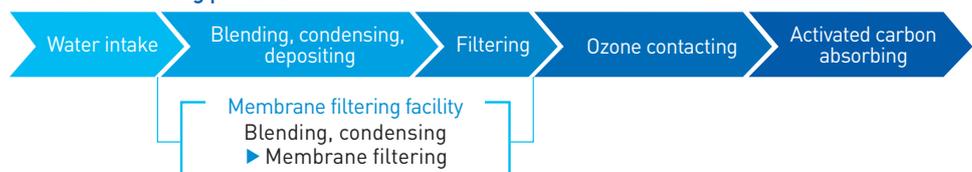


Membrane filtering system

- Membrane filtering technology offers a more precise purification mechanism than the conventional sand filtering system, using membranes as the filtering medium to separate and eliminate impurities in the source water.
- The greatest advantage in using this system is that it reduces the use of chemicals such as cohesive agents by up to 50%, thereby simplifying the maintenance procedure and reducing the budget.
- Seoul has obtained five patents for the commercialization of this technology and three patents for new environmental technologies.



Membrane filtering process



Arisu, available for more than
10 million citizens!
How is this possible?

Solution 2

Optimize the Water Pipe Network to Ensure
a Stable Supply of Tap Water



01 Installation & Operation of Purification Center

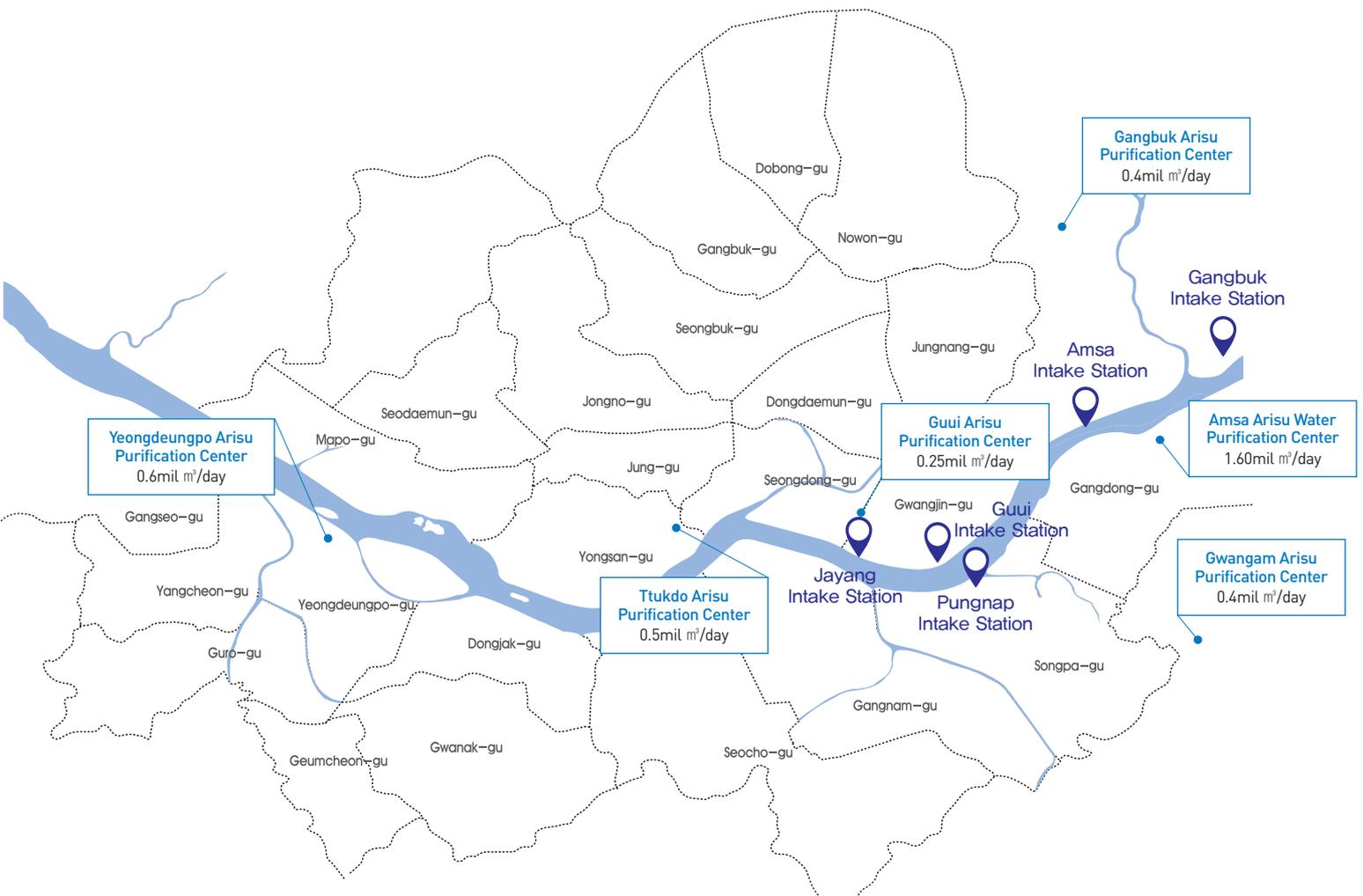
Approximately 3.2 million m³ of water is required to serve ten million citizens each day. To produce such a vast amount of tap water, Seoul Metropolitan Government operates six Purification Centers and five intake stations.

Purification Centers in Seoul

Large-capacity (more than 1.0 million m³/day) | 2 plants

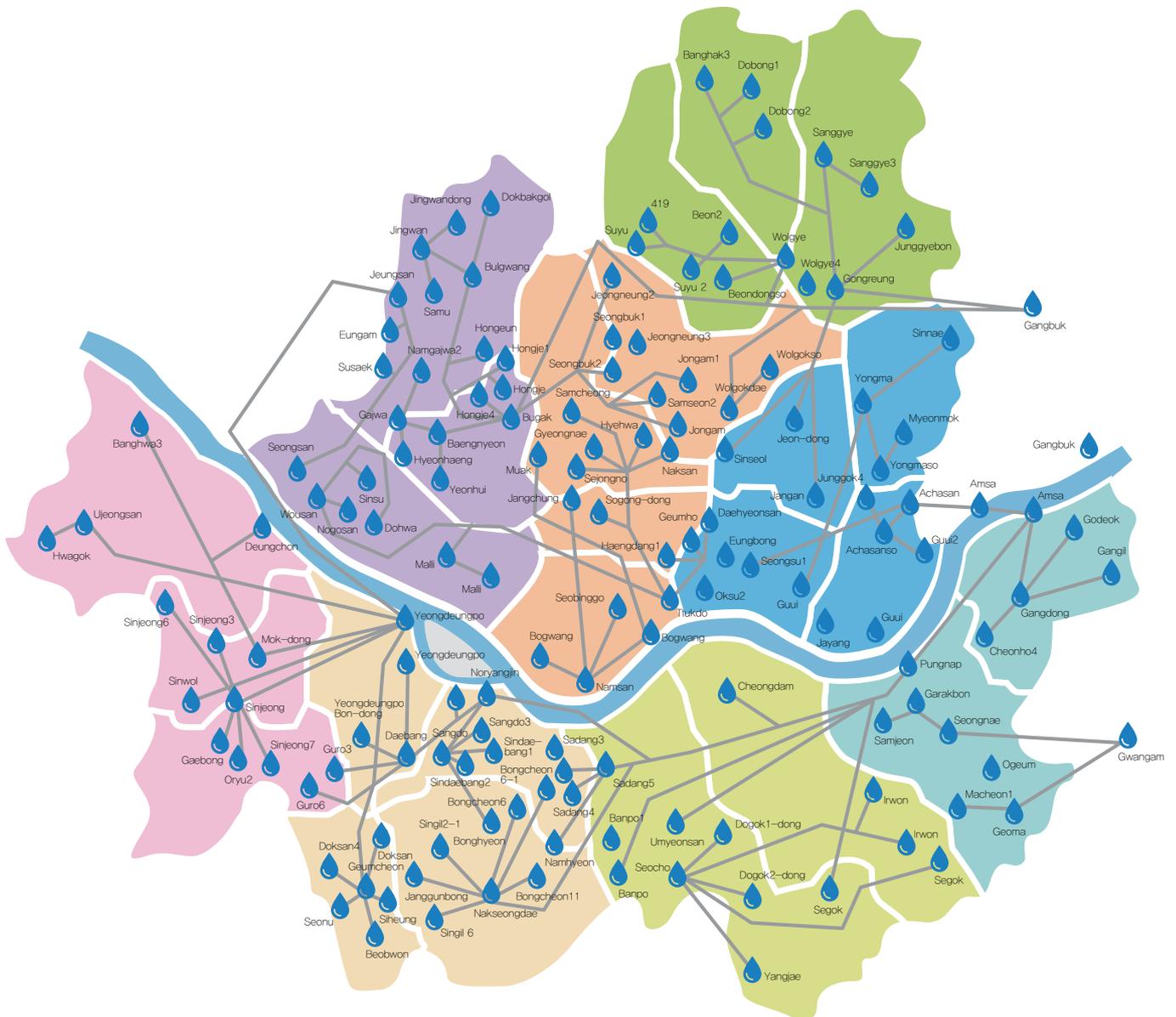
Others (less than 1.0 million m³/day) | 4 plants

Gwangam Arisu Water Purification Center	0.4mil m ³ /day
Guui Arisu Water Purification Center	0.25mil m ³ /day
Ttukdo Arisu Water Purification Center	0.5mil m ³ /day
Yeongdeungpo Arisu Water Purification Center	0.69mil m ³ /day
Amsa Arisu Water Purification Center	1.60mil m ³ /day
Gangbuk Arisu Water Purification Center	1.00mil m ³ /day



02 Expanded Capacity of Tap Water Piping Network and Hydrants

Supplying tap water through a pipe network is of paramount importance. Arisu is supplied via 13,846 km of tap-water piping and approximately 2 million hydrants. Seoul boasts a water supply rate of 100%, thus allowing anyone to enjoy refreshing drinking water anywhere, anytime (3A:Anytime, Anywhere, Anyone).

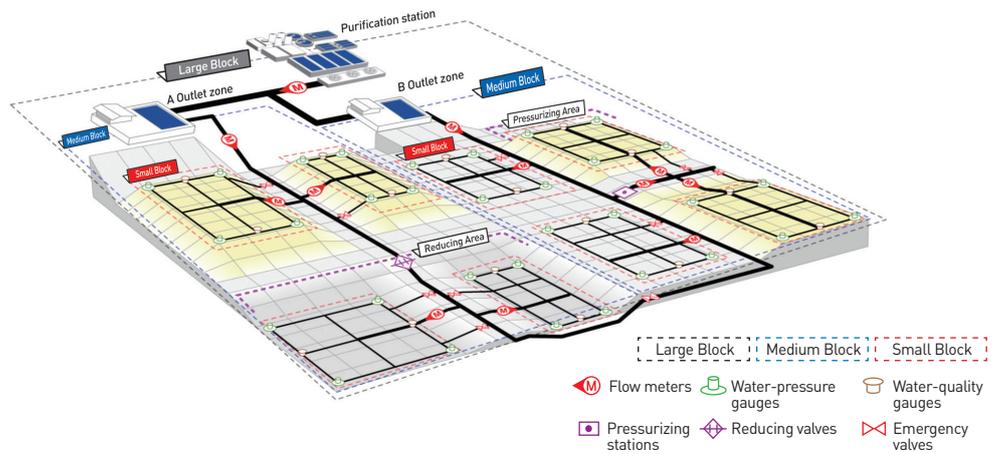


03 Comprehensive Management of Water Flow Rate

Equally as important as the production of clean water is the stable, leakage-free supply of tap water to citizens. The key to securing the supply of water for Seoul, a mountainous city with extreme temperature variations throughout the four distinct seasons, lies in effectively managing water flow rate. The Arisu System uses a methodical leakage ratio control mechanism for the effective maintenance of water piping and a blocking and indirect water distribution mechanism.

Tap-water piping network blocking

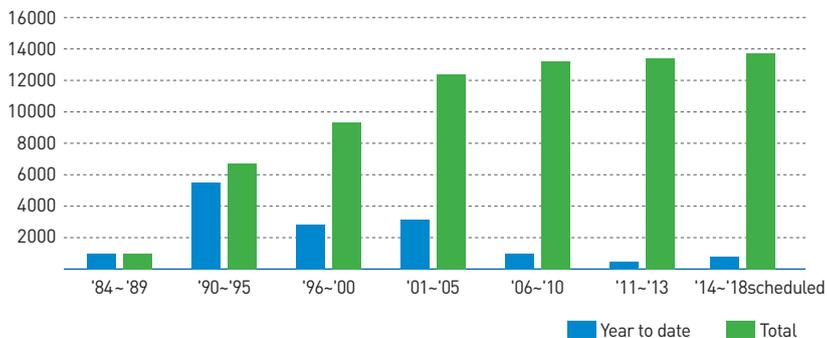
Each tap-water network is divided into large and small blocks to facilitate the analysis of water leakage and usage



Maintenance of water pipes

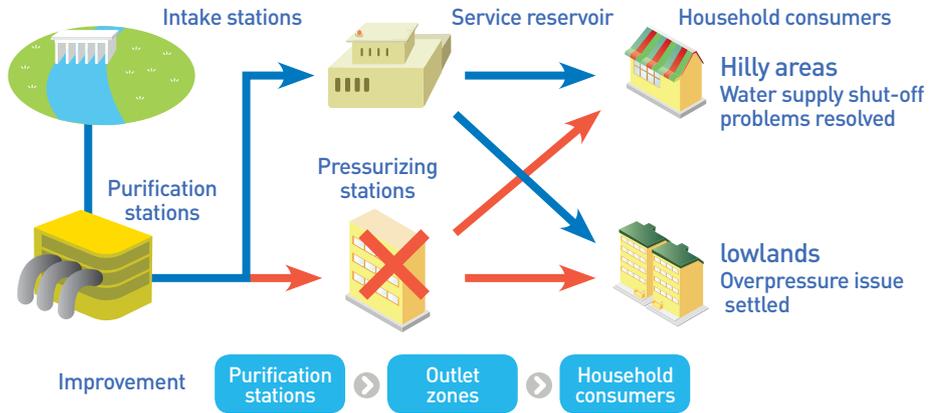
Zinc, iron and PVD pipes susceptible to frequent leakages due to the expiry of their life cycle are replaced with durable, rust-free stainless steel and ductile cast iron pipes.

Maintenance of decrepit water pipes



Indirect water-supply system utilizing outlet zones

- In the past, a pressurizing method was used to supply tap water to hilly areas and districts, but this often caused ruptures in the pipeline network.
- To tackle this issue, we adopted an indirect supply system utilizing outlet zones, which is effective in reducing ruptures.
- This has resulted in an improvement of the water flow rate from 72% in 2000 to 94.4% in 2013.



Scientific supply control

- Inlet/Outlet amount is accurately controlled by flow meters (437 points including intake/transmission, blocks and intermediate blocks).
- Flux monitoring systems were installed (in 2005) for accurate control and analysis of inlet/outlet flux, pressure and velocity.

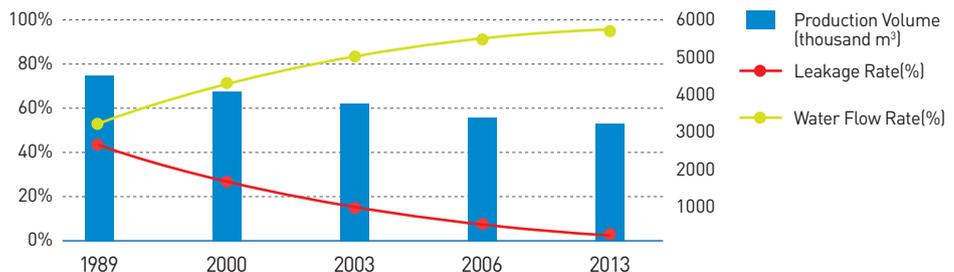
Economic Effects of Controlling the Water Flow Rate

The Arisu System has helped save a total of 4.6 trillion KRW over a period of 13 years, with a water flow rate increase of 39.2%

The city was also able to reduce the number of purification facilities from ten (7.3 mil. tons/day) in 1999 to six (4.35 mil. tons) in 2013



Water Flow Rate, Leakage Rate and Changes in Daily Production Volume



04 Reliable Water Supply around the Clock

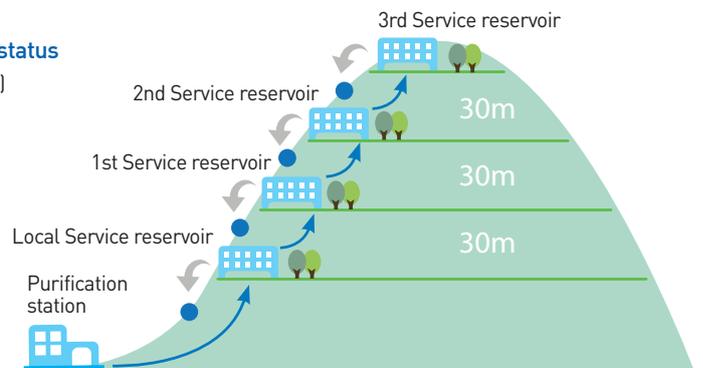
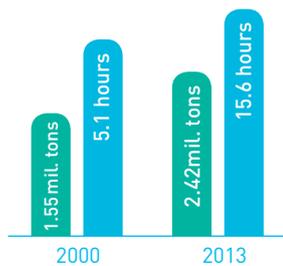
To ensure Seoul's citizens access to use their desired amount of water 24hours, the Arisu System uses cutting-edge seamless water supply instruments including reinforced outlet zones and an outage-free pipe replacement mechanism that requires no digging work.

Outage-free system with expanded outlet zones

- There are now 104 discharge stations capable of reserving a total of 242 million tons of tap water.
- This enables the reliable supply of tap water for up to 15 hours even in the event of a power outage or other accidents that may disrupt operation of the purification stations.

Discharge station expansion status

- Reservoir capacity(10,000 tons)
- Flux reservation hours

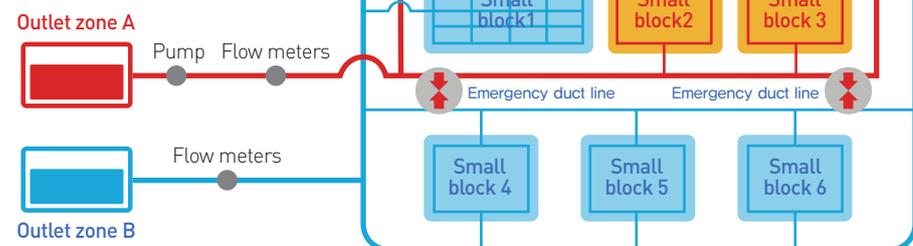


- 3rd Service reservoir : altitude of about 150m
- 2nd Service reservoir : altitude of about 120m
- 1st Service reservoir : altitude of about 90m
- Local Service reservoir : altitude of about 60m

Outage-free system incorporating dual ducts

- Dual duct lines connecting different purification stations
- This system enables prompt supply of water to a purification station which cannot fulfill its normal service requirements due to a power outage or other accident.
- This system guarantees reliable supply of tap water all year round even in the event of an accident.

Installation of Emergency Ducts Between Blocks



How is it possible to supply such a huge amount of water to more than 10 million citizens and manage the pipelines in a secure and reliable manner?

Solution 3

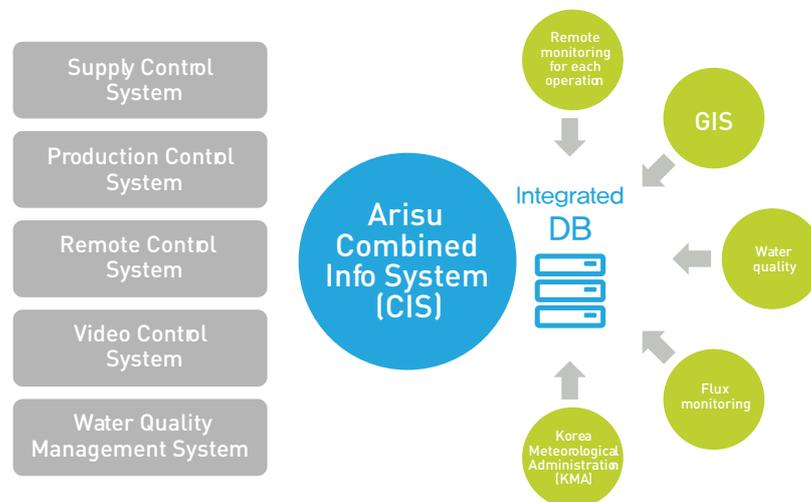
Scientific and Systematic Tap Water Operation Utilizing IT Technology



01 Operating System

Arisu Combined Info System (CIS)

The CIS is a “real-time response and control system” which monitors major tap water facilities through CCTVs and enables video conference upon a situation for discussions between different operations to come up with a solution. With this integrated information system, which is divided and managed by each operation, we could drastically save the production cost.



Arisu CIS

Integrated management of database including monitoring, operation info and system data that have previously been managed by each operation.

Production Control System

A scientific demand forecasting model that utilizes real-time weather forecasts, date information, and previous water supply patterns

Supply Control System

Effective monitoring of water supply , water quality and pressure to enhance risk management capacity in the event of accidents regarding water quality, leaks, and outages

Remote Control System

Capable of collecting and analyzing the operational info of the entire electrical systems of tap water operations(8 points) and purification stations(6 spots)
Equipped with an integrated CCTV monitoring and video conferencing system



Seoul Water Now System (SWNS)

The system enables real-time water quality testing and control throughout every segment from water source to purification, as well as delivering messages to the relevant officials to facilitate prompt management of any irregularity. This system has greatly contributed to citizens' confidence in Arisu.

Arisu automatic quality measurement/monitoring and disclosure

Monitoring points	200 points (12 production processes; 188 supply processing points)
Monitoring items	10 items (turbidity, pH, water temperature, phenol, cyan, ammoniac nitrogen, total organic carbon, residual chlorine, electric conductivity)
Disclosing items	3 items (turbidity, residual chlorine, pH)
Disclosing methods	Office of Waterworks' website or mobile Arisu application

Seoul Water Now System's website



Tap Water Geographic Info System (TWGIS) DB

The TWGIS is designed to accurately collect and analyze information on tap water facilities, including their location, for the effective forecasting of tap water demand and the prevention of accidents. The TWGIS operates in the following mechanism.

- Data collection scope: Intake and purification stations, basic environmental facilities and water source protection zones
- Key functions: The system configures catchment basins and water source protection areas, controls water quality, forecasts outages and provides the relevant information, plans leakage prevention projects, and predicts the daily demand for water.



Mobile Arisu

This app has been of great help in boosting the image of Arisu by enhancing communication with the citizens, providing tap water related information online including outages and the likelihood of outages or frozen/burst pipes, and receiving citizens' complaints real time.

1. Reporting of problems with Arisu drinking fountains through mobile QR codes

A function designed to allow users to report inconvenient aspects and failures of drinking fountains by accessing the Mobile Arisu Website using the QR codes installed at drinking fountains

2. Mobile alert service for water utility bills

In the middle of each month, this service sends a Push alert and bills upon confirmation of the details to citizens who have subscribed to the bill push alert service agreement.

3. Water outage and frozen/burst pipes

This service provides a push alert service to citizens upon an anticipated outage for each area that citizens choose (based on the address info on bills)

Mobile tap water website (m.arisu.seoul.go.kr)

One of eight tap water websites composed of key information and popular menus

- Bill checking, movement cost payment, complaints
- Bulletin boards for citizens
- Introduction of Arisu/Office of Waterworks
- Location-based services (Water quality info, Arisu Spring)



Mobile tap water application (App)

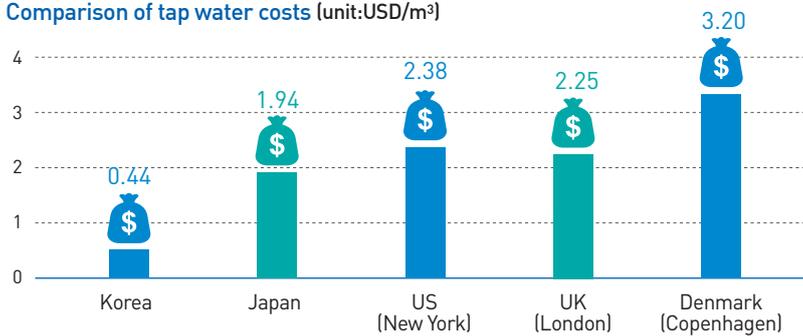
- Links to the mobile website
- Push service
 - Warning service
 - Emergency outage, freeze prevention, etc.
 - Links to embedded mobile cameras
 - Bulletin boards for citizens



02 Affordable tap water bill

To minimize the burden of tap water bills for the citizens, Seoul continued to streamline water service operations and boost efficiency. To this end, the city commissioned some tasks to the private sector, integrated affiliated organizations, and adopted information technologies in its operation. As a result, the tap water cost of Seoul is cheaper than those of major cities abroad.

Comparison of tap water costs (unit:USD/m³)



Flow chart for charging & collection of water bill

Service name	Service details	Sub-details	Remarks
Meter reading	Water meter indicator checking	<ul style="list-style-type: none"> • Metering cycle <ul style="list-style-type: none"> - Once every two months • Metering methods <ul style="list-style-type: none"> - Outsourced - Commissioned (apartment offices) - Self metering 	
Water use calculation	Calculate amount of usage based on metering result	Water rate Basic rate per caliber+usage fee	Composition of water bill Tap water+ Sewerage + Water use share
Water bill notice	Dispatch of water rate notice	<ul style="list-style-type: none"> • Notice dispatch <ul style="list-style-type: none"> - Direct (by outsourcing) - E-mail 	
Water bill payment	Water bill payment	<ul style="list-style-type: none"> • Payment methods <ul style="list-style-type: none"> - OCR bill (paid at bank windows) - Automatic transfer - Deposit to designated account - On-line payment - Convenience stores, CD/ATM, ARS smart phones 	
Collection of overdue bills	Collection of overdue bills	<ul style="list-style-type: none"> • Overdue interest (3%) • Overdue management • Compulsory disposition; seizure of property <ul style="list-style-type: none"> - Shut off water supply; - seize assets 	Calculation of overdue amount: Amount in arrears × Overdue days + Calendar days × 3%

03 Operation Authority

Seoul Waterworks Authority at the heart of tap water control

Seoul Waterworks Authority(SWA), as the biggest tap water operator in Korea, is responsible for 20% of Korea's tap water market, SWA was established 100 years ago and serves more than 10 million drinking water consumers.

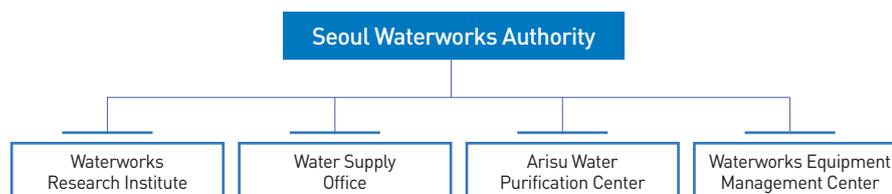
Since its launch, SWA has been drastically downsized from nearly 4,300 employees to the current 2,000.

SWA streamlined operations and reformed the existing system through computerization and automation of water services including the bill charging system and introduction of GIS and UMS applications. As a result, SWA transformed into a smaller but more effective organization.



Organization | 1 HQ(5 Bureaus), 1 Reserch Institute, 8 Affiliated Offices, 7 Centers(6 Water Purification Plants, 1Equipment Management Center)

Human Resources | A total of 2,058 personnel (HQ 244, Institute 102, Affiliated Office 1,196, Water Purification Plants 472, Facility management Center 44)



Waterworks Research Institute, a Tap Water Management Think Tank

The Waterworks Research Institute was established in 1989 to undertake the quality assurance and technological development of Arisu. It has registered a total of 13 patents in and out of the country including those for membrane filtering, eco-friendly ozone treatment, and rust-free ducts. It is truly the best tap water R&D institute recognized as an official KOLAS-certified organization.



Arisu recognized by the world! Arisu reaching out to the world!

Through constant investment in facilities and technological development, Seoul Metropolitan Government has gained recognition for the outstanding water quality of Arisu and the relevant patents that it holds.

Domestic and International Appraisals



JUNE 2009

Awarded the UN's Grand Prize in the public administration service category

Won the UN's Grand Prize for real-time, online disclosure of water quality information and free quality testing for all households; internationally acclaimed for transparency and confidence in quality assurance



MAY 2010

Acquired certification as "Korean Superior Service Provider" (in public administration)

Obtained the central government's official certification for high-quality service in public administration



SEPTEMBER 2010

Won the 2010 Global Water Industry Project Innovation Award

Awarded the certification by the Minister of Knowledge Economy, which is the only official accreditation granted by the Korean government for service quality

SEPTEMBER 2012

Awarded the "Global Honor Award" for technological development and standardization achievements related with the combined remote metering system, which uses electric lines as a medium of communication



SEPTEMBER 2010

2010 International Business Award

Selected as "Best Organization of the Year" from the Stevie Awards Inc. in recognition of the knowledge efficiency performance



AUGUST 2012

Quality certification by the National Sanitation Foundation International (NSF)

Tested and certified by NSF International as safe, high-quality drinking water

*NSF International is a respected independent certification organization for public health and environment

01 Technology patents held by SMG

Production

- 1 An operation mode selection device utilizing quality rating codes in membrane separation purification stations and the method
- 2 Pre-condensing process control unit and method for continuous monitoring of the membrane contamination index in advanced water purification stations
- 3 Selective, advanced preprocessing membrane filtering unit featuring auto control and the method
The unit can be selectively applied to the membrane filtering process in the direct membrane filtering process and after condensation and deposition.
- 4 2-step dip-type membrane filtering, advanced water purification processing unit
This advanced water purification unit is comprised of dip-type separation film performs a successive series of air cleaning and generation/discharge processes.
- 5 An ozone residue eliminating unit with an anthracite upstream device attached to the rear of the existing ozone contacting unit (Acquired from a chinese patentee).
- 6 A membrane integrity testing unit that uses the diminution of surface tension
This method of testing reduces surface tension to improve the ability to detect damage in the membrane filtering modules of a water purifying station.
- 7 An advanced film-separating water purification method that uses a preprocessing selection and auto-condensing control based on the codification of inlet water quality
This method automatically controls the amount of cohesive reagents injected to minimize contamination of membranes and effectively removes dissolved organic substances, pathogenic microorganisms and materials that generate foul odors.
- 8 Dip-type MF membrane-filtering, water purification technology designed to provide injection-type MF membrane filtration-automatically controls preprocessing-and recollect discharged water
This advanced water purifying technology is comprised of preprocessing and MF membranes that enable auto-start/stop operation depending on the quality of the source water.
- 9 Water purification technology comprising dip-type, precision filters operating in an auto-control aerated mechanism
This technology guarantees reliable quality control and recollection, and reduces electricity costs via automatic control of aerated strength based on the membrane contamination index.

Water Quality

- 1 A baffle to prevent flux stagnation in water purification and discharging stations
Effectively reduces stagnant areas in water purification and discharging stations

Supply

- 1 A method to prevent corrosion of tap water pipes using slaked lime sludge
Prevent corrosion in water ducts by using liquid slaked lime instead of a solid substance
- 2 Duct corrosion suppression method
Enables corrosion control by testing only one item instead of the traditional 20-plus items for corrosion measurement
- 3 A tap water supply method with corrosion quality control
Use conventional refractory slaked lime combined with CO2 and completely-melted homogenizers to prevent corrosion

02 Overseas Tap Water Project

Arisu has been recognized worldwide for its advanced technologies and record of awards and certifications. To take the lead in the growing world water market and boost competitiveness, SMG has initiated various overseas projects.

Overseas business achievements

Consultation on the infrastructure building project in PMB Island

Date of launch | Aug. 2012

Project type | Public-Private consortium (Pyunghwa Engineering Consultants, Korea Expressway Corporation, Saman Inc., OMC (a local firm))

Project overview | Construction of bridges, access routes and tap water/communications/power supplies in PMB Island, situated 1.5km away from the main land

Project cost | Approx. 13.5 billion won



Tap water facility improvement project for Chanchamayo City (Sanramon), Peru

Phase 1	2013 ~ 2015	Water intake facilities around Sanramon
		Improved urban water ducts and purification stations
Phase 2~3	2016 ~ 2018	Improved water intake/purification/duct lines in Lamersed/Pichanaki areas



MOUs conclude to expand cooperation in the tap water business

8 cities and organizations including Bangkok in Thailand and Ribeirao in Brazil



Invite tap water experts from foreign cities for training

Each years, 20 experts from Southeast Asia and Central and South America are invited to tap water policy briefing sessions and field trips



Host forums to promote Arisu

Provide research and advisory service regarding overseas business expansion procedures and strategies through forums led by experts in the public and private sector



Host Seoul-Tokyo Forums

Forums have been held alternately between Seoul and Tokyo to exchange tap water-related information and technologies since 1999

Seoul: Office of Waterworks, University of Seoul,
Korea Water and Wastewater Works Association
Tokyo: Tokyo Waterworks Bureau, Tokyo Tap Water
University, Japan Tap Water Association



The Future of Arisu!

We think of the people.
We think of the environment.

Operation of solar power generation facilities

By adopting a solar power generation system, we try to contribute to national energy policies, secure clean energy sources, and introduce eco-friendly, green filtering plants incorporating new & renewable energies.

- Yeongdeungpo Arisu Water Purification Center (300KW)
- Amsa Arisu Water Purification Center (5000KW)





Q&A

Q1. Many cities have suffered from many obstacles in planning and implementing tap water policies. How did Seoul Metropolitan Government tackle such issues?

Fifty years ago, Seoul had difficulties supplying tap water and lacked the technical expertise. During the same period, Seoul's population increased by as much as 4.3 times from 2.45 million in 1960 to 10 million in 2010 while the city experienced accelerated economic growth. Nonetheless, the city succeeded in supplying the world's best and reliable drinking water to its citizens. The following brought about this success:

Case1 Lack of infrastructure ► Drastic expansion of filtration plants and drainage facilities

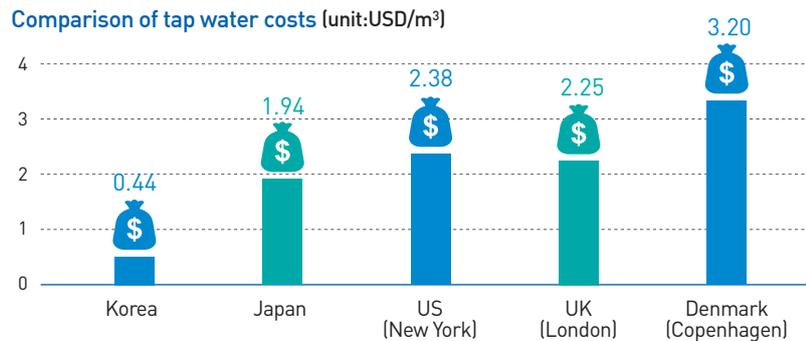
Since 1954, after the Korean War, the Korean Government opted to use foreign aid including UN and foreign loans to make up for the lack of finance to repair and restore tap water systems. In the late 1950s, the government continued to expand and renovate related facilities starting with the construction of filtration plants using domestic technology. In the 1980s, the water supply and demand in Seoul entered into a stable stage thanks to the introduction of the new filtration plants and the expansion of existing ones as well as the drastic supplementation of booster stations and drainage stations. The focus of the tap water policies shifted from quantitative growth to quality service. Meanwhile, as environmental pollution made the headlines, citizens' interest in protection of drinking water sources grew and efforts were made to improve the tap water quality.

Case2 Lack of tap water technology capacity ► Development of internal technicians and technologies

Since 1952, overseas training programs for Korean tap water technicians have helped to advance the domestic tap water-related technology to the next level. Introduction of tap water project centers and education programs contributed to the training of working-level professionals. Likewise, reinforcement of R&D capabilities of tap water research staff helped secure related expertise and technologies. The one-stop service to resolve drinking water-related complaints has also guaranteed the supply of good-quality tap water and led to improvement in services for to the citizens.

Case3 Pressure of higher bills due to inflation ► Rationalized management and improved policies leading to cost reduction

The city's efforts introduce to commission water gauge metering/replacement service, integrate affiliated organizations, intelligent task processing systems and other sustainable management methods have resulted in staff downsizing from 4,300 staff members to about 2,000. The organization transformed into a small but strong one capable of supplying the best-quality tap water at lower cost.



Q2. What are some leading policies and technologies representing Seoul's unique tap water development model that are differs from those of other major cities across the globe?

In order to plan a tap water system for the entire city and introduce the necessary infrastructure, it is important to review the conditions across the city (population, city plans, facilities, urban planning, etc.) and governing laws before applying necessary policies and technologies.

Case1 "Seoul Water Now System" incorporating cutting-edge IT technology and management know-how

To supply safe and delicious drinking water, the Seoul Metropolitan Government runs the "Seoul Water Now System" designed to perform real-time monitoring of the water quality from the water source to its purifying process, release the water quality information online, and automatically detect any irregularity to take prompt measures. This system uses auto water quality testers installed at 200 spots in the course of producing and supplying tap water as well as a monitoring system for 5 items: pH, turbidity, chlorine residues, electricity conductivity, and water temperature. If the water quality dose not meet the criteria, the monitoring system issues an alarm and sends a message to the operator.

Case2 "Hi-tech filtration systems" recognized worldwide for its technology

Seoul's hi-tech filtration system uses a mechanism of adding ozone and granular activated carbon. The system is capable of completely eliminating bad taste- and odor-causing materials including antiseptic residues and fine microorganisms generated by tainted water quality. This water-purifying method is significantly better than the traditional one. The Seoul Metropolitan Government is planning to introduce the hi-tech filtration facility in 6 purification centers in Seoul by 2016 (with a capacity of 3,800,000m³/day) and complete the repair of 3 purification centers (except Ttukdo) by 2014.

Q3. How was the city able to ensure the stable supply of tap water for its citizens?

The Seoul Metropolitan Government has been running high-end water supply management systems to supplement the drainage capacity and dual duct lines and for cut-off-free solutions through dual duct lines and inter-segment linking in order to maintain the reliable supply of Arisu (Seoul's tap-water brand name). Seoul is now capable of providing seamless tap water supply for 15 hours in case of cut-off of water supply at the water collecting or purifying stations. Stable supply of tap water has led to higher satisfaction level among the citizens and economic benefits for the city as a whole.

Policy1 Expansion of drainage capacity

The Seoul Metropolitan Government has boosted energy efficiency by introducing a customized water supply system which classifies drainage stations into local 1st, 2nd, or 3rd drainage stations depending on the landscape and conditions of the target locations. Seoul plans to gradually expand the drainage dwelling hours from 15 hours in 2011 to up to 17 hours by 2030. As a result, indirect supply rate which indicates the reliability of the tap water supply is expected to improve from 92.6% in 2011 to 96.3% in 2030.

Policy2 Introduction of cut-off-free water supply system via dual duct lines and linking between different sections

Seoul Metropolitan Government established dual duct lines and inter-segment piping in a continuous manner for the reliable supply of Arisu not only upon the cut-off of supply but also during maintenance. Efforts to this end include renovation of aged piping systems and cleaning of areas with leaking issues and aqueducts and drains. At present, most of the source water ducts between water reservoirs and filtration centers utilize dual duct lines. In the future, the city is going to build a perfect, cut-off-free water supply systems across the city by installing emergency linking ducts to the Amsa Filtration Plant in Gangbuk and reinforcing the linking system between filtration and local drainage stations.

Q4. How was the city able to maintain a world-class water flow rate?

Controlling the water flow rate is difficult because Seoul is characterized by wide altitude gaps between hilly sections and lower areas and wide seasonal variation in temperatures. Despite these obstacles, the city managed to achieve a world-class flow rate of 94.4% in a short period of time through the replacement of aged pipelines and ancillary facilities, establishment of block systems for tap water ducts, systematic leak prevention and a scientific supply control utilizing a consolidated operating system and a geographic information system.

Policy1 Continuous maintenance of tap water pipelines and blocking of ducts

To prevent water quality deterioration and ensure optimal duct environment, the Seoul Metropolitan Government replaced aged pipelines which can cause leaks and rust over time. Out of the entire 13,668km-long pipes, 96.5% or 13,192km of aged pipes have been replaced. In addition, the city standardized and arranged the existing tap water pipelines into 100 mid-size segments and 2,037 small sections. This has led to improved pipeline maintenance, minimized water supply cut-off sections upon leaks, and more effective water supply and restoration in case of an emergency. Also, with the timely assessment of leaks and the amount required for each block, the water flow rate improved.

Policy2 Systematic prevention of leaks

Seoul Metropolitan Government has established a system for calculating the flow of tap water during the night time when there is little use of tap water in order to detect tap water pipeline leaks and implement multi-point, interaction leak detectors for the early detection and repair of leaks.

Q5. Are there cases wherein Seoul City has cooperated with other cities abroad regarding tap water service?

If so, what kind of technologies or policies were shared?

After undergoing rapid urbanization, Seoul grew to become a mega-city with a population of 10 million. To meet the growing demand for tap water, Seoul city government made efforts on various fronts and successfully achieved 100% supply of high-quality tap water. Now Seoul is ready to share its experience and know-how on tap water with cities around the world through various programs.

Case1 Training Seminars by inviting tap water professionals abroad

Seoul Metropolitan Government invites 30 tap water professionals from other cities around the world including Southeast Asia to share its drinking water-related technologies during short-term training sessions each year. The objective of the training seminar is to share Seoul's successful policies so that the participants can develop a customized policy for the city.

[History of tap water training seminars]

Region	Period	Participants
Peru	'12.11.19~25	7 people from 4 cities in 1 country
Southeast Asia	'13. 9. 8~17	15 people from 10 cities in 6 countries
Southeast Asia	'13.12. 1~ 7	15 people from 8 cities in 8 countries



Case2 Tap water supply support programs for cities in foreign countries

Seoul Metropolitan Government has provided Chanchamayo City in Peru with tap water technologies and external cooperation funds to supply clean drinking water to its citizens through a series of projects to improve water intake facilities, ducts, and pipelines and water filtration stations. This is the first project in which Seoul City has supported the developing world with its own tap water technologies and materials to improve water supply facilities. The 1st phase of the project was completed in Feb. 2014 and three other phases will be finished by 2018. The city has also entered into a Memoranda of Understanding with Brazil, Thailand, and Papua New Guinea to cooperate in the field of tap water, which includes inviting tap water professionals for seminars and dispatching Seoul's tap water specialists to overseas cities.

For more information on Seoul's tap water policies, contact us at the following, and we will do our best to serve your needs:

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