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.’
Overview

Arisu at a glance

<table>
<thead>
<tr>
<th>As of the end of 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplied to a total of 10,300,000 people</td>
</tr>
<tr>
<td>Percentage of households supplied with tap water: 100%</td>
</tr>
<tr>
<td>Water production capacity: 4,450,000 m³/day</td>
</tr>
<tr>
<td>Daily average production amount: 3,170,000 m³/day</td>
</tr>
<tr>
<td>Total asset amount: 5,427.5 Billion won</td>
</tr>
<tr>
<td>Budget: 772 billion won (2016)</td>
</tr>
<tr>
<td>Tap water rates: 569 won/m³</td>
</tr>
<tr>
<td>Revenue water ratio: 95.2%</td>
</tr>
<tr>
<td>Daily average per-person amount of water supplied: 301L</td>
</tr>
<tr>
<td>102 distributing reservoirs</td>
</tr>
<tr>
<td>206 pumping stations</td>
</tr>
<tr>
<td>2,121,000 hydrants</td>
</tr>
<tr>
<td>2,117,000 water meters</td>
</tr>
<tr>
<td>6 water purification stations</td>
</tr>
<tr>
<td>2 Intakes</td>
</tr>
<tr>
<td>4 Intakes</td>
</tr>
<tr>
<td>13,697km</td>
</tr>
<tr>
<td>2006 employees</td>
</tr>
</tbody>
</table>

History of Arisu

1900s
First introduction of tap water technology
1908 Seoul tap water first supplied to 125,000 people

1960s
Tap water facility expansion
Expansion and improvement of facilities to meet rapid increase in demand amid rapid urbanization and increase in population

1980s
Stabilized tap water supply
1989 Launch of Seoul Waterworks Authority
1991 Tap water ratio 100%
1996 Research of hi-tech water purification/treatment

1990s
First introduction of tap water technology

2000s
Improvement of tap water quality
2001 Production of bottled Arisu water
2004 Registration of Arisu as a trademark
2007 Launch of the Arisu Quality Certification System
2008 Automated round-the-clock water quality monitoring

2010s
Strengthening international competitiveness
2010 Launch of the “Healthy and Good-Tasting Water” Project - Received Project Innovation Award from the IWA (International Water Association)
2012 The world’s first bottled tap water to have its quality certified by the NSF - Won the project for provision of consulting for infrastructure construction in PMB Island, Brunei

People at Arisu

The Seoul Waterworks Authority of the Seoul Metropolitan Government is the country’s largest tap water agency, occupying 20% of the country’s tap water market. Since its launch in 1989, through efficient management and system improvements the HQ has become a much more efficient organization, and now has 2,006 employees.

Organization

- 1 HQ (5 divisions)
- 1 Research Institute
- 8 Project Offices
- 7 Centers
- 6 Water Purification Centers
- 1 Material Supply Center

Awards received in association with Arisu

- 2009. 06 UN Public Service Award
- 2010. 05 Korean Standard Service Quality Certification (in the area of public administration service)
- 2010. 09 IWA’s Project Innovation Award
- 2010 International Business Awards
- 2012. 08 Quality certification by the National Sanitation Foundation (NSF)
- 2012. 09 IWA’s Project Innovation Award
- 2015. 10 Korea Management Grand Award
- 2016. 03 Korea Premium Brand Award
- 2016. 04 Korea Creative Economy Award
Arisu, Safe and Good-Tasting Water

The tap water of Seoul boasts a meticulous water quality management and water-tight crisis management throughout the entire system, from the water supply source to faucets in households. The city’s tap water supply system maintains the world’s highest revenue water ratio through systematic water leakage management, despite unfavorable conditions associated with rugged topography and seasonal temperature differences. We are doing what we can to ensure a stable supply of healthy and clean water to ten million Seoulites.

High-quality technology and policies displayed by Arisu

Seoul Arisu aims to be the safest drinking water in the world. We are carrying out 170-item water quality inspections, which is more than what is recommended by the WHO. We check water quality with a focus on five major items: residual chlorine, turbidity, hydrogen ion density, iron, and copper toward 300,000 households each year.

Number of items checked by major countries in water quality inspection

<table>
<thead>
<tr>
<th>Category</th>
<th>WHO</th>
<th>Seoul</th>
<th>U.S.</th>
<th>Japan</th>
<th>EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items inspected</td>
<td>163</td>
<td>170</td>
<td>112</td>
<td>125</td>
<td>52</td>
</tr>
</tbody>
</table>

- Water quality inspection at water supply sources and intake points: 33 spots
- Operation of tidal water/odor warning system: real-time checking of inflow of pollutants
- Water quality inspection more stringent than what is recommended by the WHO: 164 items (2015) → 170 items (2016)
- Periodical water quality inspection at faucets to enhance the percentage of people drinking tap water: 450 spots (more than once a month)

Guidelines for Safe and Refreshing Water

<table>
<thead>
<tr>
<th>Category</th>
<th>Elements</th>
<th>Unit</th>
<th>MOE-set criteria</th>
<th>SMG-set criteria</th>
<th>Relevant factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health related elements</td>
<td>Minerals (Ca, Mg, Na, K)</td>
<td>mg/L</td>
<td>-</td>
<td>20–100</td>
<td>Essential elements for humans</td>
</tr>
<tr>
<td></td>
<td>Total Organic Carbons</td>
<td>mg/L</td>
<td>5.0 (an item for watching)</td>
<td>1.0 or less</td>
<td>Removal of disinfection residues for health</td>
</tr>
<tr>
<td></td>
<td>Turbidity</td>
<td>NTU</td>
<td>0.5</td>
<td>0.3 or less</td>
<td>Removal of microbes for health</td>
</tr>
<tr>
<td></td>
<td>Residual chlorine</td>
<td>mg/L</td>
<td>4.0</td>
<td>0.1–0.3</td>
<td>Odor of chemicals</td>
</tr>
<tr>
<td></td>
<td>2-MIB</td>
<td>ng/L</td>
<td>20 (an item for watching)</td>
<td>8.0 or less</td>
<td>Bad odor</td>
</tr>
<tr>
<td></td>
<td>Geosmin</td>
<td>ng/L</td>
<td>20 (an item for watching)</td>
<td>8.0 or less</td>
<td>Bad odor</td>
</tr>
<tr>
<td></td>
<td>Copper</td>
<td>mg/L</td>
<td>1.0</td>
<td>0.05 or less</td>
<td>Causing greenish color in water</td>
</tr>
<tr>
<td></td>
<td>Iron</td>
<td>mg/L</td>
<td>0.3</td>
<td>0.05 or less</td>
<td>Causing reddish color; bad odor</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
<td>°C</td>
<td>-</td>
<td>4–15</td>
<td>Suitable for drinking</td>
</tr>
</tbody>
</table>
Hi-tech water purification system: Adopted in the six purification stations in Seoul
Inclusion of ozone and granular activated carbon in the treatment process to get rid of pollutants and unpleasant flavor/odor.

- Inclusion of ozone and granular activated carbon in the purification/treatment process for complete removal of 2-MIB and Geosmin and environmental hormones like antibiotics
- Production of cleaner and safer water with a treatment process using ozone featuring powerful oxidizing strength and activated carbon featuring excellent absorbing strength.

Chlorine dispersed input system
Making it possible to reduce chlorine odor drastically through twice dispersed input of chlorine disinfection to raise the percentage of people drinking from tap water.

Membrane filtration water purification treatment
This is a method of purifying water by removing impurities from water with the use of membrane as a filtering material. It helps on costs by reducing the use of chemicals like flocculent by more than 50% and simplifies the requirements of operation and maintenance. The SMG had its water purification technology recognized by obtaining eight membrane filtration-related patents.

The world’s highest revenue water ratio (95.2%)

- Leakage amount reduced by
  - 8.8 billion tons
- Budget saved: 5 trillion won
- Reduction of the number of water purification stations (from 10 to 6)

Overhaul of tap water pipelines
Old pipelines are replaced with durable and rust-resistant stainless steel and ductile cast iron pipelines (97% of old pipes by 2015).

Scientific water supply management
Accurate control of inflow/outflow water amount, using water flow meters and relevant inspection systems

Effects of improvement in revenue water ratio

Membrane filtration water purification treatment
[pressurized, immersed]
Uninterrupted tap water supply

Operation of an uninterrupted tap water supply system by increasing the number of water distribution reservoirs

Helping prevent water pipe rupture and making it possible to continue uninterrupted tap water supply for up to 16 hours even in the case of an incident.

The number of water distribution reservoirs increased to:
- 102 (2.42 million m³/day (2015)

Uninterrupted tap water supply

Establishment of dual pipeline system

Pipeline system between water purification stations to cope with a crisis situation

- 3rd water distribution reservoir: about 150m in elevation
- 2nd water distribution reservoir: about 120m in elevation
- 1st water distribution reservoir: about 90m in elevation
- Local water distribution reservoir: about 60m in elevation

Arisu-related integrated information system

This system makes it possible to monitor tap water facilities with surveillance cameras and hold video conferences between water works offices in case of an incident. It can go a long way to reduce production cost through integrated operation of the operation systems at different water works offices.

Seoul Water Now System

Being able to cope with a crisis situation through real-time water quality inspection/management in all areas, ranging from water supply source to purification stations.

Tap water-related GPS (Global Positioning System)

Contribution to prevention of incidents through accurate analysis of information on tap water facilities in Seoul.

- Scope of collection of materials: Intakes, water purification stations, basic environment-related facilities, Source water protection areas
- Major functions: Designation of source water collection areas, designation of source water protection areas, water quality management, provision of information on areas subject to interruption of water supply, setting up a plan for leakage protection projects, forecast of required water supply amount

Mobile Arisu

Going a long way to enhance the image of Arisu through smooth communication with people by listening to their complaints on a real-time basis and providing tap water-related information, including notices of interruptions in water supply and warnings against freezing of water meters in winter.

Arisu-related patented technology

- International patent for up flow-type ozone-contacting reservoir for removal of residual ozone (China and Japan)
- Operation mode selection device using water quality grading code of membrane separate purification stations
- Flocculation-based pre-treatment process control device by means of continuous monitoring of membrane fouling index of hi-tech purification devices
- Optional hi-tech pre-treatment membrane filtration treatment device using automated control
- Method of testing membrane integrity using reduced surface tension in hi-tech purification devices
- Selection of pre-treatment process for coding inflow water quality and membrane separate hi-tech purification treatment technology
- Pretreatment automatically controlled pressurized-type MF (membrane filtration) and discharging water collection-based submerged-type MF purification technology
- Purification technology, using submerged-type precision filtration membrane
- Baffle used to prevent formation of stagnant water in a clear water reservoir or a distribution reservoir
- Method of preventing corrosion of water supply pipelines, using milky lime sludge
- Method of preventing corrosion of water supply pipelines
- How to supply tapped water, with corrosion put under control
We at the SMG are pushing forward with collaborative projects with cities around the world to share our years of accumulated experience in water supply operation and high-end technologies.

We were awarded a project for provision of consulting concerning infrastructure development in PMB Island, Brunei in July 2012, and are carrying out water supply-related projects in 20-plus countries, including Peru and Vietnam. Our partner countries welcome our efforts for mutual collaboration in water supply-related projects.

Consulting on the development of infrastructure, including bridges, access roads, tap water pipelines, communications, and power lines on PMB Island
- Construction of 2.8km-long bridges and 5.0km-long access roads
- Improvement of water supply facilities in San Ramon, part ofPMB Island

Project period: 2012~2018

Client: The Brunei Industrial Development Authority
Project amount: 13.5 billion won

Method of promotion: formation of a consortium including private businesses

The SMG’s role: Supervision and operation together with Saman Co.

Project content:

- Consulting on the development of infrastructure, including bridges, access roads, tap water pipelines, communications, and power lines on PMB Island
  - Construction of 2.8km-long bridges and 5.0km-long access roads
  - Supply of potable water (400m³/day) + industrial water (2,000m³/day)

We carried out a training session on water supply policy for relevant officials from cities in foreign countries.

We dispatched experts to cities (including the following) in foreign countries to diagnose their water supply facilities and provide consulting:
- Port Moresby, Papua New Guinea (2012 and 2014)
- Eight institutions, including the Metropolitan Waterworks Authority of Bangkok - 2013 - Chanchamayo, Peru
- - 2016 - Thừa Thiên-Huế Province, Vietnam

We held a training session in cooperation with Saman Co. in PMB Island, Brunei.

We provided support for water supply facilities in underdeveloped countries
- Carried out a training session on water supply policy for relevant officials from foreign countries
- Conducted field studies on water supply-related projects in foreign countries:
  - Water supply projects carried out by the SMG in foreign countries
  - Signing MOUs with cities of foreign countries for collaboration in the water supply sector
  - Provision of support for water supply facilities in underdeveloped countries
  - Diagnosis of water supply facilities in cities of foreign countries using Korean experts
  - Operation of the Arisu Globalization Forum
- Three times a year for water supply-related officials (six night/seven day-schedule for each team of approximately 15 people)
- The forum is composed of experts and scholars with research expertise on the promotion of water supply works in foreign countries.
Seoul Waterworks Public Private Partnership (SWPPP)

We at the SMG operate a council of private/public sector ventures [with leading private businesses participating] making forays worldwide. The 33 participating private businesses specializing in five sectors are working collaboratively with us for the exploration of overseas projects, setting up appropriate strategies, and exchanging information.

Private businesses taking part in the SWPPP

Consulting

GCCUS Engineering Studio
02-2633-4953
rammartai@naver.com
Development of water supply/sewage projects, consulting

ROTHWELL
070-7011-5403
northpole.kr@gmail.com
Water works project management, technological development, consulting

East West EnCo, Ltd.
078-884-5166
yoonghee05@hanmail.net
Attraction of overseas investors, consulting

Design

PYUNGHWA Engineering Consultants LTD
031-420-7382
kmiaed@pec.kr
Construction business consulting, design, supervision

DOHWA
02-6323-3113
leesi@dohwa.co.kr
Construction business design, management, EPC, D&M

DONG-MYEONG Engineering Consultants & Architecture
02-6211-7425
sipaused1@hanmail.com
General architecture, water supply/sewage design

Saman
02-3424-4290
pon@hanmail.net
General engineering, construction business management, CM, survey, operations, management

SOOSUNG Engineering Co., LTD
02-2142-9230
overserv@soosungeng.com
Construction business consulting, design, supervision

Korea Engineering Consultants Corp.
02-2049-2610
dochsoon@hanmail.net
Construction business consulting, design, supervision, construction work

Hankuk Engineering Consultants
031-420-5880
pdheuy@empal.com
Construction business planning, design, management

Erection

DAELIM Industrial Co., Ltd.
02-2011-8656
201601822daelim.co.kr
Design, erection, project exploration, planning, investment, financing, operation, management

KDC Korea Development Corporation
02-420-9956
jlim2019@kdc.co.kr
Civil engineering work, industrial plant construction

Dossan Heavy Industries & Construction
02-513-7592
kyungyun.bun@dossan.com
Water industrial plant

DAEWOOW E&C
02-2288-2899
taehoon.kim@daewoownc.com
General construction

Sanfahng Construction Co., Ltd.
02-553-9270
san9270@hanmail.net
General construction

Water quality management

GeoMarine Corporation
02-622-8386
lakefi@geomarine.kr
Water supply/sewage design, contractual work, water supply source pre-treatment, water quality management, plant for removing green/red tide

Da All Engineering Co., Ltd
02-859-8471
tyshin12@hanmail.net
Online water quality measuring equipment for turbidity, pH, residual chlorine, conductivity, dissolved oxygen, etc.

Toray Chemical Korea Inc.
02-3277-7599
ben.hur@toray-tck.com
Separation membrane for water treatment, water filter (RO, NF, UF, MF)

DAEYANG ENBIO CO., LTD
02-6309-7700
4rang0518@hanmail.net
Sewage treatment plant operation and management

CHUNG-HO ENVIRONMENT DEVELOPMENT
02-526-9848
sd8choeongho.net
Water purification, artificial wetlands, water circulation devices

Water supply-related materials and devices

SEDKWANG MFS Co., LTD.
02-709-1430
skealwill@chol.com
Butterfly/ball valves

GoBee Co., Ltd.
02-585-9190
gobeinfo.info@gmail.com
Multiple-walled earthquake-resistant water pipes

SAMJIN PRECISION CO., LTD
02-872-3600
shinjib@jibco.kr
Valve parts

SHIN AN CAST IRON Co., LTD.
02-743-1890
shinhan1090@daum.net
Ductile cast iron pipe and accessories

SSENG
051-304-3531
pdl@sseng.co, leejy@sseng.co
Pore control filter, container-type water treatment facilities

JAINTECHNOLOGY
02-856-6114
bkkim390@gmail.com
Water flow meter (ultrasonic, portable, solar energy)

PPI PIPE SYSTEM
031-663-6200
hongjipipinet@naver.com
PVC water supply/sewage pipes, standpipe (firefighting)

HITEC EPC CO., LTD
02-3812-2900
yose5712@hitecpipe.com
Water meter, automated water meter, remote automated meter reading system

HANGUK BIG TECHNOLOGY CO., LTD
02-565-4190
kcip@hanmail.net
Leakage detection equipment/system, technological diagnosis

Korea Cast Iron Pipe
02-611-9852
kcp1@hanmail.net
Ductile cast iron pipes, steel pipes for water works

HANSIL PRECISION METER Co., LTD
02-997-1465
hansil@hmeter.com
Water meter, hot water meter, heat meter

HYORIM INDUSTRIES INC.
070-7497-3238
leajin@hyorim.co.kr
Water supply/sewage materials and equipment

Consulting

Design

Erection

Water quality management

Water supply-related materials and devices
Status of SMG ventures into world markets for waterworks

Projects currently promoted

- PMB Island, Brunei
  Provision of consulting for infrastructure development - 2012–2018
- Chanchamayo, Peru
  Improvement of water supply facilities (Phase-2 for La Merced) - 2016–2017
- Cities in Vietnam
  Improvement of water supply facilities - 2016

Completed projects

- Java, Indonesia
  Feasibility study for improvement of a water purification station - May 2014 – Dec. 2015
- Port Moresby, Papua New Guinea
  Feasibility study for improving water supply facilities - July 2014 – Mar. 2015
- Chanchamayo, Peru
  Provision of support for water supply facilities (Phase-1: San Ramon) - 2013–2015

Consulting on water supply-related technology

- Port Moresby, Papua New Guinea
  - 2012 and 2014 (twice)
- Thừa Thiên-Huế Province, Vietnam
  - 2015
- Hải Dương Province, Vietnam
  - 2015

Mohs signed for collaboration

- Metropolitan Waterworks Authority Bangkok, Thailand (May 2012)
- City of Ribeirão Preto, Brazil (June 2012)
- City of Mogi Mirim, Brazil (June 2012)
- City of Picci, Peru (June 2012)
- City of Chanchamayo, Peru (June 2012)
- PNG Waterboard Services, Papua New Guinea (July 2012)
- Java Waterworks, Indonesia (September 2014)
- Thừa Thiên-Huế Province Waterworks, Vietnam (March 2015)
- Junin Province, Peru (April 2015)

Training session for water supply-related policies

- 16 countries in Asia (59 people)
  - Vietnam (14), Indonesia (9), Bangladesh (10), Philippines (4), Nepal (2), Laos (2), Taiwan (3), Brunei (3), Cambodia (2), Singapore (2), Mongolia (2), Myanmar (2), Thailand (1), India (1), Bhutan (1), Sri Lanka (1)
- One country in South America (16 people)
  - Peru (16)
- Two countries in Africa (3 people)
  - Tanzania (2) and Gabon (1)
- One country in Oceania (2 people)
  - Papua New Guinea (2)
The water made by Seoul supplied around the world

Arisu