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Seoul, ready to share with the world!

# Seoul Environment



SEOUL METROPOLITAN  
GOVERNMENT

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Green city Seoul, where people and nature live in harmony, values the future and prioritizes the environment.

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## Environment of Seoul

The city of Seoul has been carrying out various policies to turn Seoul into a world-class environmental city with a healthy, pleasant and sustainable environment. Seoul implements energy policies in order to pass down a healthy and safe city to generations to come. Recycling and enhanced energy efficiency facilitates industries so that Seoul is reborn as a dynamic city. Seoul is making enormous efforts to enhance water and air quality, eliminate noise and malodor, encourage less consumption and expand resource circulation in the city. At the same time, no effort is spared to share outstanding policies and best practices to make Seoul the perfect place to walk, and to create beautiful parks in the city. The city of Seoul is moving forward to a global climate and environmental capital.



Indexes of Seoul's environmental policies in 2015



Fine dust  
**38 $\mu\text{g}/\text{m}^3$**

Jungnangcheon  
BOD  
**6ppm**

Ecological and  
Landscape  
Conservation area  
**1%**

Area of  
planned park  
per person  
**17.81 $\text{m}^2$**

Environmental  
budget compared to  
total budget  
**12.6%**

# Vision

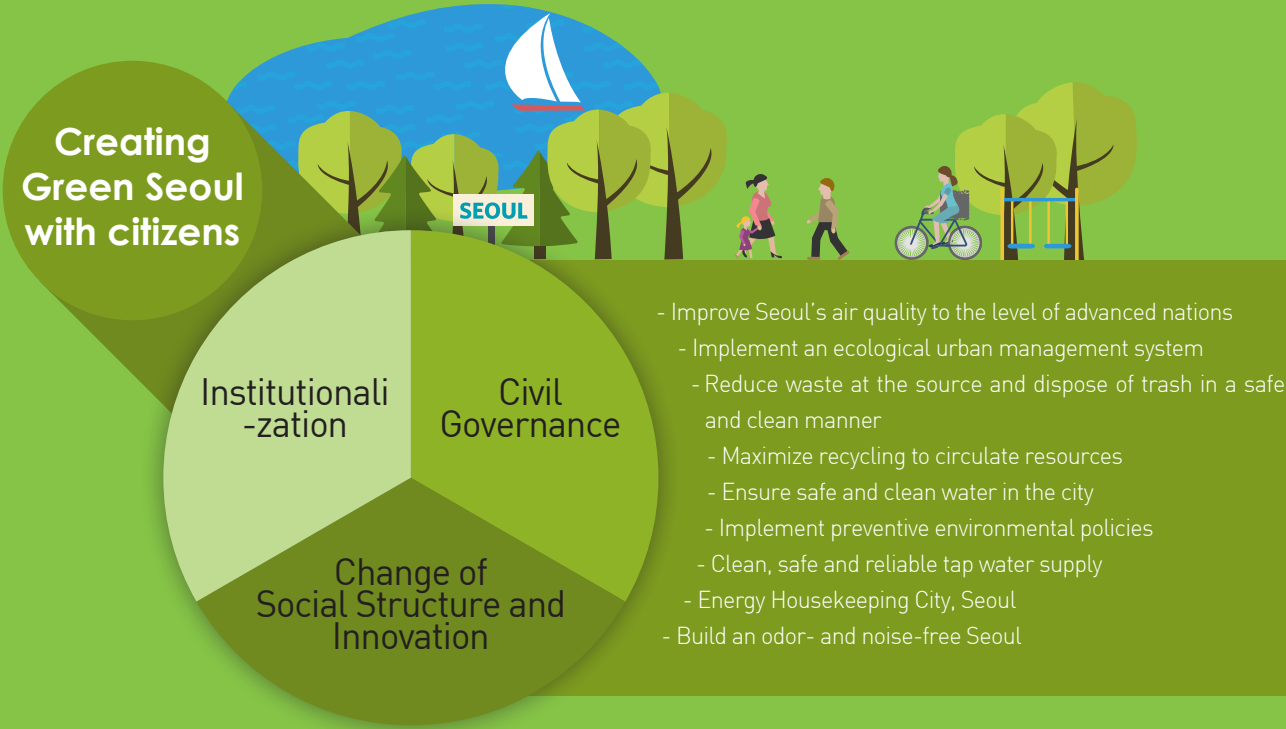
Green Seoul  
where nature and  
humans co-exist

# Strategy

1. Trustworthy Bio-resources
2. Pleasant Living Space
3. Environment Full of Life
4. Conservation and Maintenance of Healthy Land
5. Leading Participation in Conservation Efforts
6. Environmental Administration in Preparation of the Future

# Goal

- Creating a pleasant living space
- Recovering healthy nature
- Cooperating in the conservation of the environment





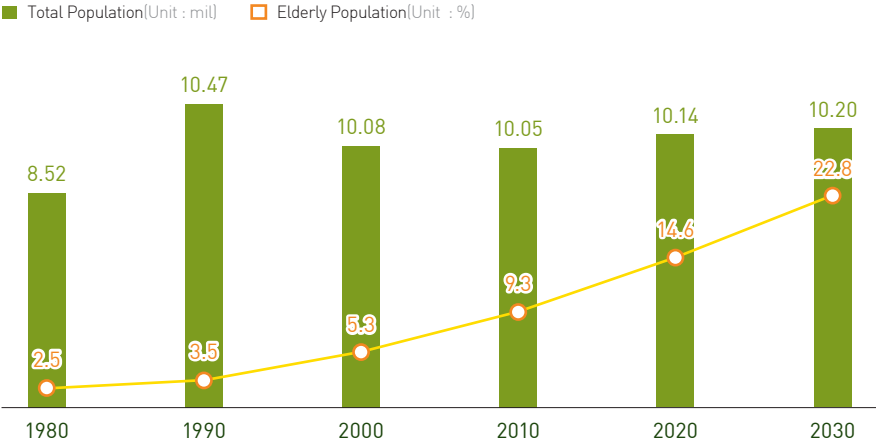
01 Overview of Seoul

Geographical Features

**Location**  
Basin city placed in the middle of the Korean peninsula  
**Size** 605m<sup>2</sup>  
**Major River** The Han River  
**Major Mountains**  
26 Mountains including Mt. Nam, Bukhan, Gwanak, Dobong, Umyeon and Bulam



Population Trend

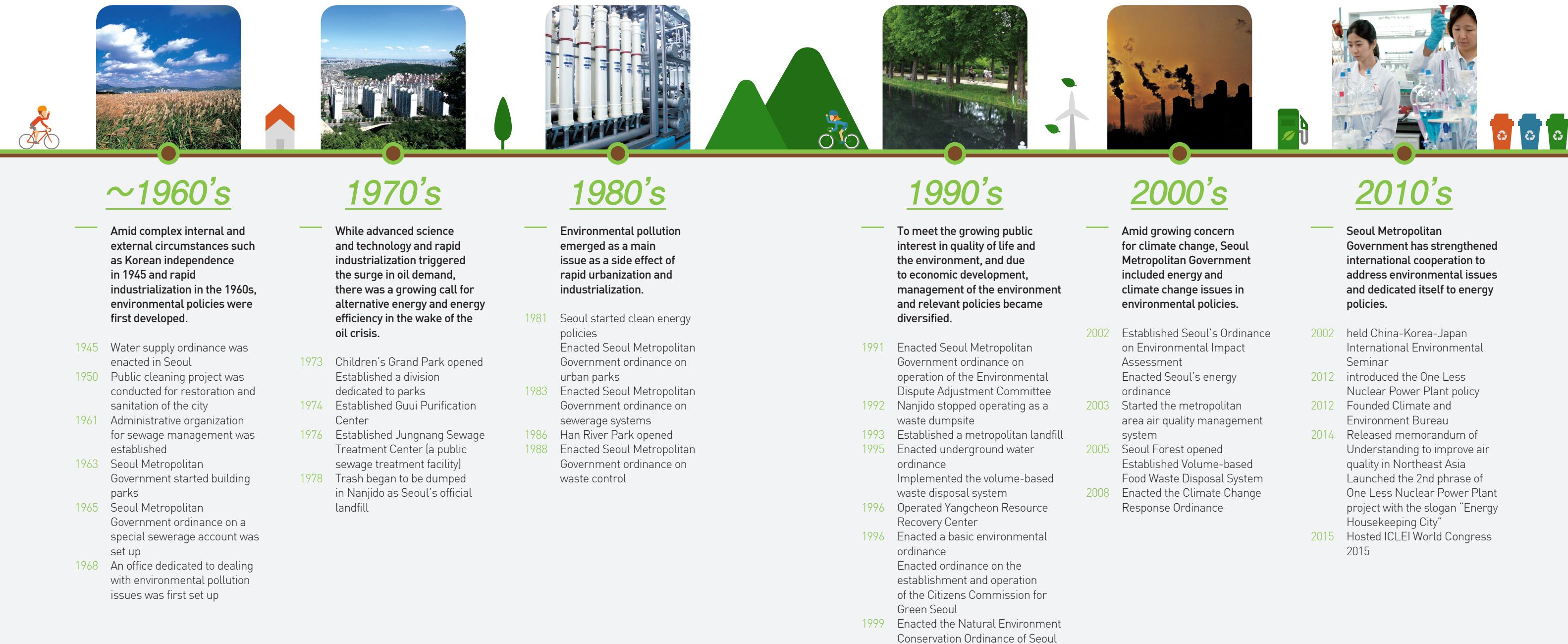


Major Projects and Index

Core Strategy	Projects	Index	
		Item	2015
Trustworthy Bioresources	- Conduct targeted car emissions control - Enact indoor air quality maintenance ordinance	Fine dust (µg/m³)	38 (Tokyo, 40)
	- Build network for tap water supply system - Introduce advanced purification system	Revenue Water Rate(%)	91
	- Secure instream flow - Develop conditions for aquatic plants' habitats	Jungnangcheon BOD (ppm)	6 (based on law, 10)
Pleasant Living Space	- Establish resource recovery base - Clean roads with water and expand cleaning zones	Heat recovery rate	25 (Achieve common use)
	- Introduce underground water advanced purification facilities by phase - Improve pipelines and facilities to reduce rain water outflow	BOD(ppm) BOD of effluent water in Jungnang Sewage Treatment Center	10 (based on improved effluent water)
	- Maintain response system against hazardous chemical materials - Enhance management of livestock wastewater discharging stores	Incidence rate(%)	0
Environment Full of Life	- Manage designated Ecological and Scenery Conservation Area - Link disconnected green belts - Continue developing natural type streams	Ecological and Landscape Conservation area(%)	0.83 (2020, 1% Seoul Plan 2020)
	- Enhance follow-up management of buildings' landscape - Create parks within 5minute distance of residential area - Enhance biodiversity of green zones in parks	Area of planned park per person	16.91 (2020, 17.81% Seoul Plan)
	- Conduct survey on soil pollution and install responsible organization - Purify and then utilize polluted soil - Enhance regulation on impermeable pavement by regions	Impermeable soil area(%)	43
Conservation and Maintenance of Healthy Land	- Conduct continuous development and recovery of abandoned wells - Designate groundwater conservation area - Effectively utilize naturally released underground water	Naturally-released underground water utilization	103 (Utilize all released groundwater from subway stations)
	- Promote green purchase by companies - Implement CCP 5 phase strategies of ICLEI - Operate integrated eco-friendly car program	Green purchase compared to procurement cost(%)	10 (2015, National Environment Plan)
	- Establish mid and long term energy basic plan - Lay foundation for renewable energy adoption and its utilization	Renewable energy/ Primary energy(%)	5.0 (2011, Renewable Energy Basic Plan)
Leading Participation in Conservation Efforts	- Conduct precautionary environmental policies - Secure consistency for Seoul Plan and Environment Plan	Environmental budget compared to total budget(%)	12.6~13.5 (2006~2015)
	- Secure time for project initiation and required materials - Secure and monitor cooperation system - Draw the future of new Seoul	-	-
	-	-	-



## 02 History of Seoul Environment Policies





# Waste Management Policy

To meet the growing demand for a better waste disposal system, the SMG has committed to providing innovative cleaning services and coming up with a waste disposal system which can satisfy sanitation workers and the general public. The SMG is dedicated to managing waste to achieve a 71% recycling rate and 30% reduction in food waste, and to minimize landfill waste by 2020.

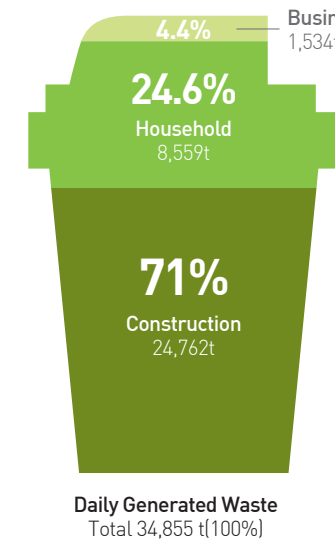


## 01 Principles of Waste Management ‘Minimizing Landfill Waste, Maximizing Recycling’

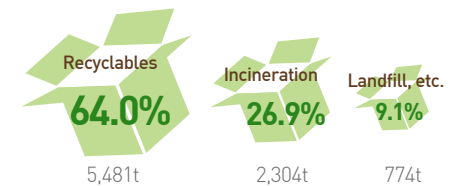
The city government will no longer pass down the full responsibility of waste disposal to its administrative districts; instead it has started encouraging citizens to engage in the task together to reduce waste under the vision of making Seoul the ‘World’s Cleanest and Best Resource-recirculating City’. And the government is working on strengthening financial investment in metropolitan facilities and mediation capability.

### Waste Status of Seoul

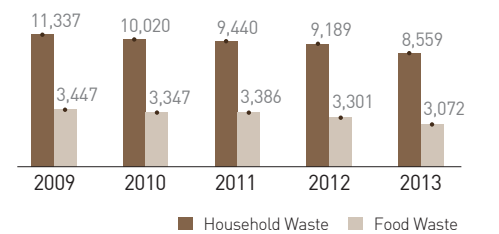
#### Amount of Waste Generated in Seoul (As of 2013)



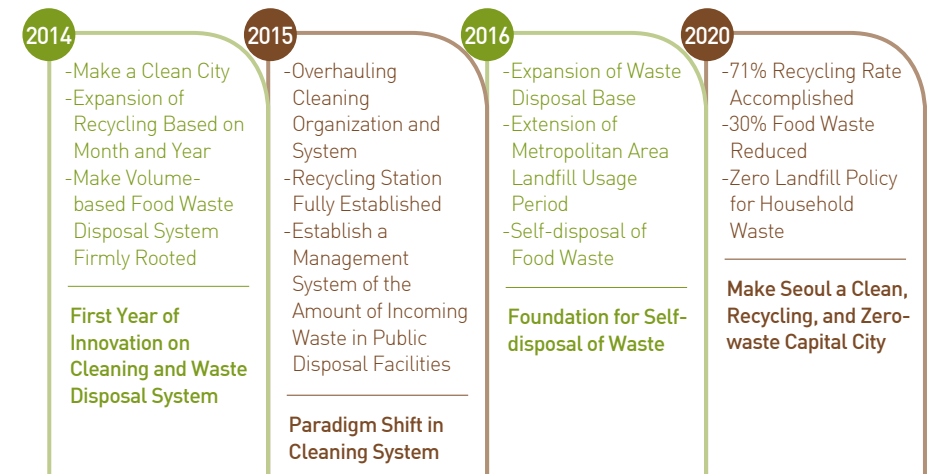
#### Amount of Household Waste Disposed of in Seoul



#### Amount of Household Waste Generated (Unit: t/day)



### Seoul's 4 Goals of Waste Policy





02 Efforts to Reduce Food Waste

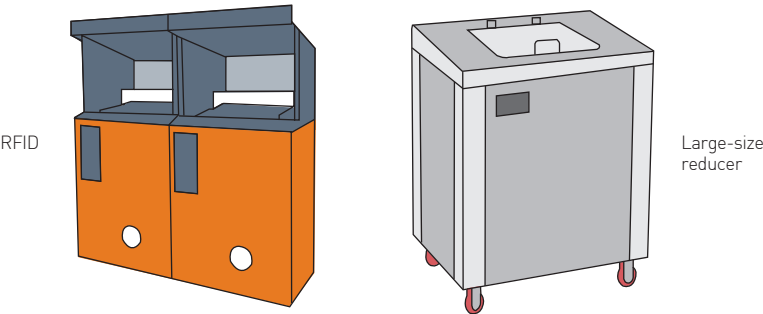
Food Waste Generated on a Daily Basis

Since 2013 the city government has fully established the volume-based food waste disposal system to cut huge cost related to strengthening regulations on food waste disposal and waste disposal. Also, water treatment centers treat food waste water reliably.

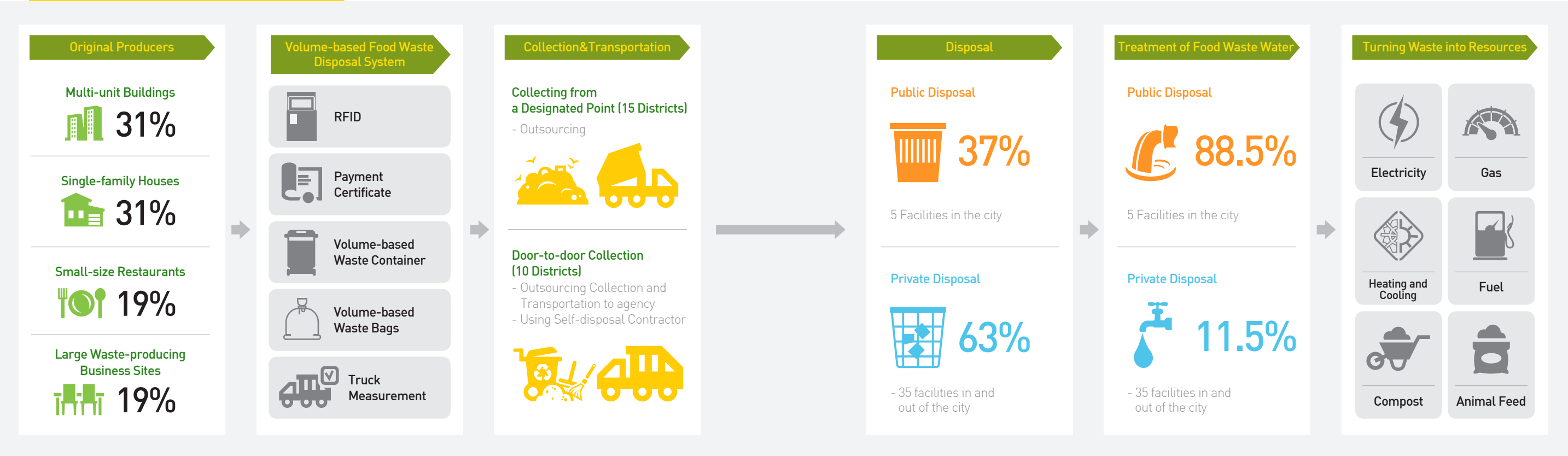
Food Waste Generated on a Daily Basis



There is increasing interest in large-size reducers and RFID volume-based food waste disposal systems which can cut down on waste by 80% and 30% respectively thanks to the full adoption of the volume-based food waste disposal system. Seoul has been working on achieving the goal of applying the RFID system to 70% of multi-unit buildings in the city. The government encourages each district to purchase and install a large-size reducer with proper performance at affordable prices by setting up quality guidelines for the reducer, as the equipment boasts great performance in waste reduction, offsetting its high price tag.



Flow Chart of Food Waste Collection and Disposal

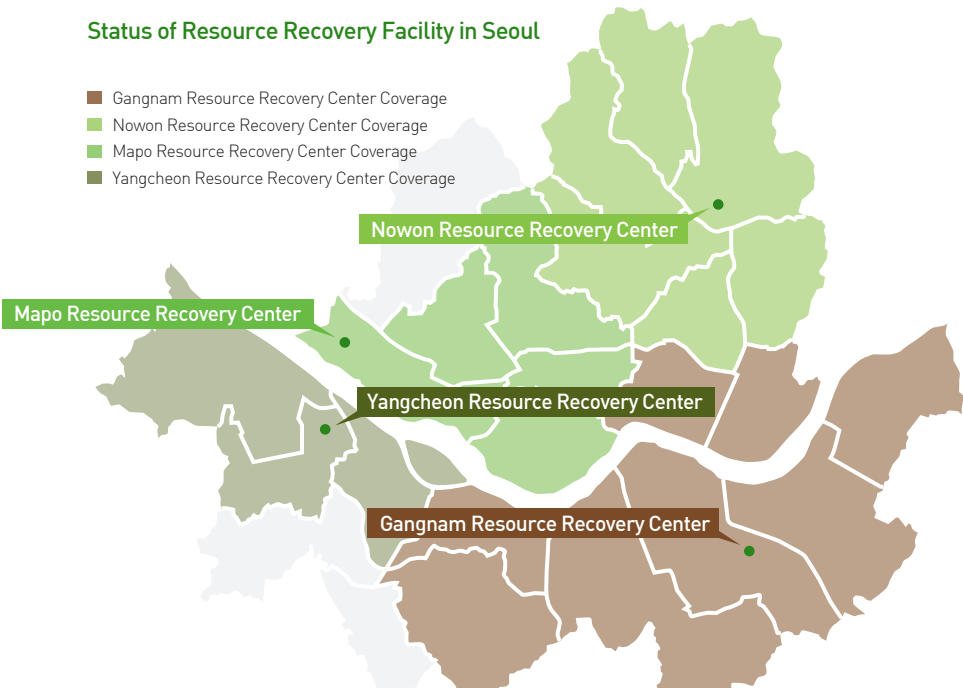


03 *Stable and Clean Operation of Resource Recovery Facility*

As part of efforts to ensure hygiene in household waste disposal, while addressing the problem of insufficient landfills, Seoul opened resource recovery facilities in 1996. Today, 4 facilities can handle as much as 2,850 tons of waste every day. High-temperature waste heat generated in the process of incineration can be leveraged as an energy source to meet the demand of cooling and heating of 518,000 nearby households (as of 2013).

Location and Status of Resource Recovery Facility

Status of Resource Recovery Facility in Seoul

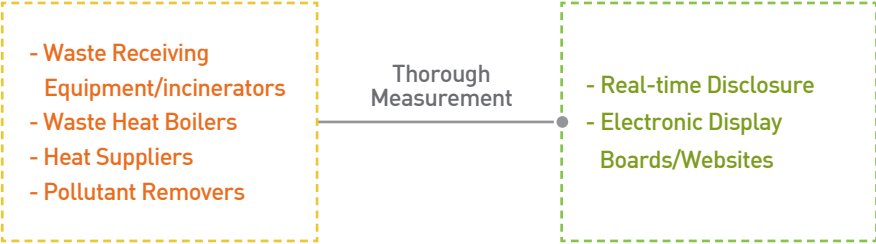


Category	Gangnam	Nowon	Mapo	Yangcheon
Capacity	900 t/day (300 t/day × 3 units)	800 t/day (400 t/day × 2 units)	750 t/day (250 t/day × 3 units)	400 t/day (200 t/day × 2 units)
Completion Date	December 2001	January 1997	May 2005	February 1996
Site Area(m <sup>2</sup> )	63,818	46,307	58,435	14,627
Construction Cost (KRW million)	101,080	74,279	166,547	31,815
Waste Disposed(t)	266,712	195,000	203,925	108,206
Waste Incinerated(t)	266,074	199,254	204,245	106,628
Electricity Generated(kW)	40,189	29,008	35,431,253	12,995,400
Electricity Sold(kW)	Used all electricity generated	Used all electricity generated	12,584,012	4,427,964

\* As of 2013, Yangcheon and Mapo are generating electricity by cogeneration, Nowon and Mapo by solar photovoltaic generation.

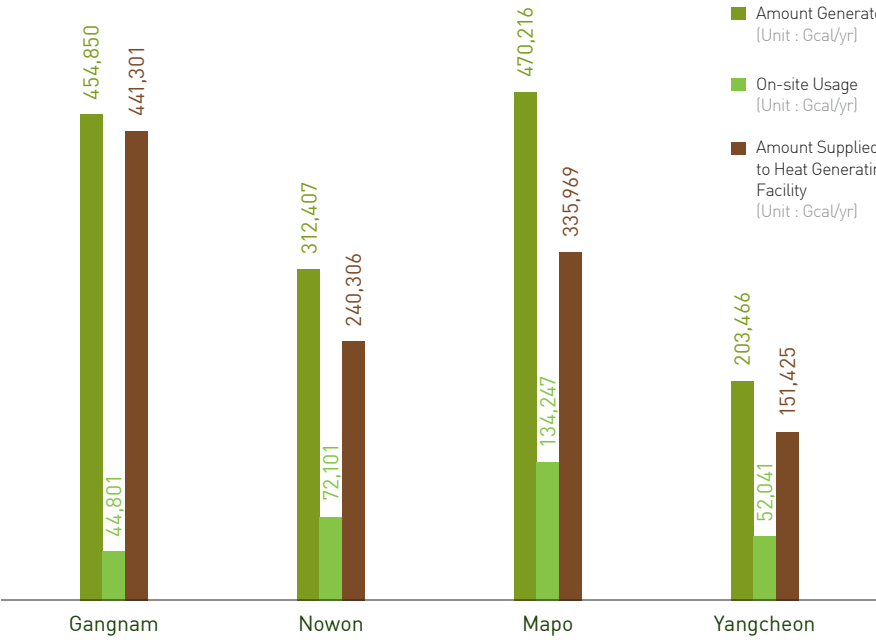
The Resource Recovery Facility has various processes including waste receiving equipment, incinerators, waste heat boilers, heat suppliers and pollutant removers. These facilities perfectly process air pollutants to a concentration level greatly less than the legal standard. Smokestack Tele-monitoring System of the Ministry of Environment monitors emitted pollutants in real time around the clock. Data taken from the facilities are disclosed to local residents on websites in real time.

Disclosure of Facility Information that Strengthens Trust



Usage of Waste Heat by Facility in 2014

The Facility transfers steam generated in the waste heat boiler in the process of incineration to a cogeneration power plant to run the steam turbine to produce electricity. After the electricity is used within the plant, the remainder is transacted at the Power Exchange.



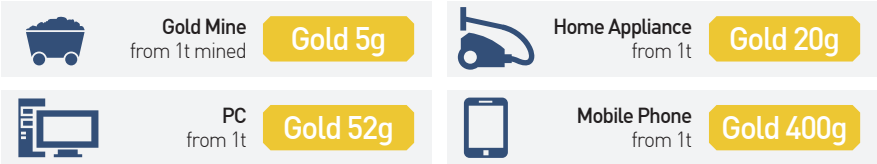
Four Resource Recovery Centers have contributed to reducing the amount of landfills in Seoul. Their operation rate, however, had remained low because of refusal of local residents in the early days. To relieve the anti-sentiment, the government has held consultations with local residents approximately 600 times since 2001, contributing to reaching agreement to operate the facilities smoothly. The city will remain committed to maintaining public confidence with transparent disclosure of information, and an open administration.



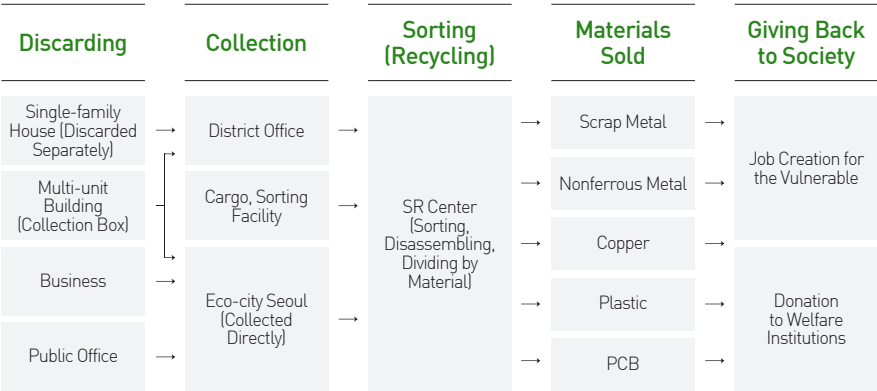
04 *Seoul Resource Center at the forefront of Urban Mining Project*

Seoul has been pushing ahead with the Urban Mining Project which has contributed to recycling resources such as discarded electronics (small-sized electronics, office devices and cell phones), and environmental preservation. The project has created jobs for the vulnerable. To that end, since 2009 the government has operated the Seoul Resource Center to extract rare materials from disposed home appliances and cell phones, and utilize them as resources.

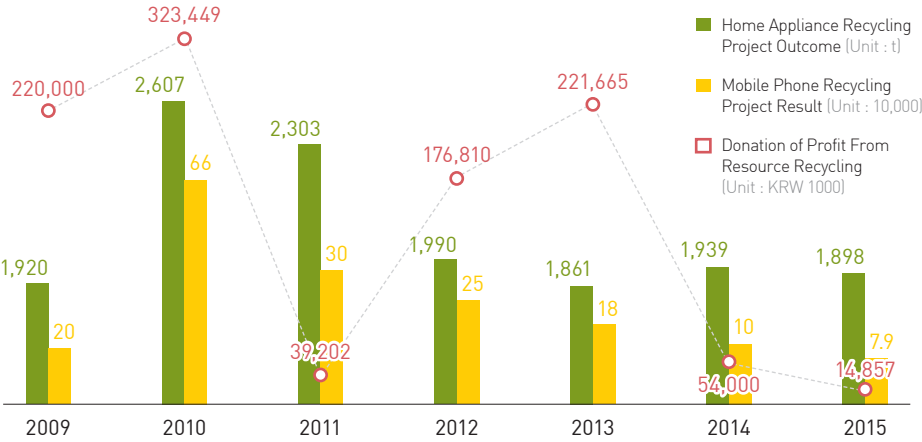
High Efficiency of Urban Mining



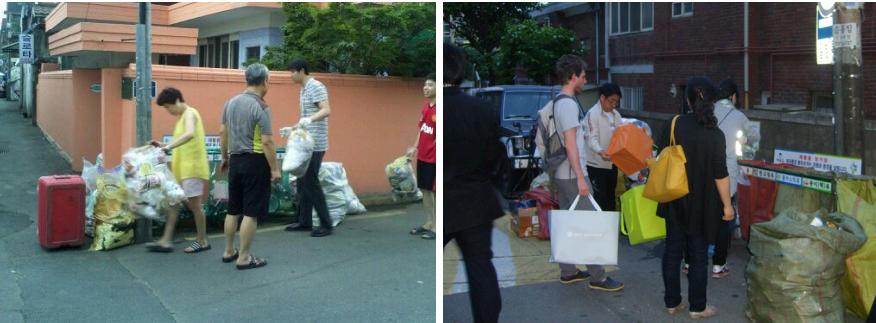
Flow Chart of Small-size Home Appliances Collection and Disposal



Outcome of SR Center

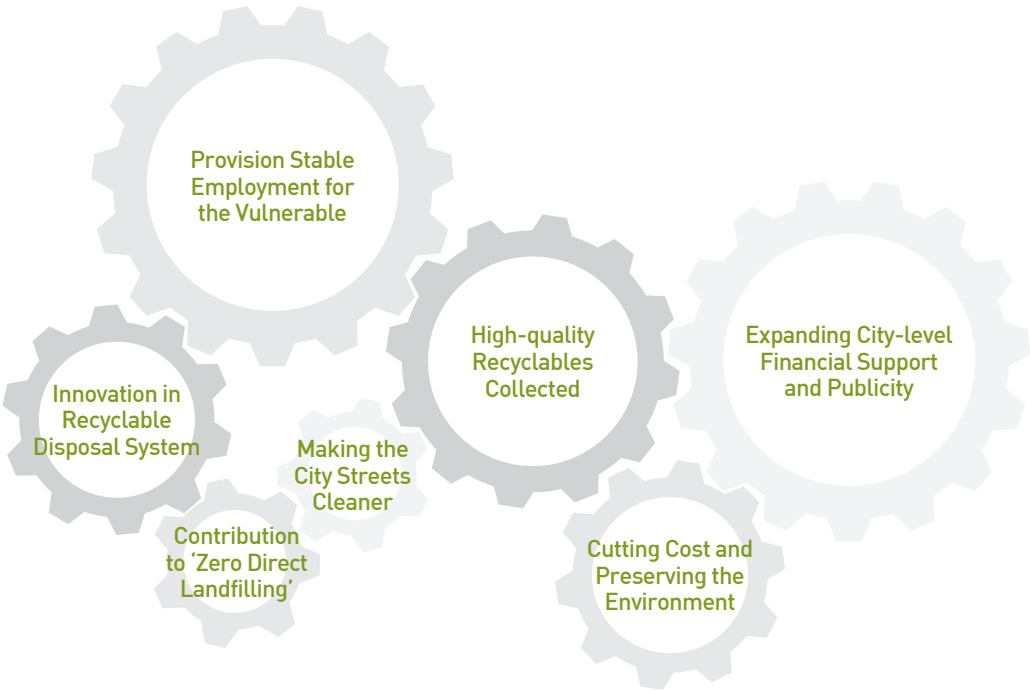


05 *Future-Oriented Recycling Station Project*



While the separate waste disposal system worked well in apartment complexes or multi-unit buildings, it did not quite work in single-family houses, small-size multi-family houses, or small commercial properties. Recyclables lost their value, and the cost for collecting and sorting recyclable materials was raised. Given the fact, the city government has applied the system under the name of the Recycling Station policy, which disposes of and collects recyclables separately at designated points for single-family houses, small-size multi-family houses and small commercial properties. As a result, more recyclables were collected and jobs were added for the vulnerable. Furthermore, the station contributed to creating a more beautiful Seoul by making streets cleaner.

Changes the Recycling Station System Brought to Seoul





# Air Quality Improvement Policy

Seoul continues to make an all-out effort to enhance air quality through various policies to achieve the 20% reduction target of ultrafine particle concentration by 2018. To this end, the government set up detailed strategies encompassing transportation, industries and non-industries and the living environment sector. Also, Seoul forged the Northeast Asia Cooperative Network to reduce pollutants. Policies to reduce fine dust which have been implemented since 2002 resulted in successful outcomes. Recently, the government has focused on reducing ultrafine particles to improve air quality.

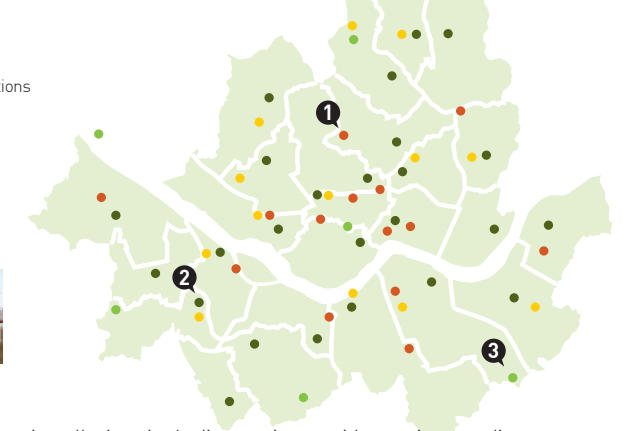


## 01 Real-Time Air Quality Monitoring System Early Forecast and Preventive Measure

Seoul prioritizes measuring, revealing and forecasting air quality around the clock to protect citizens' health. To that end, a real-time air quality monitoring system has been adopted to identify air pollution such as ultrafine particles, fine dust, ozone and yellow dust efficiently. Air Quality Monitoring Stations composed of City Air Quality Monitoring System, Roadside Air Quality Monitoring System and Background Monitoring System offers measures to improve air quality and satisfy citizens' right to know. Moreover, the stations are used to issue forecasts and warnings on fine dust, ultrafine particles and ozone.

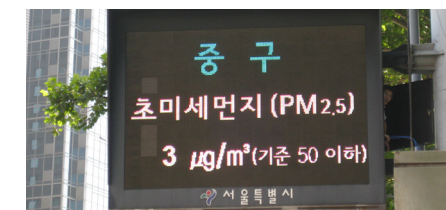
### Location of Air Quality Monitoring Stations and Display Boards

- 25 City Air Quality Monitoring Stations
- 14 Roadside Air Quality Monitoring Stations
- 6 Background Monitoring & High Altitude Monitoring Stations
- 13 Billboards Displaying Atmospheric Environment Related Information

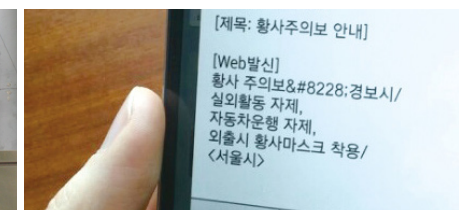


### Issuance of Fine Dust and Ultrafine Particles Forecast and Warning

To protect citizens vulnerable to air pollution, including patients with respiratory diseases, children and the elderly, Seoul Metropolitan Government issues four warnings a day on fine dust and ultrafine particles (twice for the forecast of the day, twice for the forecast of the next day) on the website (<http://cleanair.seoul.go.kr>) dedicated to air quality and environment information. When the warnings are issued, an action plan according to the forecast level is available via the website, text message, fax, Twitter, electronic display boards which show the status of air pollution, bulletin boards on major expressways and in the downtown area, and screens installed at subway stations and bus stops.



Disclosure of Air Pollutant Level on an Hourly Basis



Yellow Dust Warning Service

### Ozone Forecast and Warning System

The ozone warning system was first initiated by the Seoul Metropolitan Government in 1995. Seoul carries out the Ozone Forecast System from 15th of April to 15th of October annually. Depending on the ozone concentration in the atmosphere, the government issues an ozone warning and advises the general public on what to do.



02 Green Transport Policy  
A Preventive Measure for Air Pollution

Given the fact that 52% of ultrafine dust is generated by transport, Seoul has implemented the Green Transport policy to prevent the emission of pollutants. Seoul set specific targets of a 30% reduction of traffic volume of passenger cars, 40% adoption of green cars, deployment of 1,000 electric car fast-chargers, and emissions control on in-use vehicles. These policies have greatly contributed to air quality improvement.

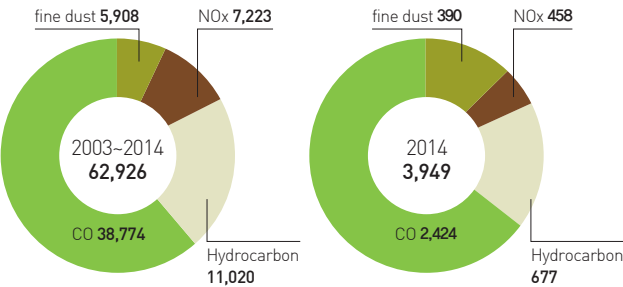
Main Tasks of Green Transport

- Vehicle Management**  
Introducing and promoting electric taxis, Promoting the use of Electric/CNG/Hybrid buses and the transfer of passenger cars and trucks to electric vehicles, Implementing measures to reduce emissions from diesel cars, and to reduce NOx from in-use vehicles and to reduce emissions from construction equipment, Managing low-polluting vehicles previously not regulated
- Redesigning LEZs**  
Introducing 'Clean Air Zones' near Namsan and redesigning LEZs, Establishing a comprehensive management system and revising LEZs
- Demand Management**  
Improving the current "Self Car Free Day" and introducing a passenger car mileage system, Advising citizens to refrain from buying passenger cars and promoting the use of public transportation
- Institution Improvement**  
Strengthening management of vehicle emissions from manufactured cars, Managing emissions from vehicles in use, Promoting the use of eco-friendly vehicles, Managing emissions from construction equipment, Strengthening regional management capability

In-use Diesel Vehicle Emissions Reduction Project

Since 2003, Seoul has carried out projects to attach emission control devices on dirty diesel vehicles, modify LPG engines and encourage early car scrapping so that 300,000 diesel vehicles can cut their emissions. As a result, fine dust concentration levels have gradually declined. Particularly, the NOx reduction pilot project such as the engine replacement project for construction equipment has delivered a 60% reduction in NOx from 2013 to 2014.

Air Pollutant Reduction by In-use Diesel Vehicle Emissions Reduction Project



NOx Reduction Pilot Project (Unit : %)

Measures	Emissions		
	CO Reduction	NOx Reduction	HC (PM) Reduction
PM-NOx Duel Reduction Device	-	70	(80)
Three-way Catalyst Replacement	70	70	60
Engine Replacement of Construction Equipment	25	45	40(60)

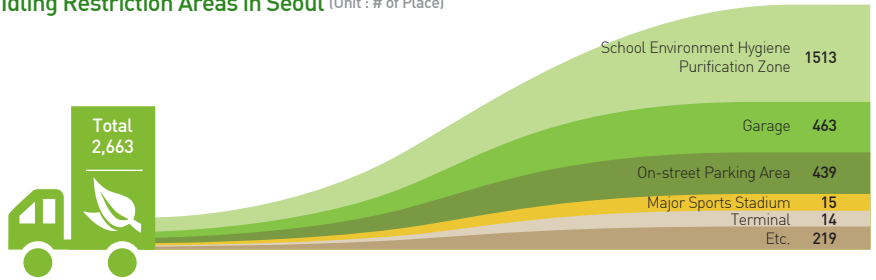
Natural Gas Vehicle (NGV)

Natural gas vehicles (NGV) run on natural gas which has abundant reserves. Compared to diesel-powered vehicles, NGVs emit 64% less air pollutants such as NOx. Seoul provided subsidies to replace large-size diesel vehicles (intra-city buses, local shuttle buses, garbage vehicles) with CNG vehicles. As a result, 100% of intra-city buses (7,522 units) were replaced with CNG buses. The number of CNG local shuttle buses and garbage vehicles reaches 1,119 and 525 respectively. The government offers subsidies and grants to deploy CNG hybrid vehicles and garbage vehicles which get 34.5% better mileage and emit 30% less air pollutants than CNG buses.

Emissions Control on In-use Vehicles

Seoul has emission regulation standards on in-use vehicles depending on fuel and car types. For gasoline or gas-powered vehicles, carbon monoxide, hydrocarbon and excess air ratio are subject to regulation, whereas in diesel-powered vehicles, exhaust is regulated. The city introduced an emissions inspection system to identify vehicles which emit excessive exhaust fumes, and to encourage car owners to install relevant emission control devices. To reduce unnecessary idling which aggravates air pollution, the entire Seoul area is designated as a Vehicle-Idling Restriction Zone, including 2,663 school zones.

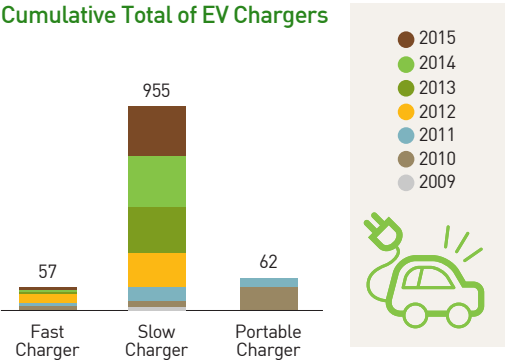
Idling Restriction Areas in Seoul (Unit : # of Place)



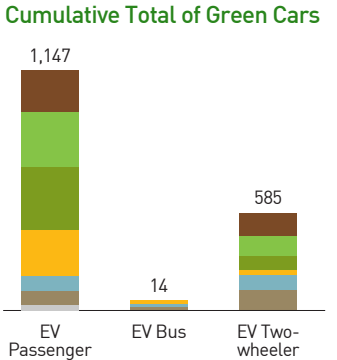
Electric Vehicle (EV) and Infrastructure

The Seoul Metropolitan Government has been at the forefront of deploying green cars since 2009, while working hard to bring people one step closer to the era of EVs. The government has been leading the way to develop relevant technology and electric buses, and operate them. Furthermore, the city has deployed electric two-wheeled vehicles and expanded charging infrastructures to promote the use of EVs. These efforts have been highly recognized by the international community. In 2012, World Electric Vehicle Association awarded Seoul the EV Exemplary City Award.

Cumulative Total of EV Chargers



Cumulative Total of Green Cars



03 *Total Pollutant Load Management System  
Moving Away from Follow-up Measures to  
Preventive Measures*

As the Special Act on the Improvement of Air and Environment for Seoul Metropolitan Area was enacted in 2003, a previous system which only regulated each pollutants concentration regardless of the total amount of emission was abolished. Under the Special Act, an emissions cap is allocated. If business sites surpass the cap, a fine is imposed or a smaller amount of emissions are allocated in the following year. NOx and SOx will be regulated under the new system, the scope of which has been gradually expanded.

Role of Each Stakeholder

Seoul Metropolitan Governmenta

- Authorizing permits, allocating total allowable emissions
- Ordering mandatory installation of measuring devices

Metropolitan Air Quality Management Office

- Management of the Total Pollutant Load and determination of the permissible emissions
- Management of the ETS

Korea Environment Corporation

- Management of a center to control emissions (Remote Monitoring)
- Verification and confirmation of emissions of each business operator

Improvements on the Total Pollutant Load Management System

Expansion of Target Business Sites

Type 1~2 Business Sites + Type 3 Business Sites over 4 tons

Strengthened regulation on Best Available Control Technology (BACT) to reduce total allowable emissions

- Gradually reduced total allowable emissions, taking into consideration advanced technology and development trends
- Between 2018 and 2022 the BACT standard will be 50% stricter than the current standard
- Introduction of a systematic method to manage emissions

Gradual transfer to emission allowances at a cost

- Business operators will be required to install the most optimized reduction facilities. After allocating a certain amount of emission allowances for free, additional allowances will be provided at a cost.
- Up until now, new businesses had to buy allowances, whereas existing businesses were given allowances for free. The current system will be revised to fix unfair practices. In addition, business operators will be encouraged to install the best emission reduction facility that is available.

04 *Northeast Asia Cooperative Network to Improve  
Air Quality Seoul-led International Cooperation*

As the pollutants react, dissipate, and travel long distances regardless of borders, no country or city in Northeast Asia is immune to such pollutants. That's why particular cities alone can't resolve air pollution. Under this belief, Seoul takes the lead to make concerted efforts with regional countries and cities to enhance air quality in Northeast Asia.

International Forum on Improving Air Quality in Northeast Asia

Since 2010, Seoul has held an annual international seminar where environmental experts and public officials from Korea, China and Japan discuss ways to improve air quality in Northeast Asia.

Date	Participating Cities	Major Content
2010. 8. 26	Seoul, Beijing, Tianjin, Shandong, Fukuoka	- Shared measures to improve air quality
2011. 9. 29	Seoul, Incheon, Beijing, Inner Mongolia, Shanghai, Hokkaido	- Participating cities shared the awareness that cooperation to improve air quality is necessary. - Participating cities declared a joint announcement
2013. 10. 17	Seoul, Beijing, Tianjin, Kyoto, Kitakyushu, Ulaanbaatar	- Participating members agreed that a cooperative network among Northeast Asian cities was necessary. - Introduced Seoul's policies and displayed various products to improve air quality
2014. 9. 24	Seoul, Gyeonggi province, Incheon, Beijing, Shandong, Hong Kong, Shanghai, Sichuan province, Chengdu, Zhejiang province, Tokyo, Kitakyushu, Ulaanbaatar	- Held a forum with experts - Representatives from 13 cities announced memorandum of Understanding
2015. 11.4	Seoul, Beijing	- Shared policies to enhance air quality - Discussed cooperative measures with Beijing Environmental Protection Bureau

Signing Memorandum of Understanding to Enhance Collaboration in Improving Air Quality



Seoul signed the first Memorandum of Understanding to improve air quality with 13 participating cities in the 2014 seminar. The MOU stipulates concrete reduction targets, efforts to achieve the goal and ways to cooperate with participating cities, going beyond commitment to cooperation.

- Seoul** Promote the use of eco-friendly cars and boilers, and implement reduction projects based on the priorities of polluting sources to reduce PM-2.5 by 20% by 2018
- Gyeonggi** Province Reduce PM-10 by 40 $\mu$ g/m3 and NOx by 20ppb by 2014
- Incheon** Reduce pollutant emission concentration by 15% by focusing on intensive management of large-scale business operators
- Beijing** Implement Clear Air Action Plan from 2013 to 2017 in order to reduce PM-2.5 by 25% by 2017
- Sichuan** province Strengthen cooperation with stakeholders to reduce pollutant emissions
- Shandong** province Reduce PM-2.5 by 50% by 2020
- Hong Kong** Reduce NOx by 20%, VOC by 15%, PM-10 by 15% by 2020
- Shanghai** Reduce 20% of PM-2.5 by 2017 compared to 2012 levels
- Chengdu** Strengthen cooperation with stakeholders to reduce pollutant emissions
- Zhejiang** Province Implement an action plan in 6 sectors to reduce PM-2.5 by 20% by 2018
- Tokyo** Reduce annual PM-2.5 to 15 $\mu$ g/m3 and daily PM-2.5 to 35 $\mu$ g/m3 by 2024 at all monitoring stations
- Kitakyushu** Cooperate with cities overseas to improve air quality
- Ulaanbaatar** Reduce PM-2.5 by 10% by 2018



# Energy Policy

Seoul declared the One Less Nuclear Power Plant Project in order to improve energy self-sufficiency, as the city consumes much energy but has lower energy self-sufficiency. The city government successfully reached its target of reducing 2 million TOE, equivalent to the production capacity of 1 nuclear power plant, by June 2014 through producing renewable energy, boosting efficiency and cutting down consumption. Based on this success, the SMG has collected various ideas from experts and citizens and is launching Phase 2 of the project, under the slogan of "Energy Housekeeping City", to achieve 20% of power self-sufficiency and to cut 10 million tons of greenhouse gas emissions by 2020. Seoul will be reborn as an international environmental city to create a virtuous cycle in energy.



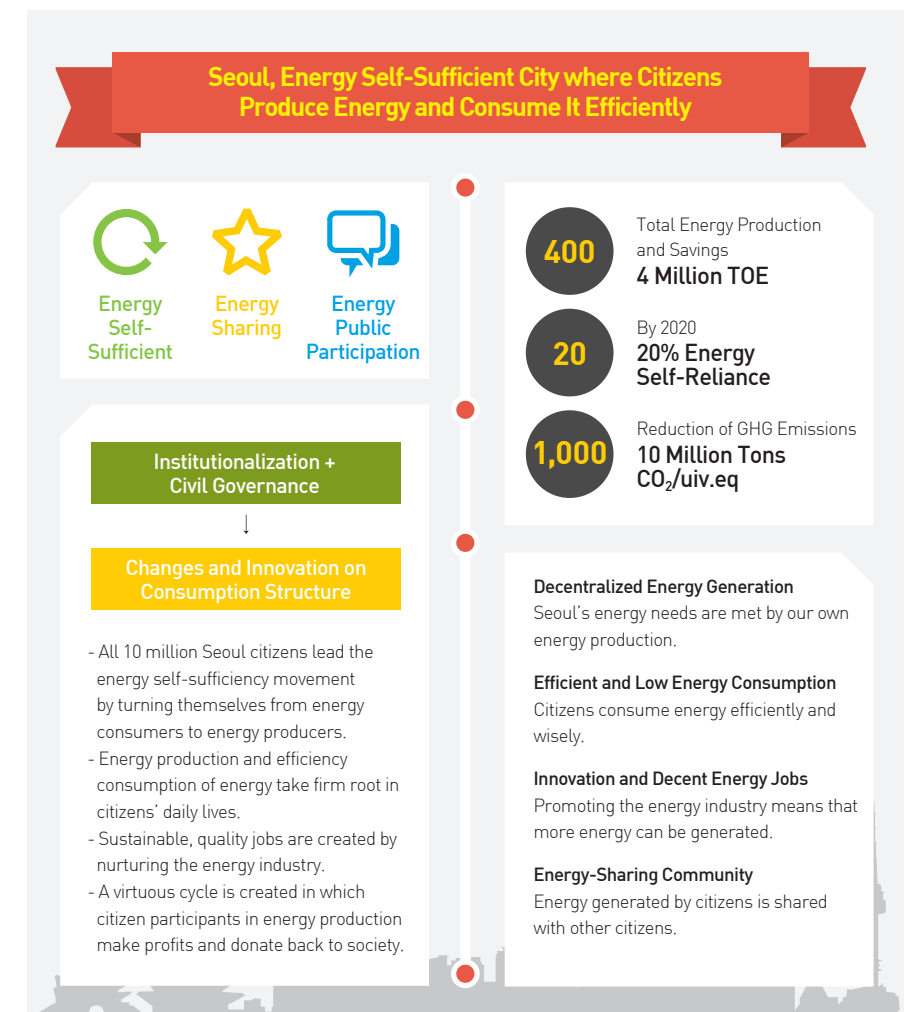
## 01 *The One Less Nuclear Power Plant Project Project to Encourage Public Participation*

### Introduction of the One Less Nuclear Power Plant Project

Seoul's power consumption accounts for approximately 10% of the national total, yet its power self-sufficiency rate was a meager 4.7% in 2014. It is expected to see energy demand rise because of increasing quality of life. Seoul decided to enhance self-sufficiency in response to climate change and a potential energy crisis. Thus, the government is carrying out the 2nd phrase of One Less Nuclear Power Plant project with the slogan of "Energy Housekeeping City".

### Energy Housekeeping City, Seoul

Civil engagement is essential to the energy policy. Seoul always listens to citizens and works with citizens.





02 *Building Retrofit Project (BRP)*  
*Delivering Both Environmental Protection*  
*and Economic Benefits*

Buildings account for 56% of energy consumption in Seoul. Hence, it's essential to implement BRP to reduce energy consumption. Since the development of the BRP in 2008, the Seoul Metropolitan Government has provided low-interest loans to citizens. Public organizations have engaged in the project in a preemptive manner, enabling greater citizen involvement. As a result, social welfare facilities cut energy use by 16%, and received good responses from citizens. In 2013, Seoul received its Climate Action Leadership Award from the World Green Building Council as the city's effort was highly praised by the international community.

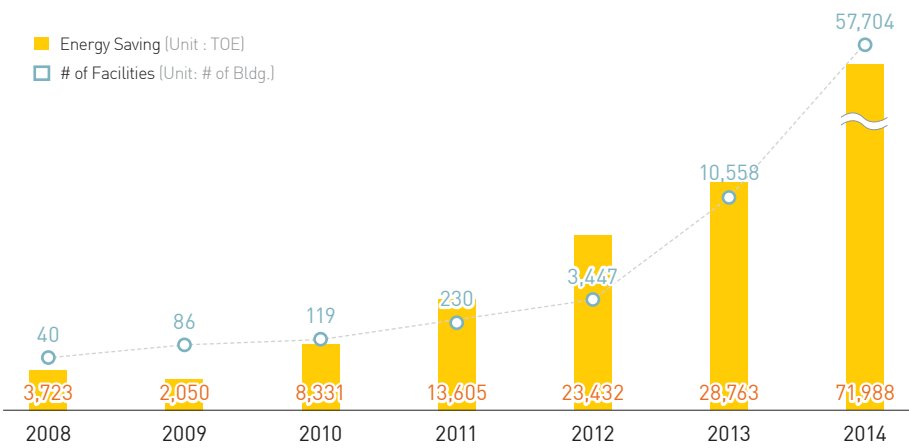
What is BRP?

Seoul's Building Retrofit Program (BRP) aims to save energy and boost efficiency in buildings by installing new energy saving equipment or improving existing ones. The money saved from these retrofits, in turn, is invested in citizen welfare programs. The city government raised climate change funds to offer low interest rate loans to cover initial investment, aiming at enabling greater civil engagement.

Financial Support  
for BRP

Category	Houses (including multi-unit buildings and single-family houses)	Collective Buildings (including large-size buildings and small and medium-size buildings)
Ceiling for Loan	100% within the project budget	
	Min. 2 Million/ Max. 10 Million won	Min. 5 Million/ Max. 2 Billion won
Interest Rate	Yearly 1.7%	
Conditions	Project : Installation of energy-saving facilities Loan : 8-year loans Duplicated support is available for multi-family houses Collective buildings such as universities can receive 2 times greater maximum support if deliberations are passed	

BRP  
Implementation  
by Year



03 *Sunlight City Project*  
*Entire Seoul Powered by Sunlight*

Seoul installs solar PV generators all over the city through cooperation with the private sector and civil society, aiming to expand deployment of renewables and raise energy self-sufficiency. As of September 2015, the city government built PV facilities with a total capacity of 101MW at unused sites of 10,069 public facilities, schools, houses and the rooftops of commercial buildings. Many local governments have benchmarked the project, making the project a nationwide one.



PV system on the roof top of Seoul City Hall

PV  
Facilities

Total Capacity	Public Facilities	Private Facilities	Schools	Houses (mini solar PV generator)
101.2MW (100%)	41.4MW (41%)	32.1MW (32%)	12.1MW (12%)	15.6MW (15%)

Multifaceted  
Efforts to Make  
Seoul an Energy  
Housekeeping  
City

**Seoul's Own Feed-in-Tariff Program**  
PV plants with 100kW or less capacity are entitled to the support of KRW 100 per kWh for five years.

**Low Interest Rates for PV Plant Operators and Expansion of Permits to PV Operators**  
- Loans up to KRW 150 million, within 80% of the installation charges can be taken out at an annual interest rate of 1.75%  
- Streamlined process to receive a permit

**Seoul Solar Map**  
Seoul offers information on the website (<http://solarmap.seoul.go.kr>) to let citizens know whether PV power plants can be installed.

**Building Energy-Independent Community**

**Support to the PV Workers Cooperative**  
- As of 2015, 19PV cooperatives are have been set up.  
- The city plans to provide 20 public spaces annually for cooperatives.

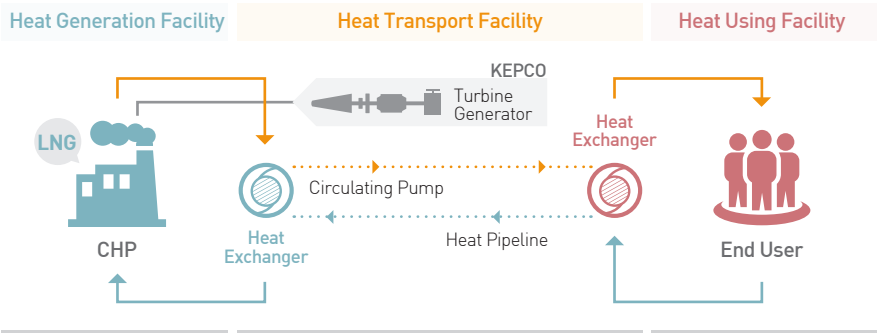
**Spreading Seoul's Experiences and Sharing Expertise**

04 District Energy  
Economical and Effective Energy Supply

What is District Energy?

District energy is a system of distributing heat generated in a centralized location, such as CHP (combined heat & power plant), resource recovery facility or renewable energy facility, for heating and hot water supply in residential and commercial buildings instead of installing separate facilities in each building. Because the heat is generated in an economical way, the district energy system can provide higher efficiency and price competitiveness to users than the system that uses localized boilers.

Schematic Diagram of District Heating



district energy use as heat sources in various examples

- Adoption of District Heating**  
First introduced in 1987 / 35% Adoption in Multi-Family Houses as of 2014 / Plant to Increase Adoption to 45% by 2020
- Waste Heat from Power Plants and Incineration as Heat Sources**  
Nowon and Gangseo districts in Seoul can get its district heating from 60,000 Gcal of heat recovered from incinerators in resource reuse centers in Uijeongbu and 470,000 Gcal surplus heat from a cogeneration plant in Bucheon.
- Installing cogeneration plants at sewage treatment facilities**  
Building cogeneration plants at Seonam Water Reuse Center and Nanji Water Reuse Center to leverage biogas
- Recovering Heat from Treated Sewage Effluent (TSE) for District Heating**  
Capturing waste heat energy from effluents which remain above 10°C even in the winter at Tancheon and Seonam Water Reuse Center as resources
- Recovering Heat from Neighboring Areas**  
To diversify the energy sources for district heating, waste heat from thermal power plants in the metropolitan area will be provided through the pipeline network in the metropolitan area. Seoul will also utilize waste heat from fuel cell generators located at Seonam Water Reuse Center and from subway depots in Seoul. Seoul plans to get waste heat from exhaust fumes from factories.

05 Eco-Friendly, High-Efficient LED Lamp  
Maximizing Energy Savings

LED, or light-emitting diode, a semiconductor light source, is a highly efficient lamp which can cut up to 80% of power consumption compared to other types of lamps. Seoul has replaced 146,000 traffic lights with LED lamps from 2007 to 2009. Meanwhile, Seoul announced the Basic Plan for LED Replacement in 2010 with the aim to replace all lighting in public organizations with LED by 2020, and to replace 80% of lamps in the private sector by 2030. To achieve the target in the public sector in advance, an action plan on LED replacements in the public sector was set up (100% replacement by 2018). Seoul established an organization dedicated to the project to accomplish the target.

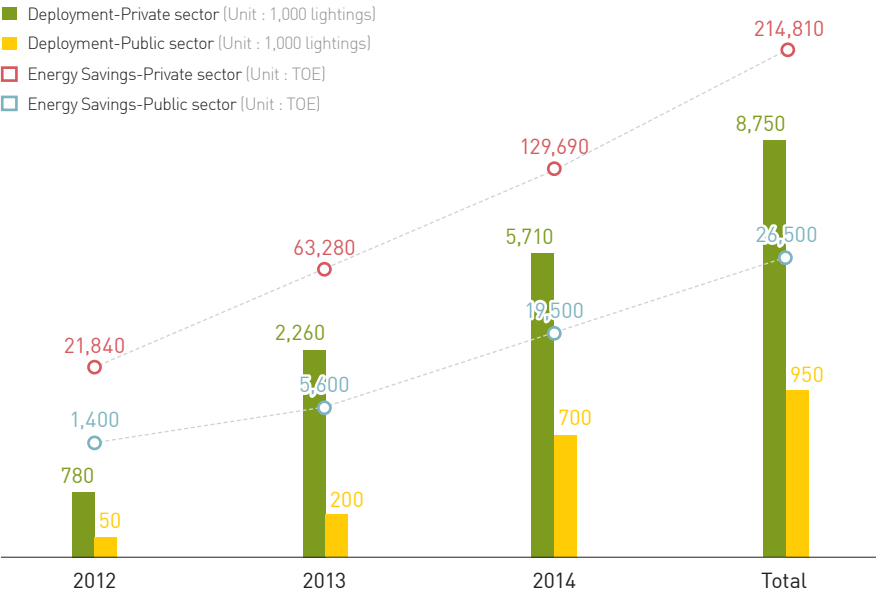
Energy Savings Effects from LED Replacement

**9.7 million LED Provided by 2014**  
The energy saved is equivalent to power 310,000 households for a year.

**More than 90% of Subway Stations Lighting Replaced with LED Lamps**  
45% of energy consumption of lightings saved

**All Traffic Lights in Seoul Replaced with LED Lamps**  
The energy saved is the same as 40,000kWh/year of annual reduction of power, which is equivalent to power 130,000 households for a month.

LED Deployment by Year & Energy Savings





# Water Management Policy

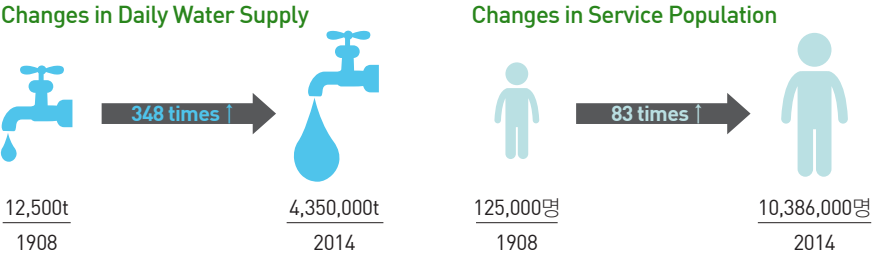
Seoul has made all-out efforts to supply clean tap water and treat sewage in an eco-friendly way in order to create a city where humans, water resources and nature can coexist. 'Arisu' is the brand name of Seoul's tap water supplied to 10 million Seoul citizens. Arisu is the essence of Seoul's water supply policy which has been improved over the last 10 decades, boasting world-class water quality. Approximately 50 million tons of daily sewage, excreta and food waste water generated by Seoul citizens are reclaimed and released safely at 4 sewage treatment facilities operated by the SMG. Seoul will remain committed to carrying out more stringent and sophisticated water management policies to enable citizens to enjoy safe and secure water.



## 01 World-Class Quality of Tap Water Safe and Tasty Tap Water

The Han River, which runs across Seoul, is the source water for 18 million citizens in metropolitan areas including Seoul. The quantity of water intake per day is 7.99 million tons. The SMG has conducted joint projects with neighboring cities and provinces, such as a water quality improvement project, the Han River Watch Group and the Han River source water management fund. The city differentiates its tap water by naming it Arisu. Arisu won the United Nations Public Service Awards in 2009, Global Water Industry Innovation Award in 2010 and International Business Awards in 2010, and acquired NSF certification for its quality and reputation.

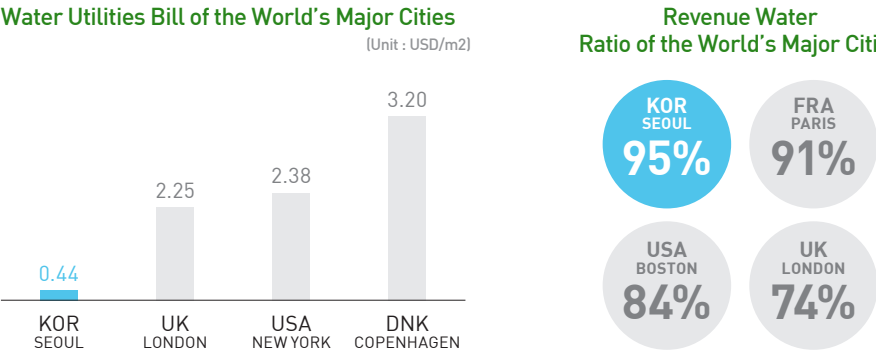
### Daily Water Supply



### Policies for Best Water Production

	Around-the-clock Water Quality Monitoring	Guideline for Healthy and Tasty Water
	Quality Testing on 164 Substances	Advanced Purification System
	Membrane Filtering Purification System	Chlorine Re-dispersion Facility
	Large Reservoirs Ensuring Emergency Water Supply and Reliable Water Supply Free of Outage	
	95.1% Revenue Water Ratio (RWR)	Water Supply Geographic Information System

### The Cheapest and Best Arisu











02 Sewage Treatment Center  
Clean Sewage Treatment

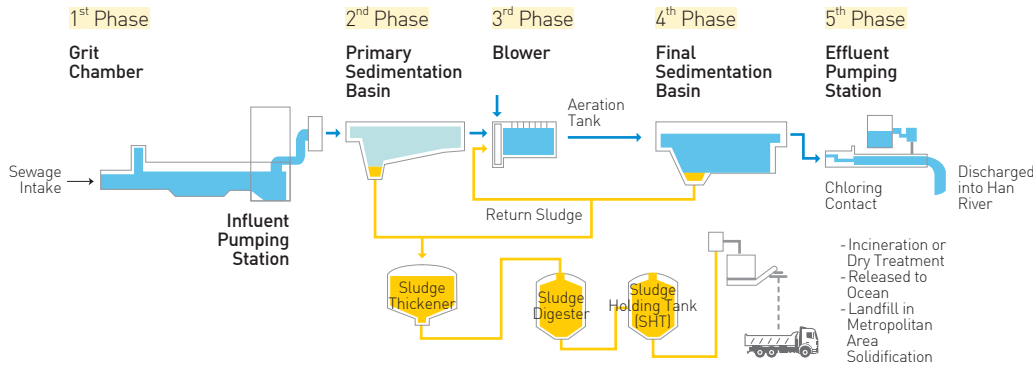
Seoul operates 4 Sewage Treatment Centers to treat 5 million tons of sewage, excreta and food waste water in a clean and safe manner. The center contributes to water quality improvement in rivers and a healthy aquatic ecosystem. The facilities, the nation’s largest sewage plants, have become exemplary ones for eco-friendly management and sophisticated sewage treatment equipment.

Location of  
Sewage Treatment  
Center



 Size	 Population	 Sewer	 Sewage Treatment Rate	 Treated Sewage Amount	 Level of Treatment
605.33km <sup>2</sup>	10.38million	10,392km <sup>2</sup>	100%	Sewage 4.98 millionm <sup>3</sup> /day Excreta 10,500m <sup>3</sup> /day Food Waste Water 900m <sup>3</sup> /day	Sewage BOD 130~170mg/L → Less than 10mg/L

Process  
of Sewage  
Treatment



Turning Sewage  
into Resources



**Reuse of Treated Waste Water**  
Reclaimed effluent water in the process of sewage treatment is sent upstream to maintain water flow or leveraged as cooling water of boilers, cleaning water and sprinkling water at construction sites. At the same time, the water is given to road cleaning trucks or subway depots to wash cars.

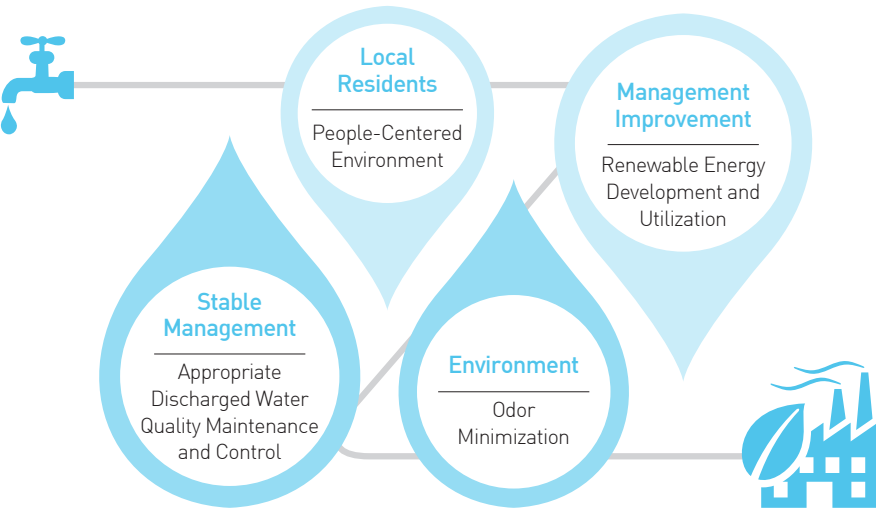


**The Use of Digestion Gas & Sale of Renewables**  
Captured and refined digestion gas generated by sewage treatment is leveraged as renewables.  
-The gas is utilized as fuel (alternative to LNG) at heated digesters and sludge drying facilities.  
-Renewables are sold for power generation, gas for households and vehicle charging.



**Recycling of Sewage Sludge**  
Dehydrated and dried sewage sludge is sold as alternative fuel for cement raw materials and thermal power plants.

Healthy Promise  
of Sewage  
Treatment Center





# Recovering Nature's Strength

Seoul has achieved unprecedented growth, known as the 'Miracle on the Han River', making itself a prime example of urban development in the world. The city, however, degraded its nature and historical value as it concentrated too much on development while putting efficiency and functions first. In response to it, Seoul pushed ahead with the Han River Renaissance project with the vision of "Clean and Attractive Global City, Seoul". As a result, Seoul has become a city whose citizens live well with high quality cultural and ecological places. For example, Nanjido landfill was transformed from a mountain of garbage to an ecological park. Annually, thousands of citizens visit clean Cheonggyecheon after it was restored. The Han River has become a landmark of Seoul thanks to the restoration of the ecological environment and installation of cultural places. The SMG will continue to pursue environmental policies to recover its clean nature.



## 01 *Revival of Han River Moving Away from an Icon of Development to a Symbol of Ecological Recovery*

Unfortunately, excessive development and overuse of the Han River degraded the river. Committed to recovering the river, the city government conducted the Han River Renaissance Project. It has greatly contributed to recovering the river by planting trees and creating an attractive habitat for many flora and fauna. Eventually, the efforts worked and those plants and animals that had once left Seoul came back. As a lot of recreational and cultural facilities were built, citizens come and rest in Han River parks. Concrete revetment of the Han River was reformed to create fish way and to ensure the water was of high enough quality to swim in. With ecological, cultural and historical services, the Han River has become cleaner.

### Han River, a rest area for citizens



Han River Swimming Pool



Banpo Han River Park



Floating Island



Ttukseom Culture Complex



Mulbit Square



Ecological Wetland Parks

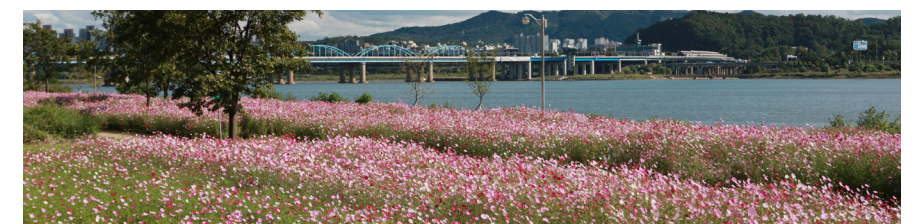
### Natural Revetment, Restored Ecology of Han River



Concrete Revetment



Natural Revetment



Forest Created in Substructure of Seongsudaegyo Bridge



02 Nanjido Landfill Recovery Project  
Transformation of Nanjido, Land of Death,  
to Ecological Park

Seoul suffered from surging waste as an adverse effect of rapid development and urbanization. It decided to designate 'Nanjido', low-lying island located in the Han River, as a landfill. Ten years later, Nanjido became a land of death that oozed leachate, malodor and harmful gases in the 1980s. To address this problem, the SMG started a project to recover Nanjido and transform it into an ecological park in 1991. Nanjido was reborn as an ecological park with the name of World Cup Park after a 10-year long plan, design and construction from 1991 to 2002. Annually, about 3,000 public officials from home and abroad visit the park to learn about Seoul's experience and insight. In fact, Seoul won the Special Award from United Nations Human Settlements Program (UN-HABITAT) for its outstanding landfill recovery project.

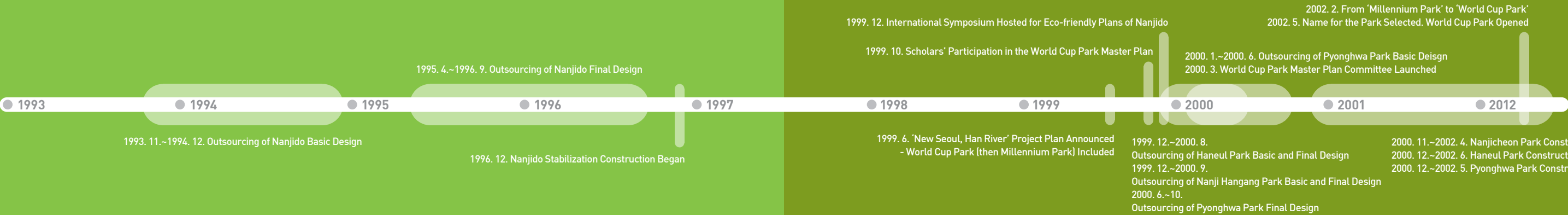
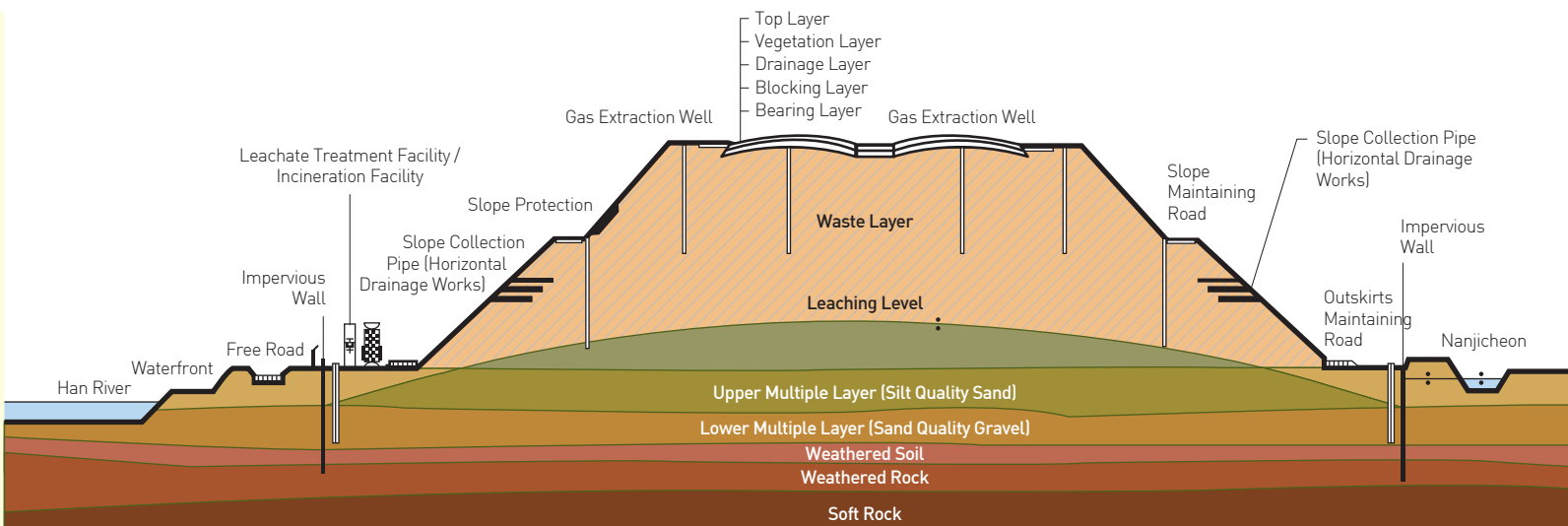


World Cup Park consists of 5 parks - Nanjicheon Park, Noeul Park, Haneul Park, Pyonghwa Park and Nanji Han River Park. Today, World Cup Park attracts 10 million visitors annually. The park offers a wide range of special programs and performances. It also serves as a popular destination for camping and fun golfing outings. The number of species found in Nanjido has skyrocketed from a mere 438 to 1,092 from 2000 before the park construction to 2013. It proves that Nanjido is no longer a land of death.

Increase in Species of Plants and Animals in Nanjido (Major Classification)



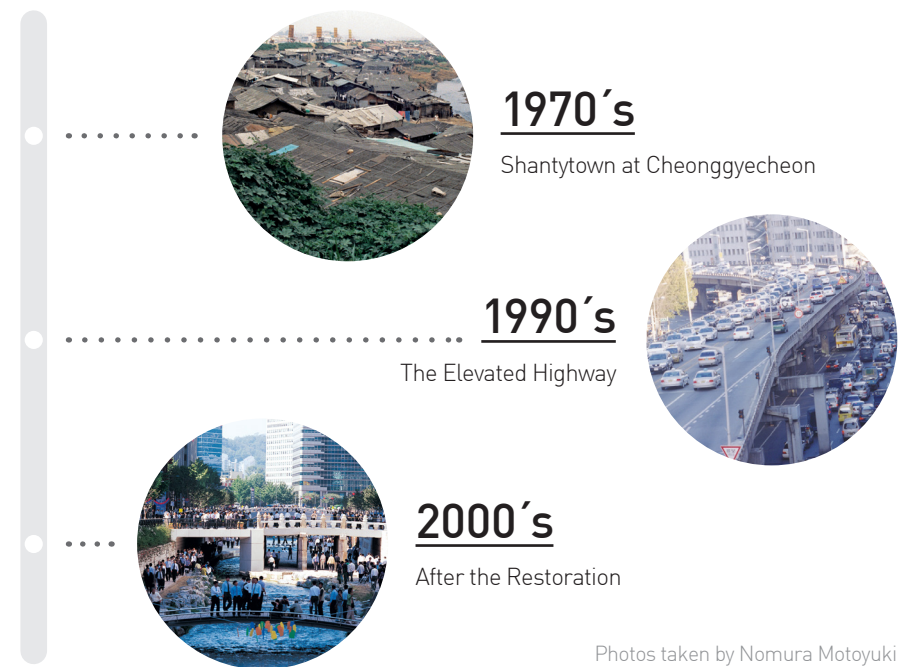
Side View of Nanjido Ecological Park



## 03 Cheonggyecheon Vibrant with Life and Energy

Cheonggyecheon is a 10.92km stream flowing across downtown Seoul, one of the Han River's water systems. It, however, was covered with concrete from 1925 during the Japanese occupation to 1977 after independence of Korea, losing its function as a stream. The Seoul government was concerned about the safety issue of the covered concrete and an old elevated highway. To address this issue, Seoul removed the elevated highway and restored the stream to revive the ecosystem and environment for aquatic diversity. In addition, the project was intended to restore cultural assets which had been buried under the concrete. The undertaking revitalized Seoul and opened a new chapter in becoming an ecological city.

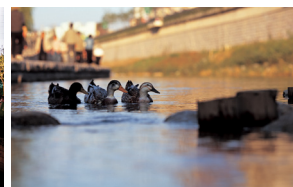
### History of Cheonggyecheon



### Restored Cheonggyecheon



Restored a cultural asset  
(Gwangtonggyo )



Cheonggyecheon with healthy  
ecosystem



Rest area for citizens

## Environmental Facilities Available for Guided Tour

Seoul offers guided tours at environmental facilities with best practices to raise transparency in policies and share outstanding environmental policies with overseas cities.

### Seoul Energy Dream Center

Exhibition Center for citizens to experience energy, and to envision an energy self-sufficient city

☎ 02)3151-0562 <http://www.seouledc.or.kr>

### Jungnang Sewage Treatment Plant

Program enabling citizens to see how sewage is treated and reclaimed

☎ 02)2211-2517 <https://env.seoul.go.kr/archives/4892>

### Seonam Water Reuse Center

Tour Program enabling visitors to see a publicity hall, promotional movie and major facilities

☎ 02)3660-2200 <http://www.seonam.seoul.kr>

### Mapo Resource Recovery Center

Guided tour to show the process of waste treatment and resource circulation

☎ 02)302-0168 <http://rrf.seoul.go.kr/main.jsp>

### Youngdeungpo Arisu Purification Center

Tour Program to show how Arisu is purified and produced

☎ 02)3146-5600

### Cheonggyecheon Museum

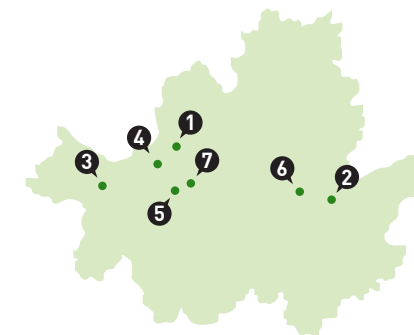
Exhibitions of history of Cheonggyecheon and changes before and after the restoration

☎ 02)2286-3410 <http://cgcm.museum.seoul.kr>

### Han River Ferry Cruise

Program to show ecology, culture, history and development of the Han River

☎ 02)3780-0756 <https://hangang.seoul.go.kr>



- 1 Seoul Energy Dream Center
- 2 Jungnang Sewage Treatment Plant
- 3 Seonam Water Reuse Center
- 4 Mapo Resource Recovery Center
- 5 Youngdeungpo Arisu Purification Center
- 6 Cheonggyecheon Museum
- 7 Han River Ferry Cruise

Contact us if you have any question about the environmental policies of Seoul

### Contact Information regarding Seoul Environment Policy

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