





Why “One Less Nuclear Power Plant”?

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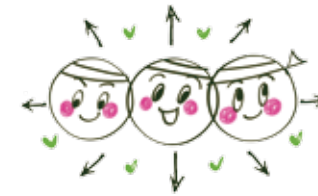
Right now, Seoul uses this much energy.

06



Seoul asked for and listened to its citizens’ opinions.

08



What change will the campaign bring to us?

09



A new paradigm of Seoul’s energy policy

**10 Key Action Plans of
“One Less Nuclear Power Plant” initiative**

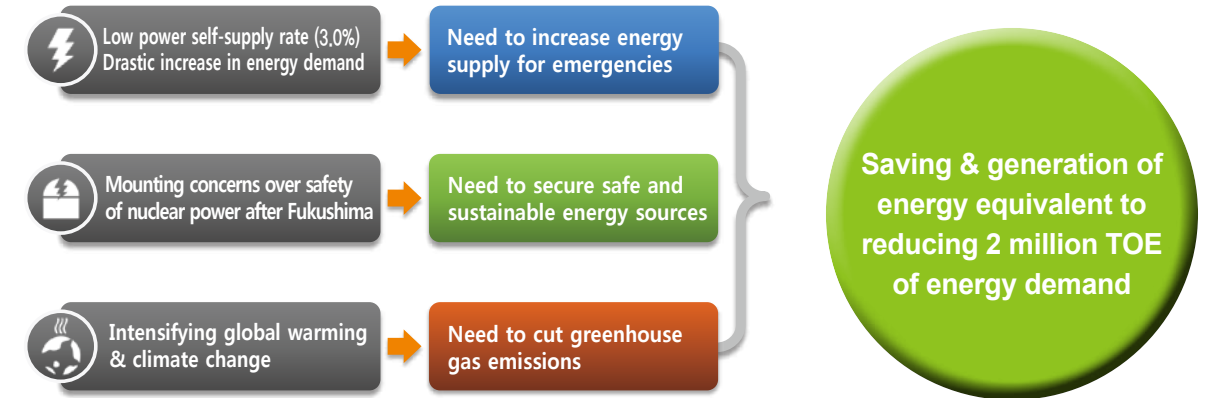
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Why launch “One Less Nuclear Power Plant” initiative?



TOE (Tonne of Oil Equivalent) is a unit of energy representing the amount of energy released by burning one tonne of crude oil, approximately 10^7 kcal. This equates to the amount of electric power that an ordinary household (280kWh/month) consumes over 41 months.

Power self-sufficiency at a low level

Seoul’s power consumption accounts for 10.3% of the national total. However, the city’s power self-sufficiency rate is a meager figure of 3.0%, and only 1.6% of energy consumed in the city comes from new and renewable sources. Furthermore, the continued rise of global oil prices makes a new paradigm of energy policy even more necessary. Seoul thus has set a goal of accomplishing 8% of power self-sufficiency by 2014, and 20% by 2020.

Nuclear power, a double-edged sword

Nuclear energy is cheap and efficient. However, it incurs enormous human and economic cost once something goes wrong, as seen in the Fukushima nuclear disaster. Seoul is committed to reducing our dependency on nuclear power by promoting sustainable and eco-friendly energy sources.

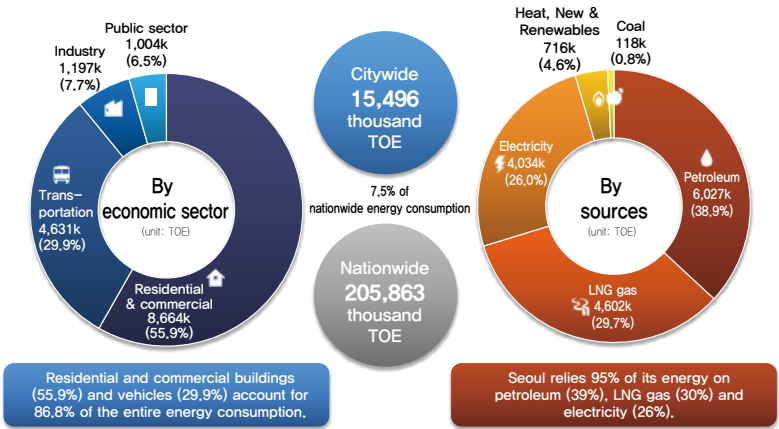
Need to address climate change and global warming

About 90% of greenhouse gases warming the globe come from the generation and consumption of energy. That is why Seoul is working to cool down the Earth and become a healthier and safer city for the future generation through the “One Less Nuclear Power Plant” initiative. Seoul’s goal is to reduce 2 million TOE of energy demands by 2014, by energy conservation and production from new and renewable sources.

Right now, Seoul uses this much energy.

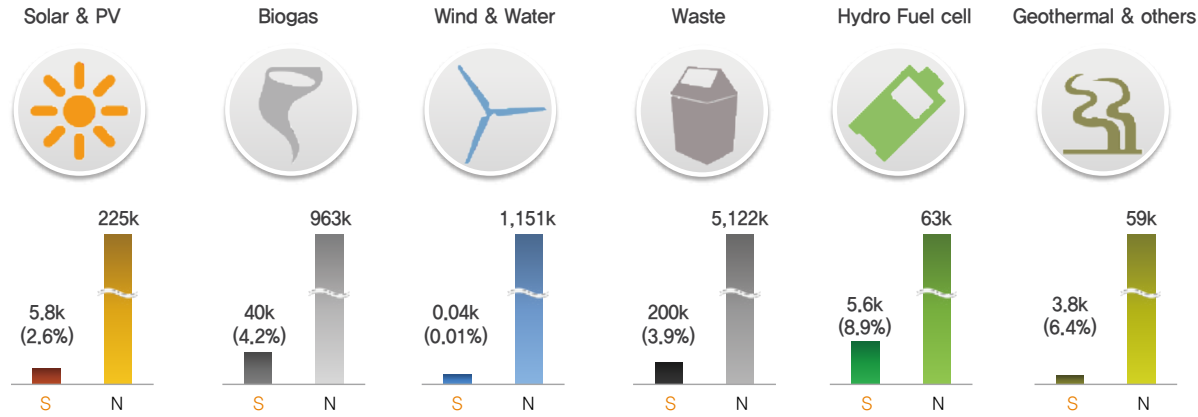
Seoul's energy consumption accounts for 7.5% of the national total.

Seoul consumes 15,496k TOE of energy per year, 7.5% of the national total of Korea. Out of Seoul's energy consumption, 56% comes from residential and commercial use. The problem is that Seoul is too dependent on fossil fuels, with oil and LNG gas accounting for 38.9% and 29.7% of energy mix respectively.



As of 2011, Seoul recorded 255k TOE of energy production from new and renewable sources; merely 1.6% of the total energy consumption of 15,496k TOE.

93.8% from waste and biogas; 2.2% from solar photovoltaic and heat



S: Seoul, N: Nationwide (Unit: TOE)

Energy consumption is continuously on the rise.

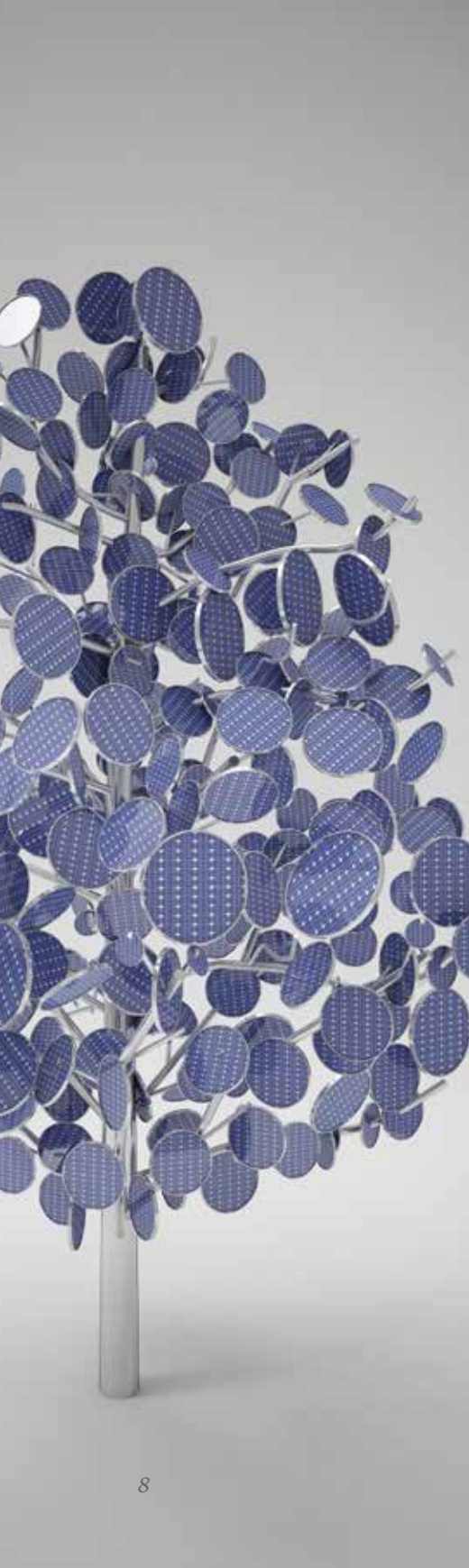
Seoul's year-on-year energy consumption rose by 4.5% in 2010 and slightly decreased by 1.4% in 2011. Despite the decrease, it is obvious that we need to control the energy demand given the continued trend of rising oil prices. While the demand placed on electricity was concentrated on the summer season in the past, today's electricity demand shows a significant increase, regardless of season.



Seoul's year-on-year energy consumption rose by 4.5% in 2010 and decreased by 1.4% in 2011

The new and renewable energy production rate is not yet high.

In 2011, Seoul recorded 255k TOE of new and renewable energy production, merely 1.6% of the total energy consumption. Out of the total production from new and renewable sources, 93.8% came from biogas and waste and 2.2% from solar photovoltaic and heat energy.



Seoul asked for and listened to its citizens' opinions.

Efforts to listen to diverse thoughts of citizens

Seoul organized more than 20 events to listen to the opinions of its citizens and various organizations and reflected them in shaping the initiative. The “One Less Nuclear Power Plant” initiative is led in cooperation with citizens.

In 2012, the first year of the campaign, citizens of various backgrounds—companies, civil society, schools, religious groups—joined the initiative. Private power suppliers signed investment agreements worth 1.4 trillion won in total to install 230 MW of solar panels and 200 MW of hydrogen fuel cells. Large supermarkets, construction companies, association of hospitals, religious groups, universities and civic groups have set voluntary energy conservation goals and started energy-saving activities adapted to each group's identity. In 2013, religious groups are taking the lead in expanding voluntary actions among citizens.



Citizens' Commission and Executive Committee for “One Less Nuclear Power Plant” campaign

A citizens' commission of 19 reputable figures from civic groups, the business & media arena as well as religious, educational and cultural sectors, and an executive committee composed of 47 advisors and experts to support individual projects play the pivotal role in garnering Seoul citizens' power.

What change will the campaign bring to us?

Seoul aims to reduce 2 million TOE of energy from its demands by 2014. This is equal to replacing the capacity of Wolseong Nuclear Power Plant Unit-2 (6,637 GWh; 790,000 TOE) and saving 9.43 million barrels (1.21 million TOE) of oil and LNG gas consumption.

Reduction of greenhouse gas emissions

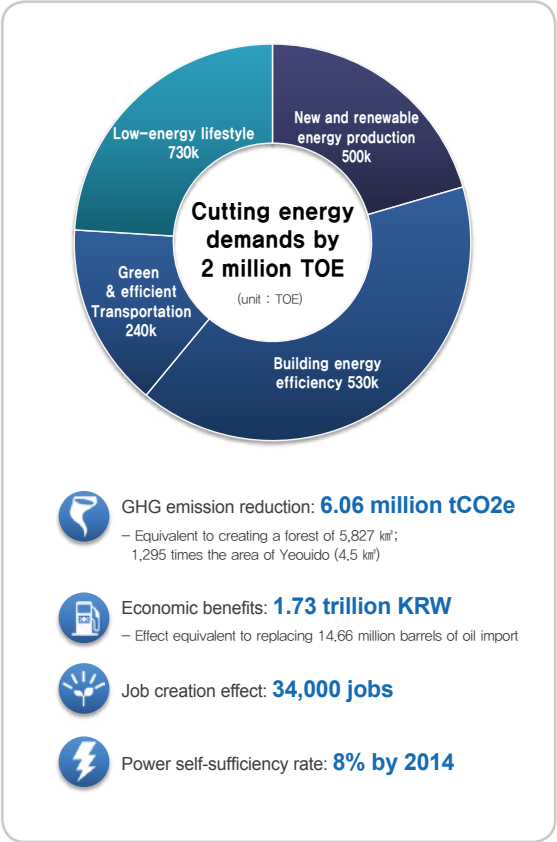
Seoul will be able to reduce CO₂ emissions — the main culprit of global warming — by 6.06 million tons. This is the equivalent to creating a forest of 5,827km², 1,295 times the area of Yeouido Island (4.5km²) and 10 times the area of Seoul (605km²).

Economic benefits

The new and renewable energy generation can replace 14.66 million barrels of imported oil, worth 1.73 trillion KRW. It is also noteworthy that 34,000 new green jobs will be created.

Higher power self-sufficiency

Seoul will have a system for safe and sustainable energy production and conservation. This will ensure a stable power supply to the capital city Seoul in preparation of any electricity supply crises. Seoul's power self-sufficiency rate will attain 8% by 2014 and surge up to 20% by 2020.



Seoul's energy policy for the future generation

“One Less Nuclear Power Plant” 10 Key Action Plans



The “One Less Nuclear Power Plant” is a large-scale initiative with the total budget amounting to 2.78 trillion KRW. This campaign will bring a groundbreaking change to Seoul’s energy consumption paradigm. The campaign will take a multi-faceted approach, consisting of 71 specific projects in 6 policy categories, which can be re-categorized in 10 key action plans.

01

Seoul becomes a city of sunlight.

The entire city of Seoul becomes a solar plant, with the action of citizens.

Photovoltaic power stations will be installed everywhere in Seoul to produce clean energy infinitely. As Seoul becomes a city powered by sunlight, where the sunlight becomes energy, Seoul will be able to strengthen its image as a truly green city and ensure sustainable development.



Citizens' Sunlight Power Stations

By 2014, Seoul plans to build rooftop PV plants on some 10,000 buildings including: public offices, schools, houses and business offices. The total capacity of all these power stations combined will amount to 320 MW.

In 2012, Seoul installed 20 MW of solar panels for one year, 7 times the total capacity installed for the previous 7 years combined. To encourage households to adopt solar panels, installation subsidies up to KRW 3.3 million are provided for houses with power consumption under 600 kW and a thorough follow-up system has been developed.

Seoul Solar Map

The city has developed the Seoul Solar Map, in which all the buildings and houses are marked with possibility to install PV plants and potential capacity. Seoul's PV power generation status can be seen at a glance. The map has been released on the Internet, in order to engage more citizens in PV promotion.

Energy-independent communities

Seoul also creates residents-led energy-independent communities where new and renewable energy is produced on site, efforts are made to save energy and raise efficiency, and external energy supply is kept to a minimum level.

The energy-independent communities work on 3-step approach: step 1: save as much energy as possible; step 2: minimize leakage and raise efficiency; step 3: adopt solar panels and renewable resources.

At this point, there are 11 energy-independent communities in Seoul that reflect different lifestyles and housing patterns of each neighborhood. These 11 communities will set examples for other urban neighborhood to become energy-independent as well.



Solar panels at Seonam Sewage Treatment Center



Residents of Seongdaegol Energy-Independent Community

02

Seoul will be safe from a massive blackout.

Hydrogen fuel cell stations & small-scale hydro plants

In order to ensure that core public facilities of the city are not paralyzed and able to maintain the minimum operation even if a sudden large-scale blackout occurs, Seoul will build hydrogen fuel cell stations and small scale hydro plants for a permanent power supply.



Small-scale hydro power station



MCFC-type fuel cell station in Sangam (2.4 MW)



Hydrogen fuel cells built in the Children's Grand Park

Hydrogen fuel cell stations

In order to establish a distributed heat and electricity supply system that will ensure the operation of core urban infrastructure in emergencies and lay the groundwork for self-supplied energy of buildings, Seoul is working to install hydrogen fuel cell power stations with a total capacity of 230 MW in 13 sites, ranging from sewage treatment centers, parks and subway car depots by 2014. By adopting the green building design guidelines and improving the environmental impact assessment process, Seoul plans also to install 2 MW of fuel cells embedded in buildings.

Small-scale hydro plants

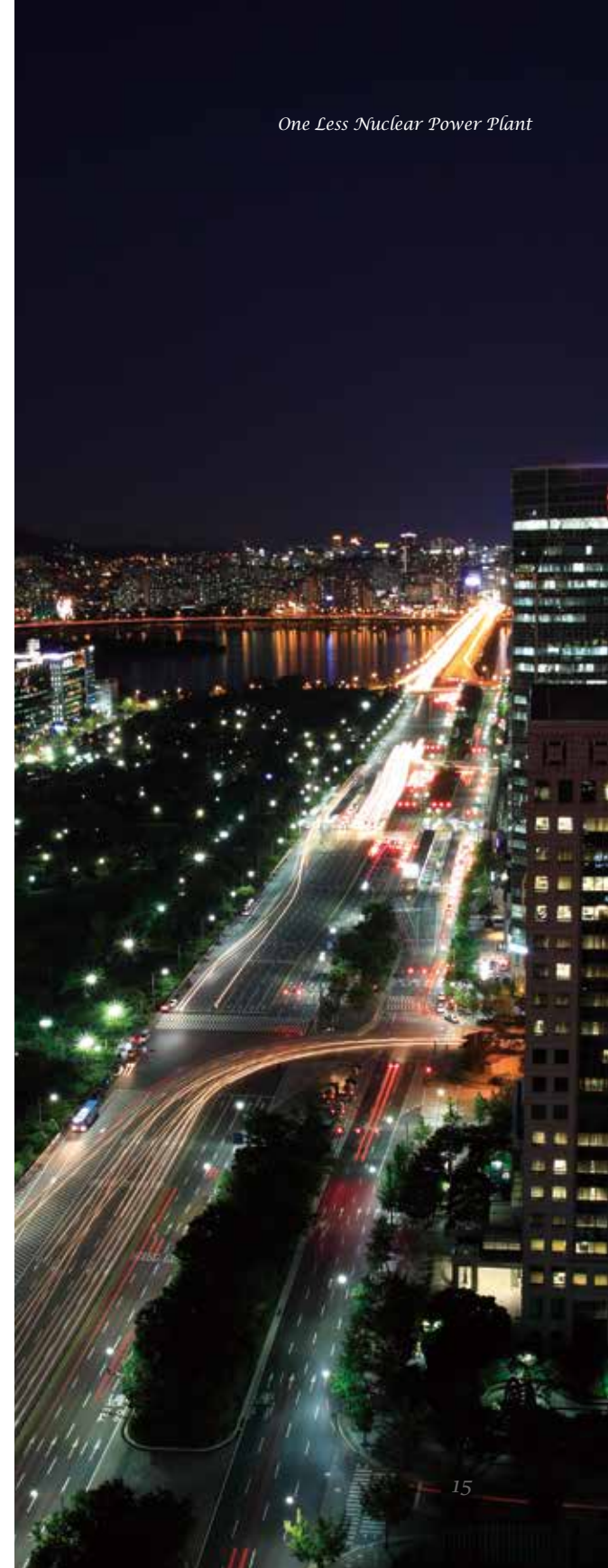
In order to utilize unused water resources, the city government is developing "low-head application technology," by which electricity can be generated with 2 m or lower effective head. Five small-scale hydro power stations will be built at streams and water supply facilities with 2 m or higher effective head by 2014. The total capacity of these stations will amount to 1 MW.

Smart Grid project

Seoul will distribute smart meters for households in order to build an intelligent power demand management system.

Power-generating sports equipments

Seoul plans to introduce sports equipment which will have power generation and storage devices incorporated, to 34 municipal fitness centers. Even a small movement of human bodies will be converted into energy.



03

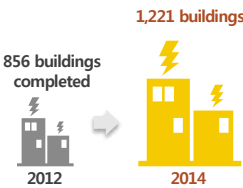
Seoul works to prevent energy leakage and raise efficiency in buildings.

Building Retrofit Program (BRP)

For three years from 2012 to 2014, Seoul is working to retrofit some 12,200 buildings including high-energy-consuming buildings, mid-to-large-sized buildings, individual houses, office buildings, public rental houses, municipal welfare facilities and schools. Through the BRP program, we will be able to prevent energy leakage and significantly improve energy efficiency.

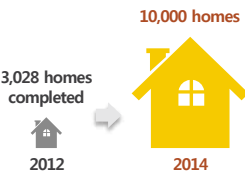


BRP (Building Retrofit Program)
A project to install energy saving equipments or improve the existing energy system in buildings in order to reduce energy loss and inefficiency, with a view to saving energy and raising efficiency



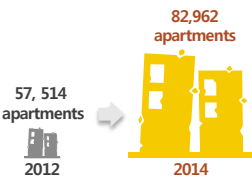
BRP for high-energy-consuming buildings

Buildings consuming over 2,000 TOE of energy per year, which account for 21.6% of the total energy consumption of buildings, are the priority target of the BRP program.



BRP for 10,000 individual houses

The focus is on improving energy efficiency of heating and electricity, since these two categories consume the largest part of energy in homes.



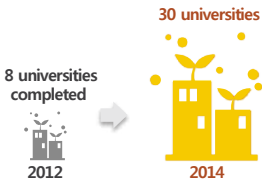
Upgrade of obsolete facilities in public rental apartments

With a view to saving heating & cooling costs by raising energy efficiency, Seoul retrofits by priority 51 public rental apartment blocks built 15 years ago or longer.



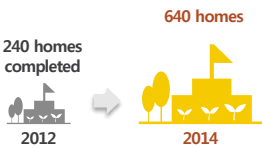
BRP for city-built social welfare facilities

Social welfare facilities owned by the city government are also targets of retrofit project in reflection of their energy consumption patterns and the age of buildings. The saved energy cost will be reinvested in welfare activities.



Low-carbon green campuses

For universities working to, or planning to work to create green campuses, Seoul provides long-term low-interest loans to support improvement of building energy efficiency.



Upgrading insulation for low-income households

The city government works to renovate houses of low-income families to raise efficiency by upgrading insulation and window systems.

04

Smart lightings make Seoul brighter.

Large-scale promotion of LED lights

By 2014, Seoul will replace lighting devices in public offices, street furniture, subway stations, underground shopping centers, large office buildings, department stores and other multi-use facilities with highly energy-efficient LEDs. The total number of lightings to be replaced amounts to 8 million.



All of the 243 subway stations in Seoul will adopt eco-friendly LED lights.

The city government is working to replace 650,000 lights in the 243 subway stations of Seoul (lines number 1 to 8) with eco-friendly, highly-efficient LEDs. 430,000 lights in the platforms and hallways will be upgraded by 2013, and the rest of 220,000 lights including the in-car lights will be upgraded by 2014.

Payback-based approach allows transition to LED without cost burden.

Seoul signed an MOU with a LED Association in order to deliver LED at a price 40% lower than the market price, even including a five-year warranty. The association takes an “invest first and recover costs later” approach: the association installs the LED lightings first and then recovers the invested costs over the span of 3.5 years thereafter from saved electricity fees. This will allow citizens to opt for LED lights without being burdened by costs. Also, the city government organizes on-demand LED light markets to encourage citizens to adopt LED.

A technological checkup of LED products is provided free of charge for small and medium businesses.

The Korea Photonics Technology Institute, a research body specialized in LED technology, has partnered with the city government to offer a 6-month test-bedding program free of charge for small and medium LED businesses, with a view to helping them upgrade the quality of their LED products.

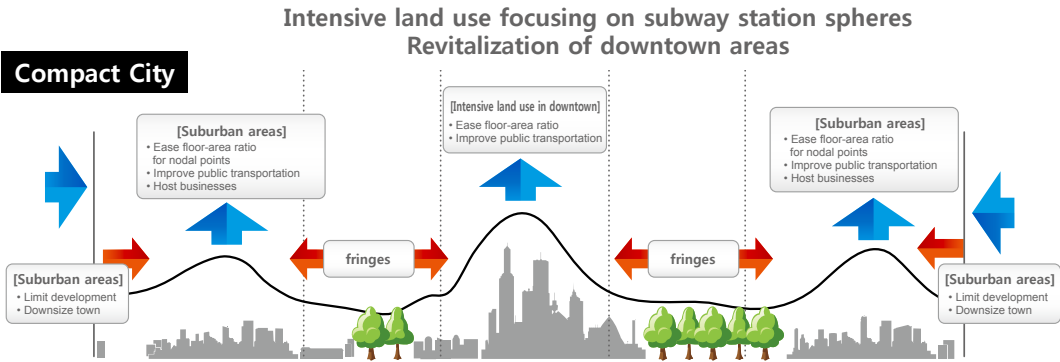


05

The urban structure of Seoul is being redesigned into a low-emission, eco-friendly city.

Low-energy-consuming “compact city”

Seoul will be upgraded into a low-energy-consuming compact city. For this goal, the city is developing an elaborate urban management system, composed of the 2030 City Master Plan and unit-specific neighborhood development plans.



Urban development projects for energy conservation and production

An energy consumption cap was introduced in 2012 in the first phase of various types of urban development planning and evaluation, and will be expanded by 2014. Also, the renewable portfolio standards are being gradually reinforced from 6% in end-2012 to 8% by 2013, and 10% by 2014. Buildings with higher portfolio will get floor area ratio (FAR) incentive. By developing such policy frameworks, the city of Seoul pursues its goal to become a sustainable green city.

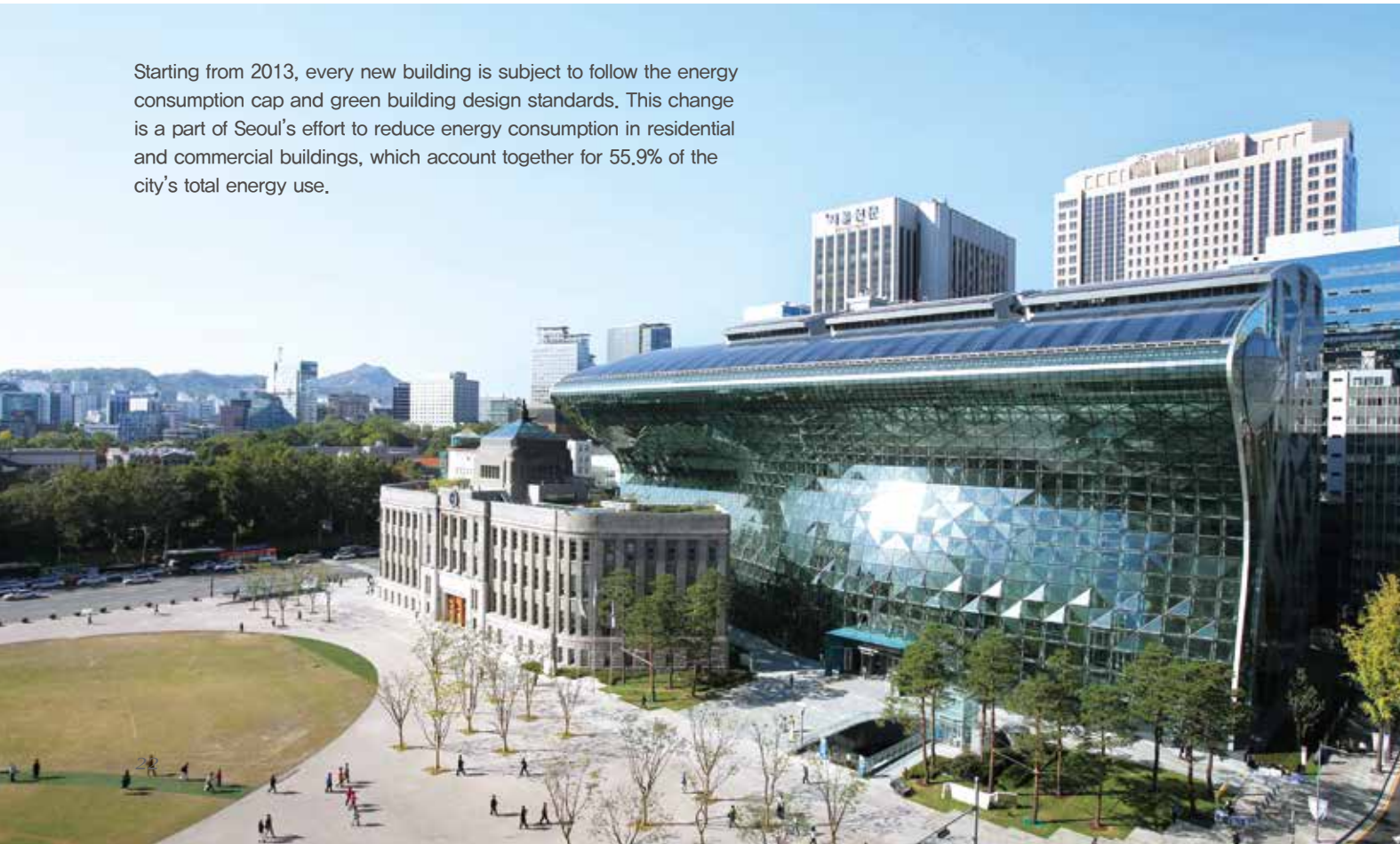


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Seoul designs and constructs smart and healthy buildings with low energy consumption.

Reinforcement of energy cap system

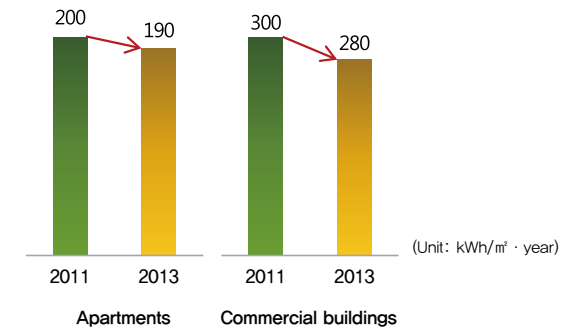
Starting from 2013, every new building is subject to follow the energy consumption cap and green building design standards. This change is a part of Seoul's effort to reduce energy consumption in residential and commercial buildings, which account together for 55.9% of the city's total energy use.



Reinforcement of energy cap for new buildings

As for now, the energy cap is mandatory only for commercial buildings with floor space over 3,000m² and apartment complexes with over 100 units. This target of the cap will be expanded to include large supermarkets, accommodation facilities and general hospitals. The consumption cap per unit area itself will also be reinforced.

※ (From 2013) Apartments: 200 → 190kWh/m² · year;
Commercial buildings: 300 → 280kWh/m² · year



Reinforcement of green building design standards

Green building design standards for small-and-medium-sized buildings with 500m² or smaller gross floor area becomes much stricter. New standards, such as 1) an energy efficiency of 2nd grade or higher; and 2) window-to-wall ratio below 50%, have been added, while insulation standards have also been reinforced from the previous level.

Incentives for low-consumption buildings

To promote low-energy-consuming construction, Seoul plans to provide a variety of incentives, including more favorable floor area ratios (FAR).

※ FAR incentives for apartments: up to 3% for buildings with Green-1st grade building certification; up to 2% for buildings with renewable energy supply over 10%;

07

Shift in the idea about cars can make a difference in the environment.

Green driving and transportation practices

Car sharing means using cars together with other people only when they are needed. It's about shifting the paradigm about cars from 'ownership' to 'co-drivership.' In this era of high oil prices, car sharing can help us save energy and save expenses incurred by owning a car.



Hi-Seoul Bike Parade



Promotion of car-sharing service

What is good about car-sharing?

By car-sharing, you can save 4.14 million KRW per year if you drive only during weekends, and 2.58 million KRW if you commute on weekdays. 770,000 drivers, or 35% of passenger car owners drive a distance shorter than 7,000 km per year and 330,000 among them drive only during weekends. If you want to be a more rational consumer, car sharing can be one answer.

〈Example of a weekend-only driver〉

- ※ If you own a car: total expense of 6,277,000 KRW (10 year usage of a mid-sized gasoline car)
 Depreciation: 2,850,000 KRW (26.5 million KRW for car purchase and 2 million for tax equally depreciated over 10 years)
 Maintenance: 2,580,000 KRW (400,000 for automobile tax; 800,000 for insurance, 900,000 for repairs, 480,000 for parking)
 Fuel: 847,000 KRW (fuel price for driving 28 km twice a week, 110 times a year)
- ※ If you choose car-sharing: total expense of 2,138,400 KRW
 Annual membership fee: 110,000 KRW; rental fee: 2,028,400KRW
 (For driving 28 km twice a week, 110 times a year, supposing that rental fee for 2 hours is 18,440 KRW)



Improvement of median bus lanes

Transportation demand control for a greener environment

- Enhancement of median bus lane network and pedestrian environment
 New median bus lanes: 2 additional lanes (5km) by 2014
 Improvement of existing median bus lane infrastructure: 10 lanes per year
 Shortening transfer distances between subway station and bus stop: 150m → 100m (181 sites by 2013)
- Improvement of transfer infrastructure
 Removing grey zones of public transit by improving transfer infrastructure: 3 sites by 2014
- Prohibition of idling expanded to the entire city (by 2013)
 Idling prohibited in the entire city of Seoul by the revised ordinance in 2012
 Special checkup sessions during hours when idling happens frequently
- Installation of eco-friendly driving devices and hands-on training sessions
 Installation of eco-friendly driving devices in public buses: 4,597 buses by 2013; 5,847 by 2014
 Hands-on green driving training for public bus drivers: 7,780 drivers by 2013; 10,780 by 2014

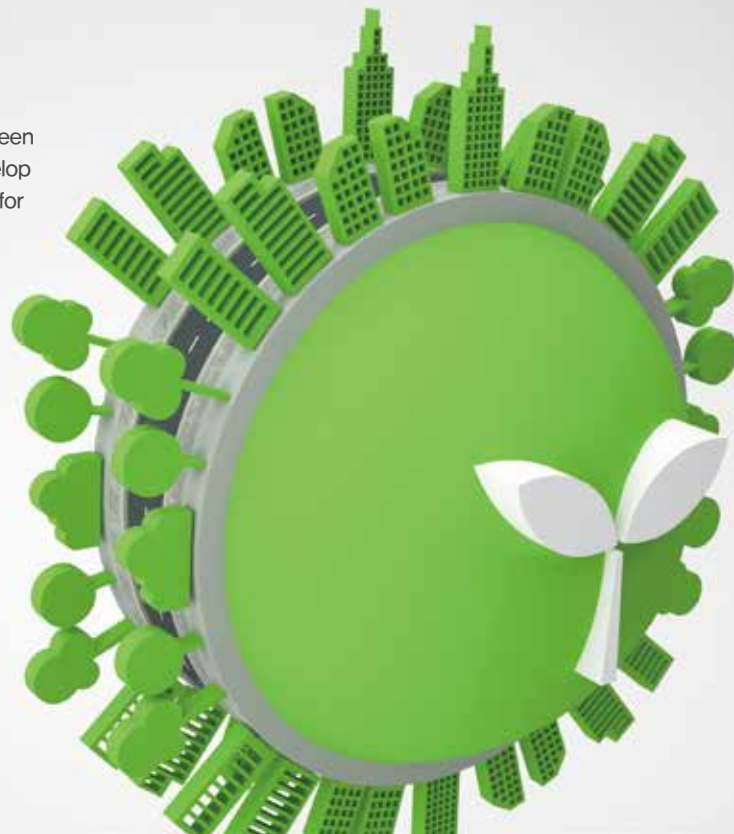
08

Actions for the Earth boost green industries.

Job creation in green industries, including new and renewable energy industry

The United Nations Environment Program (UNEP) defines green jobs as work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Seoul invests in nurturing green industries and creating green jobs with a long-term point of view, in order to develop the capital into a green city that fulfills responsibility for the environment of the Earth.

The United Nations Environment Program (UNEP) is an inter-governmental institution under the United Nations dedicated to the environmental issues. Its objective is to promote, coordinate and facilitate United Nations environmental activities with a view to closer international cooperation for environmentally sound policies and practices.



Green Startup Creation Fund & promotion of social enterprises

By 2014, Seoul aims to create a “Green Startup Creation Fund” worth 60 billion KRW. This fund will support green companies that have advanced technologies but suffer from lack of investment. Also, the city government is working to discover and promote 10 social enterprises in the energy sector, PV module cleaning companies and waste cooking oil collecting companies for instance.



Nurturing talents

To address the need of job creation due to an expanded investment in new and renewable energy projects, BRP and LED promotion, Seoul aims to nurture over 100 experts and 1,000 field workers every year.



Support for SMEs in environmental sectors

For small and medium green enterprises of Seoul in new and renewable energy and LED businesses, the city government provides an enhanced support by management consulting, credit finance, investment consulting and trade promotion.



09

Thoughts and actions of citizens
power the campaign.

Promotion of energy-saving green lifestyle among citizens

Citizens' green actions bring joyful changes in Seoul. In order to let citizens initiate, conduct and expand the energy saving movement, the city government has organized a citizen commission and executive committee for the "One Less Nuclear Power Plant" initiative. With the Eco-Mileage program designed to promote energy conservation for the future generation and the Energy Guardian Angel Corps organized to lead energy-saving actions, the city government works on a variety of projects to promote green lifestyle among citizens in neighborhood, at home and school.



Seoul Energy Dream Center



Participation in the Global Earth Hour



Eco-Mileage & Energy Guardian Angels

The Eco-Mileage is a signature energy-saving program of Seoul city, powered by voluntary participation of its citizens: You can receive monthly monitoring report on your energy consumption, and if you save electricity, water, LNG gas and district heating at home or in building by a certain percentage (over 10%), the Eco-Miles — convertible into green products or public transportation coupons — are provided as incentives.

The Energy Guardian Angels is a group of young students. They will be recruited by schools, and teachers will be nominated as mentors for each school. The goal is to engage young students, who are leaders of the next generation, in energy saving and volunteer activities. In 2012, 9,745 young students in 214 schools became energy guardian angels. Seoul aims to expand the angel corps up to 20,000 members in 400 schools. The city government encourages all age of students from elementary to high schools to join the corps and start to develop energy-saving habits, while organizing a mentor group of university students to help the kid angels.

Seoul Energy Dream Center

The first public building ever to achieve 100% of energy self-supply, the Seoul Energy Dream Center located inside the World Cup Park is the starting point of Seoul Eco-Tour. Any citizens can learn and enjoy the "energy" touring around the solar panels, hydrogen fuel cells and Mapo resource recovery facility alongside the center. The tour course is also pivotal in improving the educational program for young students.

Energy-Saving Pilot Zones

To engage citizens in major action plans of the campaign, Seoul will create energy-saving pilot zones and energy conservation plants, with different themes for each one of the 25 districts of Seoul. Also, the city government establishes local environmental education centers, the Tower of hope and the Eco-house, all of which will be operated by citizens themselves.

Expansion of recycling and reduction of food waste from source

The city government is working to improve the process of separate waste disposal and collection in order to raise the recycling rate, introduce separate disposal system for apartments to individual houses, and enhance the process of collecting waste cooking oil to produce energy from it.

To achieve the goal to recycle 168 tons/day by 2014, the city is working on many pilot projects to identify recyclable resources such as remnants of cloth and to collect waste vinyl in separate bags. Seoul city is also working on reducing food waste by improving disposal and collection processes and distributing waste reducer in order to cut the generation of food waste in the first place, with a view to reducing food waste to 669 tons/day by 2014.

10

Seoul establishes an organization that will serve as the epicenter of the campaign.

Seoul Natural Energy Foundation

Seoul creates a foundation to lead the energy policy shift and implement the projects in a more organized way. Provisionally named "Seoul Natural Energy Foundation," the foundation reviews proposed energy policies to make improvements, and reflect feedback arising in the course of implementation, to find better directions.



"One Less Nuclear Power Plant" Information Center

The center provides diverse information regarding energy saving consulting services, promotion of photovoltaic and other new and renewable sources and the status of the implementing the action plans. Specifically, the center is equipped with a website and telephone hotlines to file energy waste reports, gather ideas of energy saving or production and provide information to and from citizens.

Climate & Energy Information Center

Established under the Seoul Institute — think-tank of the city government, this center is in charge of research relating to the Seoul Solar Map, development of building energy consumption standards, improvement of the weekly no-driving day scheme and other climate or energy issues.

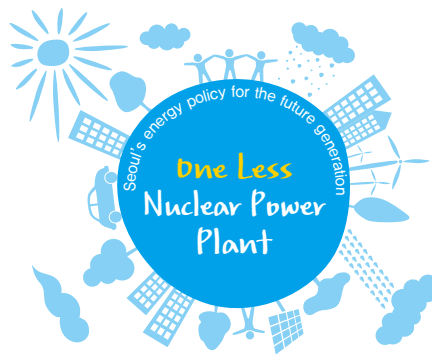
Seoul Natural Energy Foundation

The aim of the foundation is to promote green lifestyles among citizens, provide energy diagnoses and raise efficiency, ensure energy welfare for vulnerable people, nurture talents in relevant fields, develop new energy technologies and create jobs. To cover the operational costs, Seoul will get donations from businesses and civic groups and rent sites for photovoltaic installation. Benefit generated by these activities will amount to over 10 billion KRW every year.



"One Less Nuclear Power Plant" Information Center





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