

# District Energy: Cost-Effective & Efficient Energy Supply

Date 2015-06-18 Category Environment Updater ssunha

## Introduction

District energy is a system that involves the distribution of energy generated at a centralized location, such as a combined heat & power (CHP) plant or a resource recovery or renewable energy facility, for heat and hot water in residential and commercial buildings. Because the heat is generated in a cost-effective way, the district energy system offers greater efficiency and cost competitiveness for users than localized boilers.

## Energy Efficiency & Reducing GHG Emissions

### Two Oil Crises & Prioritizing Energy Conservation

The two rounds of oil crises in the 1970s forced the Korean government to seek ways to save energy as a fundamental solution. The central government passed the Act on Rationalization of the Use of Energy and enforced a series of energy-saving measures.

In conjunction with the central government's energy initiative, the Seoul Metropolitan Government (SMG) adopted a district energy system for a new town development project in Mokdong that began in May 1985. Then in 1987, it introduced the system to multiple-unit housing for the first time in Seoul.

### 33% Adoption in Just 30 Years

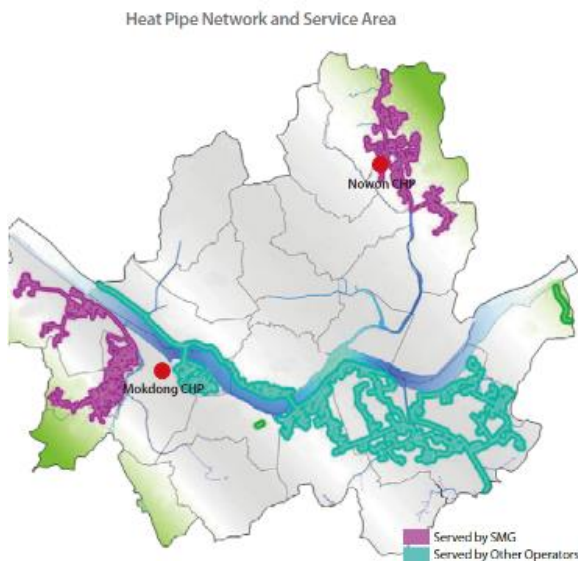
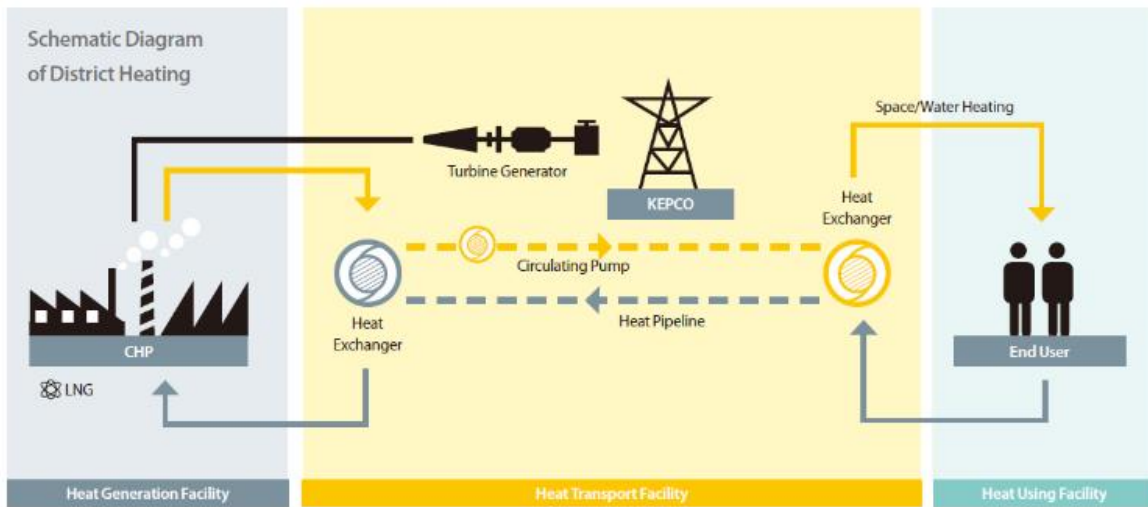
By 2013, 30 years after it was first introduced in Seoul, 518,000 households, mainly in 16 of the city's 25 administrative *gu*-districts, were receiving energy from the district energy system. This represents 33% of the total population in multiple-unit housing, which currently stands at 1.546 million.

## Cost Competitiveness

### Waste Heat from Power Plants & Incineration as Energy Sources

To make the system cost-competitive, the SMG cooperated with the cities of Bucheon and Uijeongbu to use the waste heat from their incinerators and power plants as heat for Seoul's district heating. In March 2013, the SMG signed an MOU with Uijeongbu that led to construction of a transmission pipe network. Thanks to this network, since December 1, 2012, Seoul's Nowon *gu*-district has received 60,000 Gcal (6,000 TOE) of waste heat recovered from incinerators at resource reuse centers in Uijeongbu. In addition, since

March 2013, a 3.1 MW CHP plant using biogas as its source of energy was established in Seoul's Nanji Water Reuse Center.



Schematic Diagram of District Heating / Heat Generating Facility / Heat Exchanger / Turbine Generator / Circulating Pump / Heat Pipeline // Space/Water Heating // End User / Heat Transport Facility / Use of Heat Generated

Heat Pipe Network and Service Area / Served by SMG / Served by Other Operators

Heat transport pipe connecting Seoul and Uijeongbu

### **Recovering Heat from Treated Sewage Effluent (TSE) for District Heating**

Sewage effluent is a viable energy source for district heating because it remains above 10°C even during winter. Recognizing this feasibility, Seoul began capturing 190,000 Gcal of waste heat energy from effluent at Tanchon Water Reuse Center to recover and use to heat water for the Ilwon area in Seoul's Gangnam *gu*-district. The project began commercial operation in December 2014.

Seoul is also working to recover 150,000 Gcal of heat from wastewater at Seonam Water Reuse Center to provide district heating in Gangseo *gu*-district's Magok area. The facility is scheduled for completion by August 2015 through a partnership between SMG and Seonam Energy Co., Ltd. Once complete, it will mean that the district energy system can supply heat to 15,000 households. The project is also expected to be a boost to the industry from the KRW 35 billion invested by the private sector.

### **Financial Support to Low-Income Households**

The SMG is using a special account to provide more affordable district energy to 242,000 households who can benefit from the service. In addition, towards a more inclusive society where everyone benefits from energy welfare, a 10% discount will be given on heating costs to 55,000 rental housing units where low-income households reside.

## **Expanding the Generation Capacity of District Energy**

### **Targeting a 45% Adoption Rate**

Seoul is currently planning to set up a 295 MW CHP plant in Magok area, which will contribute to achieving Seoul's ambitious aim to generate 1,998 GWh of electricity from district energy and CHP by 2020. The district energy initiative is expected to help Seoul's umbrella project, One Less Nuclear Power Plant, to attain its 20% electricity self-sufficiency target by the same year.

In addition, district energy systems can use waste heat from burning fuel to produce electricity at a power plant. Through this mechanism, the SMG plans to provide district energy services to new housing in Magok area, 66,000 multiple-family housing units in Guro, Guemcheon, and Yeongdeungpo *gu*-districts and 177 office buildings. The targeted penetration rate is 45% by 2020.

### **Recovering Heat from Neighboring Areas**

The city government has put diversifying energy sources high on its energy agenda. To this end, 470,000 Gcal of waste heat is recovered from Bucheon and 200,000 from Namyangju every year. In addition, 50,000 Gcal of heat generated from server cooling at KT, Korea's IT giant, will be used in the district energy system. From 2018, 350,000 Gcal will be provided on an annual basis to Seoul through the pipeline network connecting the greater metropolitan area.

In addition, as part of its renewable energy initiative, Seoul will also utilize waste heat (78 Gcal/hr) from

fuel cell generators (196 MW capacity) at Seonam Water Reuse Center. Other potential sources of heat include some resource recovery facilities, with 32 of them providing waste heat (180°C) from their exhaust by 2018, starting with the Mapo facility.