

□ **History**

- (2009) Dongtan New Town Designated as a district energy zone
- (October, 2010) Hwaseong Dongtan District 2 District Energy Business Permission obtained (Korean Government)
- (August, 2014) Established Dongtan District Energy construction branch
- (March, 2015) Dongtan District Energy Project EPC Contract
- (December, 2018) District Energy Facility completion
- (December, 2018) Fuel Cell Purchase Installation Completion.

□ **Facility Size**

- 768MW + 533Gcal/h (including fuel cell (11.44MW + 8.78Gcal/h))

□ **Configuration of production units**

- CHP (Gas Turbine 246.47MW × 2, Steam Turbine 131.91MW × 2)
- Electricity: 756.76MW (Mode III, 32°C)
- Heat: 524Gcal/h (Mode I, -12°C)
- Accumulator: (60,000m³ × 1)

□ **Distribution network**

- Length 98.1km × 2row (Diameter 40 ~ 900A, 16bar)
- Length 6.6km × 2row (Diameter 600 ~ 850A, 25bar)

□ **Number of households supplied**

- 85,000 households (As of December 2020)
- 231,000 people currently living

□ **Average age of production and distribution system facilities**

- 3 years

Dongtan 2 is a large-scale housing development project and is a perfect condition to introduce district energy. It is a new city where large-scale apartments are concentrated, and it is a suitable place for district energy business.

In December 2018, Dongtan 2 LNG combined heat and power plant capable of producing up to 757MW of electricity and 524Gcal/h of heat at the same time was completed by investing about 1 billion Dollars in project costs to supply stable district heating and cooling to the new city and to supply electricity to the nearby metropolitan area.

Facility Status

Category		Details	Remarks
District Energy	Combined Heat & Power	<ul style="list-style-type: none"> o Gas Turbine 246.47MW × 2 o Steam Turbine 131.91MW × 2 - Electricity: 756.76MW (Mode III, 32°C) - Heat: 524Gcal/h (Mode I, -12°C) 	
	Accumulator	<ul style="list-style-type: none"> o 60,000m³×1 - 40m(H)×44m(D) 	
	DH Pump	<ul style="list-style-type: none"> o Return Pump: 4,300 m³/h×40m×2(1 Future) o Supply Pump: 4,800 m³/h×65m×2(1 Future) o Accumulator Pump : 2,500 m³/h×85m×2 	16Bar
		<ul style="list-style-type: none"> o Return Pump: 4,600 m³/h× 85m×2 o Supply Pump: 4,600 m³/h × 145m×3(1 Spare) o Accumulator Pump : 4,800 m³/h×85m×1 	25Bar
	Heat transfer pipe	o Length 98.1km × 2row (Diameter 40 ~ 900A)	16Bar
		o Length 6.6km × 2row (Diameter 600 ~ 850A)	25Bar
Renewable	Fuel Cell	o Capacity: 11.44MW + 8.8Gcal/h	Start operation 2018. 12.

KDHC established various strategies to maximize the effect of the district energy project and applied them to this project.

First, investment costs were reduced by maximizing the use of existing facilities and energy efficiency was maximized.

In Dongtan2 project, it played an innovative role as convergence energy by combining various energy sources such as LNG CHP, fuel cell, surplus heat recovery system, solar energy, and electricity vehicle charging station.

Second, it enables stable heat supply in case of any emergency.

By installing pipes connected to existing facilities and loop network, more stable energy supply is guaranteed.

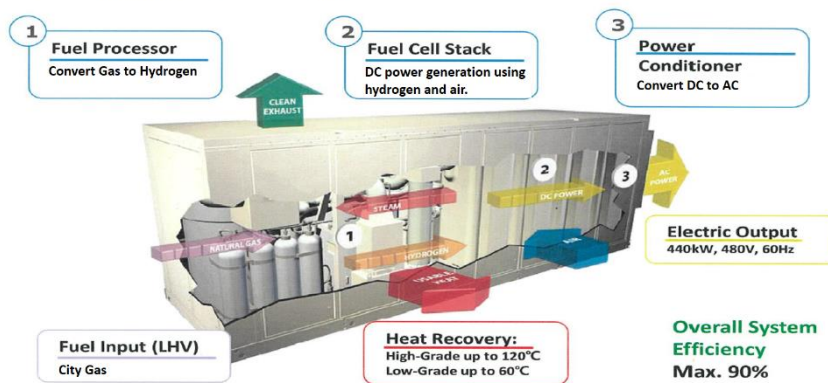


Third, a fuel cell power plant was additionally built on the site of this project to produce 9MW of electricity and 8.8Gcal/h of heat.

Dongtan Fuel cell Process Overview

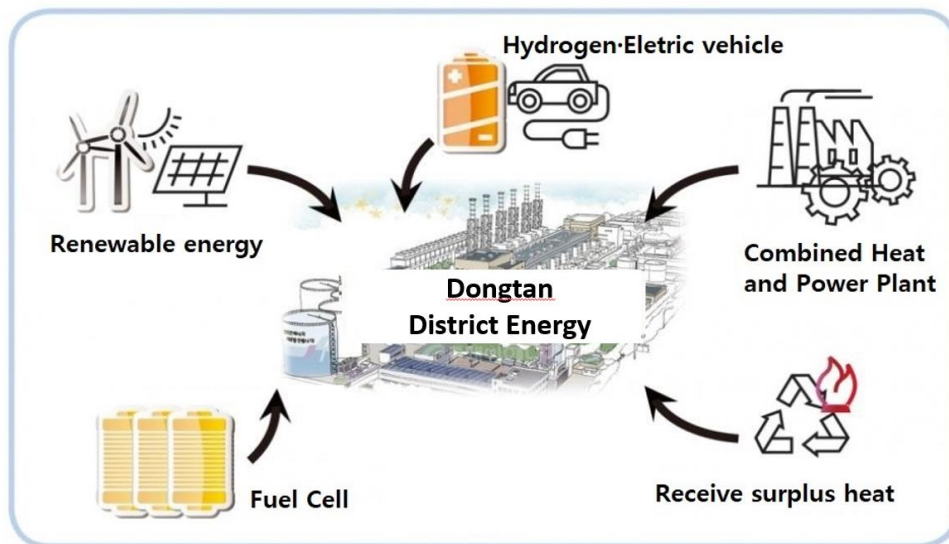
(440kw x 13 set) x 2 Block = 11.44MW

- PAFC Type (Model 400, Doosan)



It was built near the demand site and faithfully performed its role as a distributed power source by securing a pleasant urban landscape and reducing transmission loss without a large-scale transmission tower.

By utilizing new and renewable energy, wasted heat from power generation, significant energy savings and environmental improvement were achieved.



With the impletation of this project, energy savings of 32% (410,885 TOE) compared to, individual heating, 89% of air pollutants(SOx 941Ton, NOx 1,150Ton, Dust 55Ton) and 57% of green house gas reduction(2,475,180Ton) were realized.

In recognition of such continuous efforts to expand and disseminate district energy, it acquired low-carbon product certifications for district heat and electricity home and abroad.(home : ministry of environment, abroad : Carbon Trust(England)



Low carbon certification
(Ministry of Environment)



Carbon Trust certification
(Reducing CO2)



Carbon Trust Standard
(Reducing CO2)

To carry out this project, we analyze the current status and prospects of climate change in project area, classify the causes of risk for climate impact derive extreme climate index through the amount of change in climate value and utilize three step multi-layered analysis technique. Therefore, we conducted a climate change risk assessment to identify the vulnerability to heat waves among the five major climate influencing factors. In line with the 2050 carbon neutrality and Korean New Deal policies, KDHC plans to continue promoting low-carbon, eco-friendly district energy projects to reduce carbon emissions and reduce greenhouse gas emissions.

In order to contribute to resolving the initial imbalance between supply and demand in the hydrogen energy market and stabilizing the price of hydrogen, we have installed Kohygen, an investment company and are accelerating the 'Collection Energy convergence Hydrogen City Project.

'District energy convergence hydrogen city project is a low-carbon project to overcome the climate crisis by generating heat and electricity based on hydrogen and supplying it to the city to build a city environment free from fine dust and reduce greenhouse gas in the city.

KDHC is in the process of converting heavy oil power generation facilities into eco-friendly fuels and high-efficiency facilities in two areas.

KDHC will invest about 2 billion dollars over the next five years, which will reduce annual nitrogen oxide emissions by 71% and pollutants such as sulfur oxides and dust by 74% in the city of Chengju.

The Daegu area is expected to reduce annual air pollutant emissions by 67%, contributing to significant air quality improvement and green house gas reduction.

In the future, Korea District heating Corporation, as Korea's largest district energy company, will focus on various eco-friendly district energy projects to overcome the climate crisis.

Attachment (SDGs)

(SDGs 3) Good health and Well-being

KDHC is a government-run energy corporation established to proactively respond to climate change agreements and to reduce energy and promote the benefits of people's lives.

By focusing on environmental pollution prevention with advanced technology in the field of hydrogen and renewable energy, it is a company that has an infinite possibility of ensuring healthy lives for all age group.

The fuel cell power plant built in Dongtan2 project site produced 9MW of electricity to satisfy Korea's obligation to supply renewable energy, while recovering 8.8Gcal/h heat using it for heat supply.

The Dongtan2 Fuel Cell Power Plant is designed to exceed the limitations of the site, increasing the capacity of the facility, and reflecting Korea's first low-temperature heat recovery system, which can be seen as an example of advanced technology in renewable energy.

Unlike conventional fossil fuel generation, fuel cell power not only emits less pollutant such as nitrogen oxides and sulfur oxides without combustion process. but also makes less noises(less than 65 dBA) KDHC plans to continue its low carbon eco-

friendly district energy project to reduce zero and greenhouse gases in line with the Korean government's recent 2050 carbon neutrality and Korean New Deal policy.

We established Kohygen, an investment company, to contribute to resolving the imbalance in supply and demand of the hydrogen energy market and stabilizing hydrogen prices.

We are also accelerating the promotion of 'district energy convergence hydrogen city project' which is a low-carbon project to overcome the climate crisis by producing heat and electricity based on hydrogen and supplying it to cities to build an urban environment without worrying about fine dust and reducing greenhouse gases in the city.

(SDGs 7) Affordable and Clean Energy

In carrying out this project, the surplus heat from existing facilities is utilized and the emergency heat source is shared through the connection network, thereby dramatically reducing investment and operating costs, contributing to the stabilization of the heat rate and supplying cheap and clean energy to consumers.

(SDGs 9) Industry, Innovation and Infrastructure

This project creates innovative results as convergence energy by combining various energy sources such as LNG CHP, fuel cells, and surplus heat recovery for district energy supply, contributing to the expansion of district energy, and providing stable thermal energy supply to large-scale residential development districts. It plays a role as a social

infrastructure that supplies electricity to the metropolitan area.

(SDGs 13) Climate Action

With the implementation of this project, energy savings of 32% (410,885 TOE) compared to individual heating, 89% of air pollutants (SOx 941Ton, NOx 1,150Ton, Dust 55Ton) and 57% of greenhouse gas reduction(2,475,180Ton) were realized.

- (adaptation) To carry out this project, we analyze the current status and prospects of climate change in project area, classify the causes of risk for climate impact derive extreme climate index through the amount of change in climate value and utilize three step multi-layered analysis technique. Therefore, we conducted a climate change risk assessment to identify the vulnerability to heat waves among the five major climate influencing factors.