



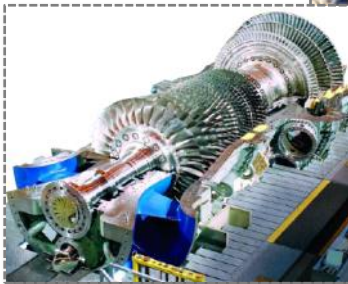
한국지역난방공사
KOREA DISTRICT HEATING CORP.

The Characteristics of Supply and Demand of District Cooling Using Wasted Heat

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TZU-LUNG, TAN
KDHC District Cooling Team



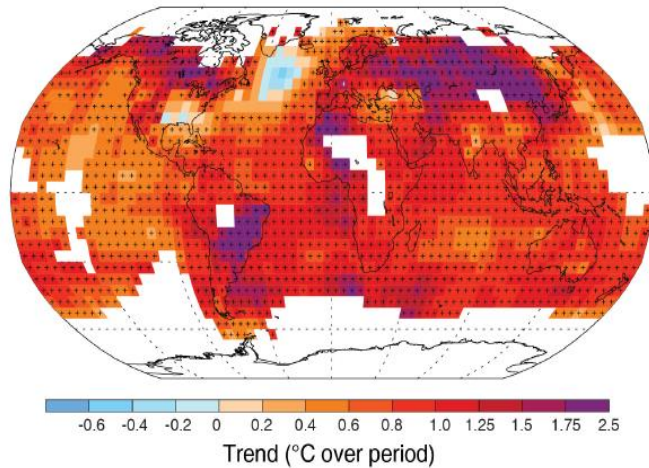


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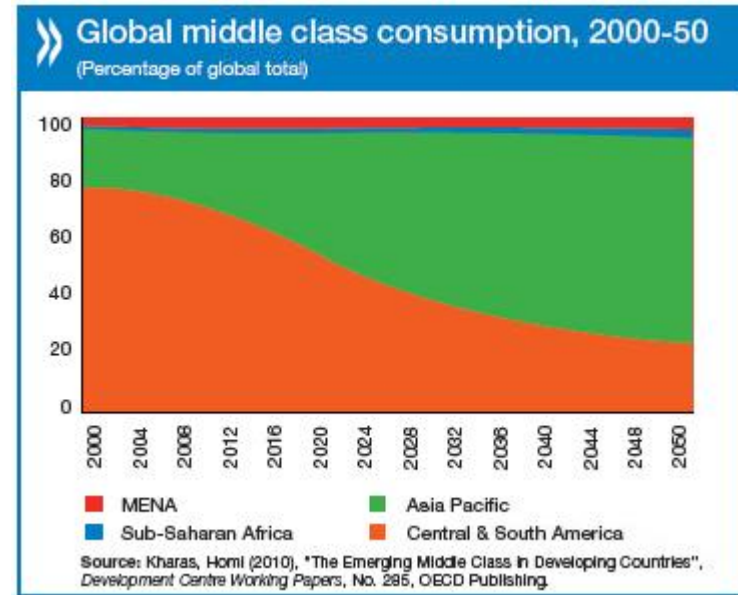
1. The concept of district cooling(DC)
2. Korean market and policies for DC
3. The effect of reducing greenhouse gas of the DC
4. The role of the DC as reduce greenhouse gas

Because of global warming and rising incomes, the demand of cooling is expected to consistently increase

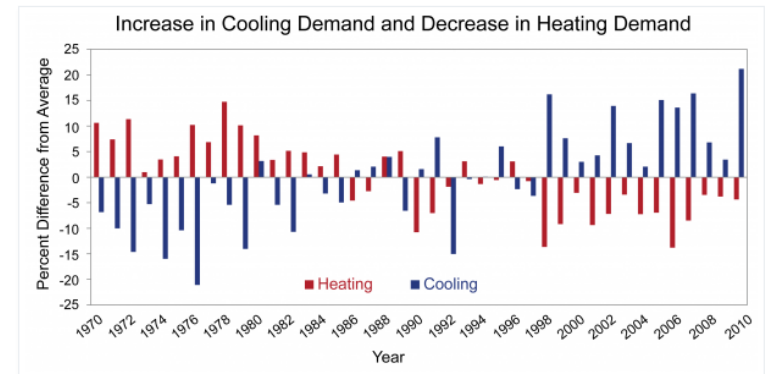
Change of Global trend



A change of average global temperature
(from 1901 to 2012)

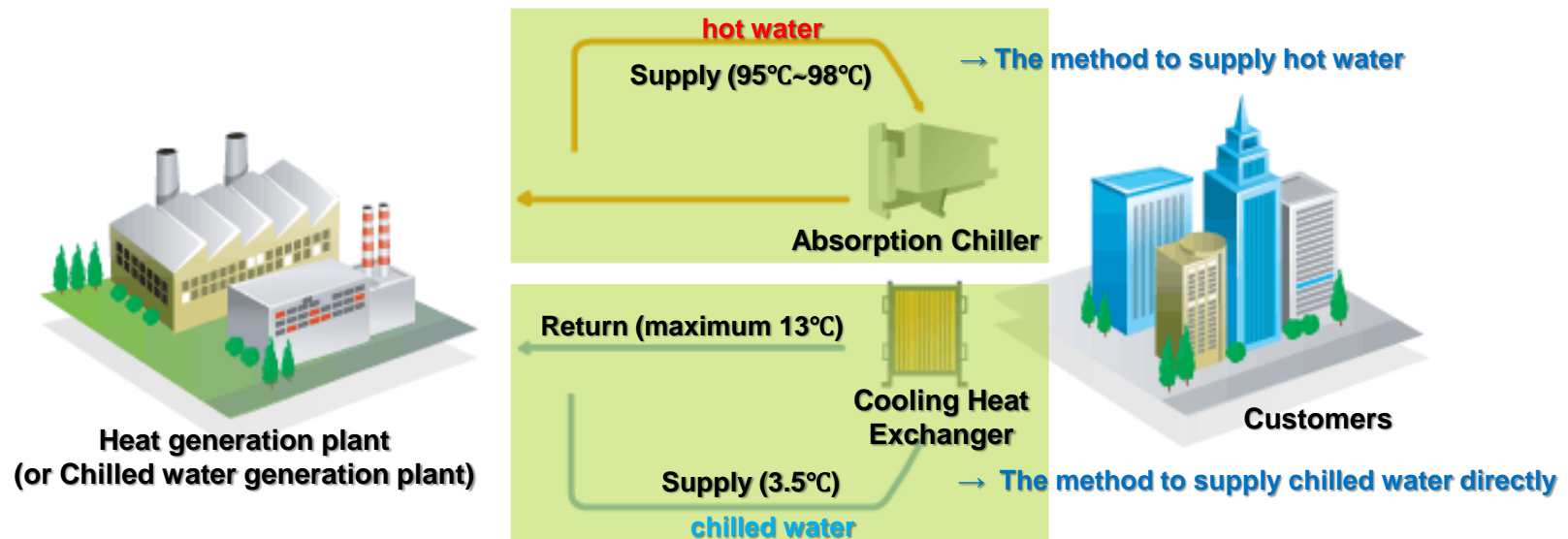


Demand of cooling increases!



District cooling(DC) is massive centralized production of cooling energy then delivers to consumers through the pipeline network

DC Conceptual Diagram



Heat Generation Facilities

- Waste incinerators, Waste Heat from CHP, Renewables, Aquifers, Rivers

In Korea, DC has contributed to peak load reduction, and can also save primary energy as well as CO2 emission.

Benefits of DC in Korea (based on KDHC business model)

Improve energy efficiency
(using wasted heat)

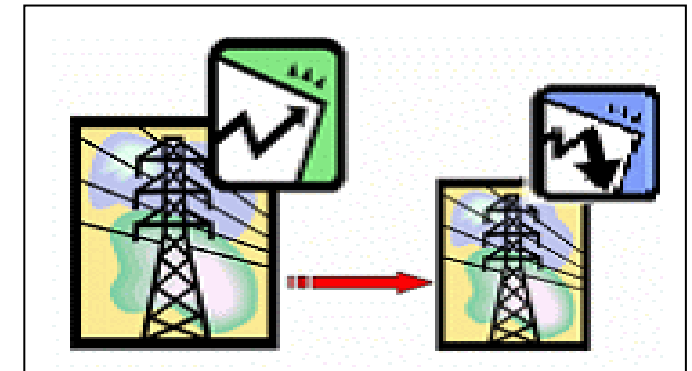
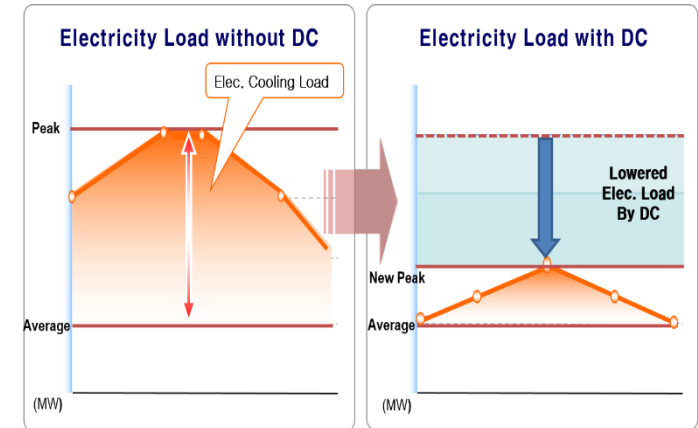
Incinerator



Combined Heat and Power plant

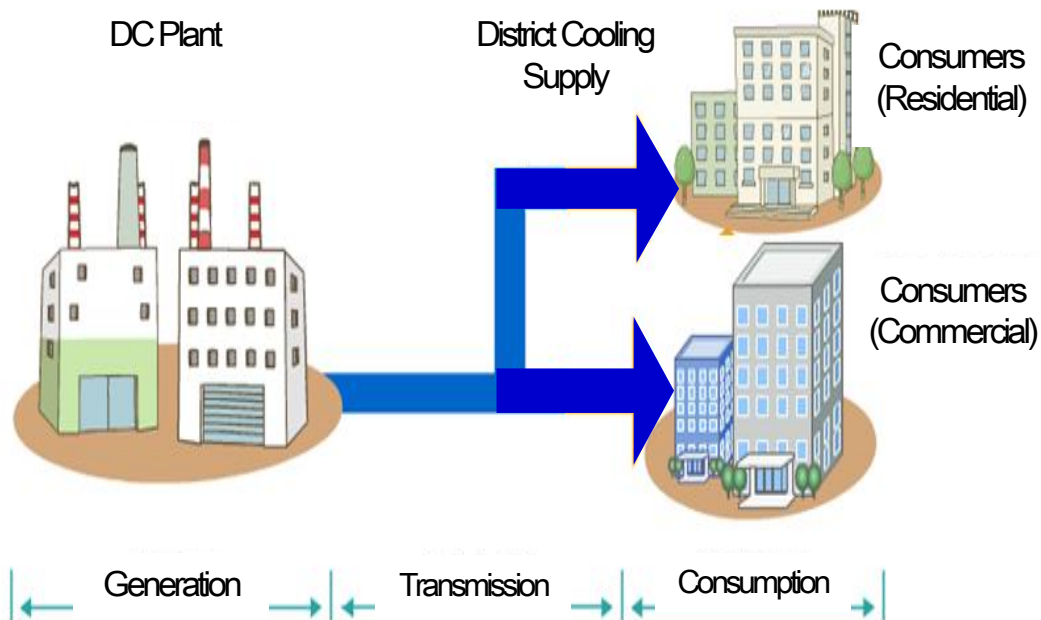


➡ Reduce greenhouse gas emission



One DC plant supplies whole consumers with cooling load, that makes consumers don't need individual air-conditioners.

Benefits of DC for consumers



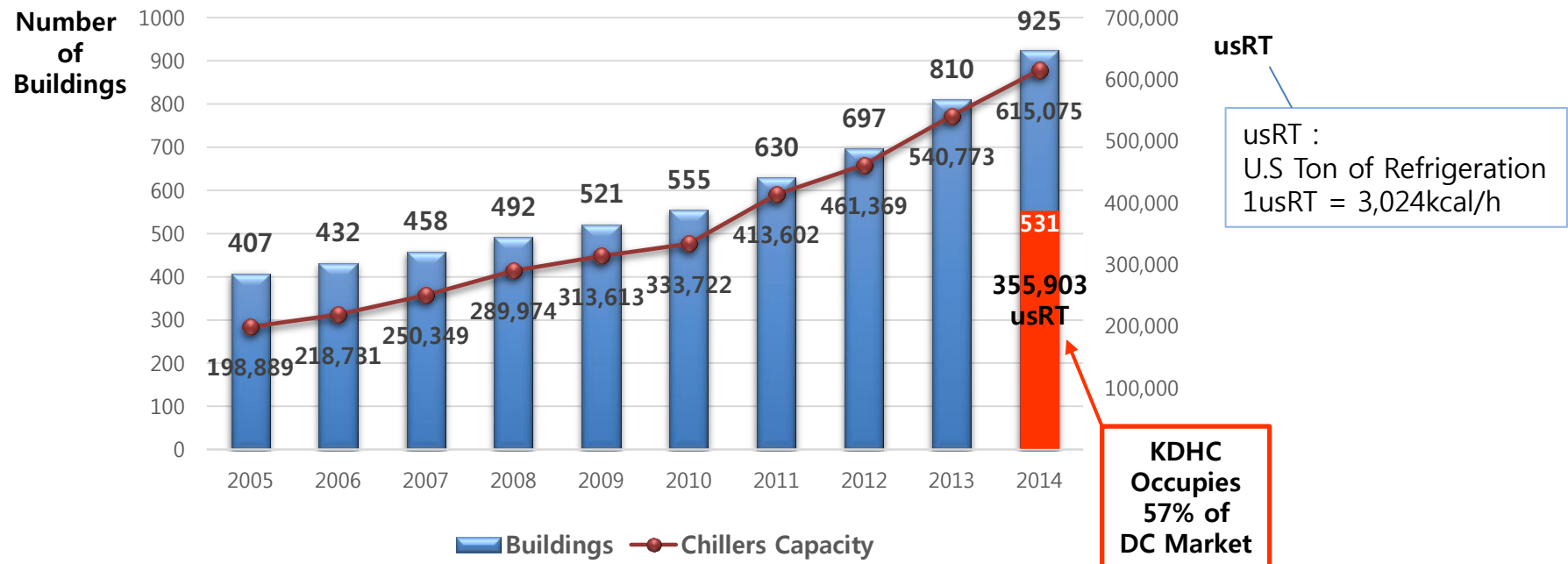
DC market in Korea has been rapidly expanding recent 10 years. DC consumers have increased 127% and DC capacity has tripled in size from 2005.

Status

- (As of 2014) 615,075 usRT to 925 buildings

Tendency

- (2005 ~ 2014) average annual growth rate of 13.5%



KDHC Sangam DC plant has been supplying **district cooling** to 35 consumers with capacity of 150Gcal/h since 2006.

Sangam Digital Media City(DMC) (Chilled water direct supply)

Facilities	Capacity(Gcal/h)	Status
Absorption Chiller	48.6	Supplying chilled water directly to 35 Buildings
Turbo-Refrigerator	63.5	
Ice Storage System	38.1	
Total	150.1	



Saved more than 25,000 tCO₂e through using wasted heat 46,990Gcal from incinerator over the last 5 years in Sangam DMC

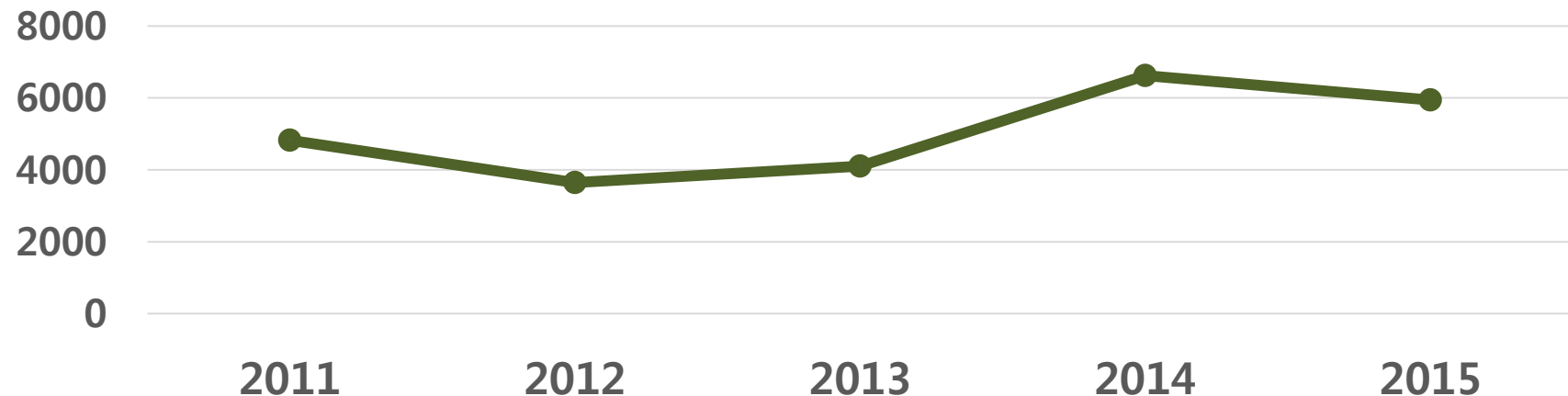
Used Wasted heat and saved CO₂

(unit : Gcal, tCO₂e)

	2011	2012	2013	2014	2015	Total
Wasted heat	9,022	6,820	7,666	12,377	11,105	46,990
Saved CO ₂	4,826	3,648	4,100	6,620	5,940	25,134

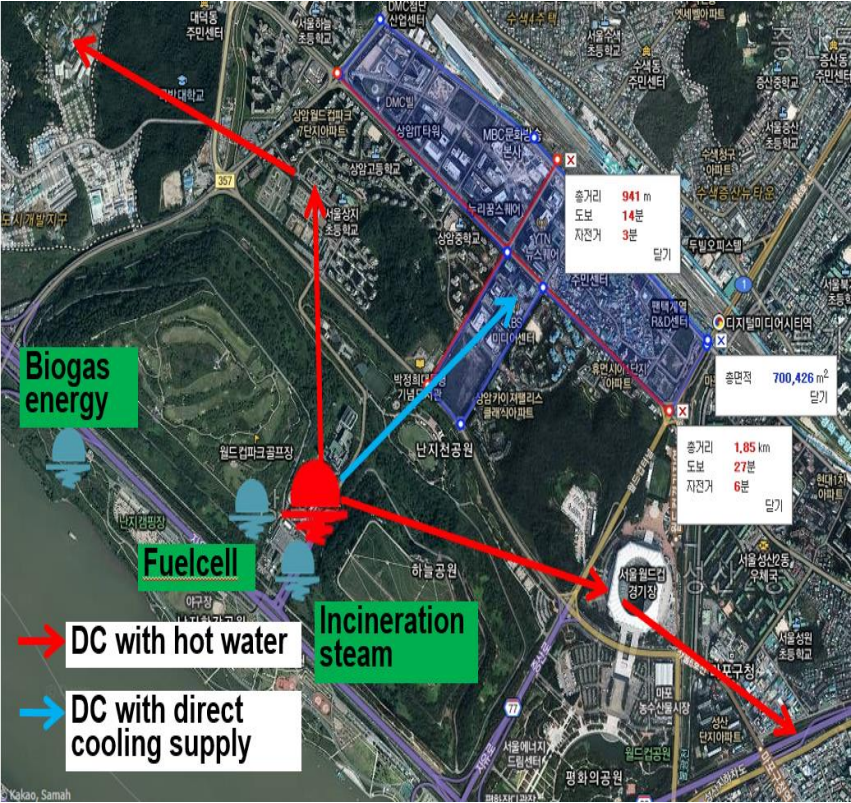
Performance of CO₂ saving

(tCO₂e)



Obstructive factor of DC : Lack of understanding, Tough estimation of equipment facilities due to difficult demand forecasting, Initial investment cost, Underground construction of pipeline network

Supply status of Sangam DMC



Underground construction Of pipeline network



Korea government supports DC market in various fields : Designation of district energy area by the law, Subsidies to DC consumers.

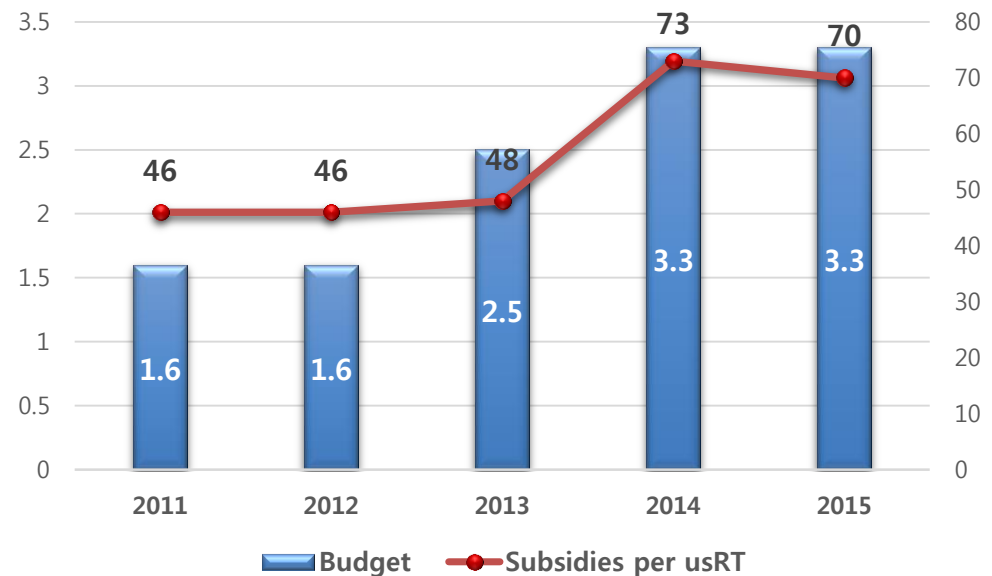
Government Supporting system for DC

In designated area, if gross floor area is over 3,000m² or Capacity of refrigerator is over 300Mcal/h, consumers should use DC.
Government subsidies for DC has increased rapidly since 2013,
And also Subsidies per usRT has doubled in size from 2011.



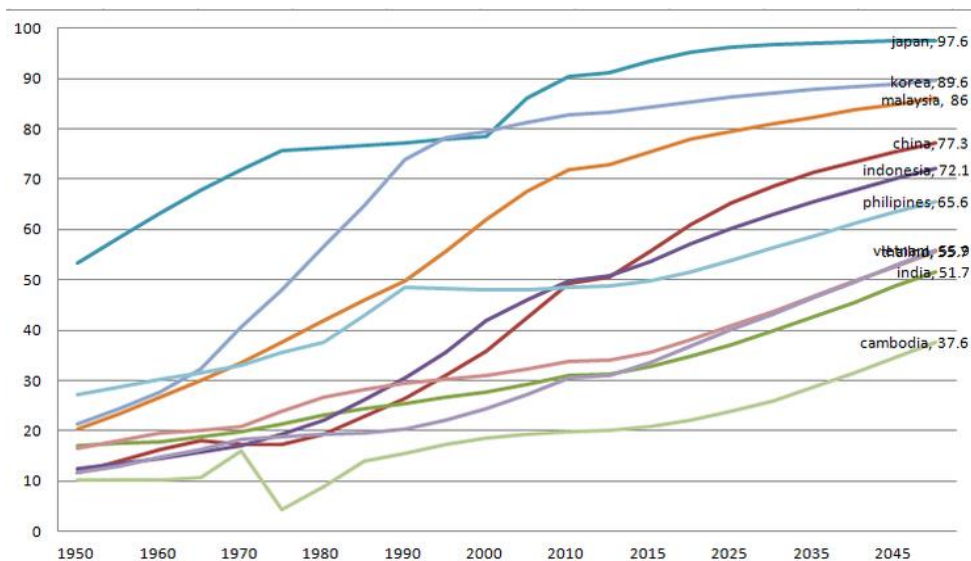
Budget
(Million USD)

Subsidies per
usRT(USD)



Most Asian countries have good conditions to introduce DC, because of high temperatures. And many opportunities of new town construction due to the increase in urbanization rate.

The Urbanization rate of Asia countries



<Annual average temperature>

Korea	13.6°C	Indonesia	26.5°C
Malaysia	26.5°C	Thailand	28.1°C
Vietnam	27.0°C	Philippine	27.7°C

KDHC's plan in Philippine

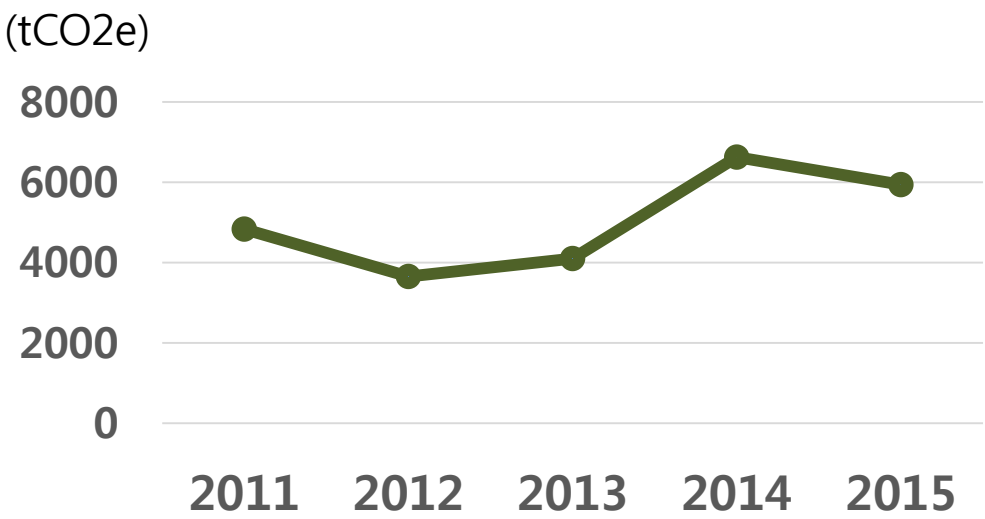
KDHC is under investigation of DC business model using a waste-to-energy in Clark, Philippine.

Equipment capacity	20MW + 45Gcal/h
Investment cost	300Million USD
(Cost of refrigerator)	42Million USD
Area	Texas Instrument, PSPC (semiconductor factory)

In conclusion, Cooling is not just luxury, but utility to survive the heat wave. District Cooling is an effective way to reduce Greenhouse gases and improve the quality of life.

Korea uses DC for energy conservation and reduction of GH gases. And also Korea government implements the Mandatory use policy and Subsidies. Introducing DC to your Countries may helpful for your national prestige and global environment.

Performance of CO₂ saving



A hand holding a small globe of the Earth against a blue sky with a paper airplane and a green field.

Thank You

TZU-LUNG, TAN

KDHC District Cooling Team

tanz@kdhc.co.kr