

APEC Workshop on District Cooling and/or Heating Systems

EWG 08 2019S

Research and Practices on Standardization for District Energy System (DES) in China



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1. Why we do it

“District Energy System” (DES)

- **District Energy System:** Integration of district heating, cooling, power and the other energy systems meeting the multi energy demand within the district.
- **Related energy systems:** District heating/cooling system (chillers), CHP, CCHP, heat pumps, etc.
- **Energy inputs:** fossil energy 、 renewable energy, residual energy
- **Energy outputs:** power, heating, cooling, etc.
- **Application:** buildings, industrial parks, cities and towns
- **Features:** deployed closed to the users (less transmission energy loss) , flexible control, system integration and cascade utilization of energy



1. Why we do it

International initiative

DES is one of the key areas of 2016 G20 Energy Efficiency Leading Programme, currently led by China, Saudi Arabia and Russia.

The objective of the Task Group is to encourage DC/DH deployment,

1. Establishing national institutions to support DC/DH deployment and regulation;
2. Developing a national DC/DH strategy, covering key issues such as licensing frameworks, technical regulation and economic regulation;
3. Encouraging the use of DC/DH in new participating public projects;
4. Defining DC/DH only zones, where DC/DH would be the only used cooling/heating technology.

1. Why we do it

Domestic policies

- < Outline for 13rd 5-yr plan > “to develop the energy internet characterized by integration of “energy source-grid-load-storage”
- < Mid and long term plan for energy conservation > “to develop CHP, CCHP...”
- <Guidance for development of natural gas based distributed energy system> “ to develop standards for grid connection, design of NG-based distributed energy system”
- <The 12nd 5-yr plan for development of standardization> “to develop key technical standards for CCHP driven by natural gas” 。
- <Implementation plan for civil heating system by using industrial residual heat > “ to develop standards for civil heating systems by using industrial residual heat”

1. Why we do it

Challenges

- Rapidly growing market;
- Lack of technical regulation/standards and supporting policies (planning, energy pricing and financing) ;
- Bad money drives out good;
- ...

1. Why we do it

Summary

It is critical to develop standards for the sustainable development of DES

- Bottom-up: to provide technical support for implementation of finance and industry policies
- Top-down: to provide technical support for the rapidly growing market and industry by identifying the unqualified ones and phasing them out, ensuring the existing ones running smoothly above the minimum requirement.

2. What we have done

Standard system for DES

DES Standards system

0. Fundamental standards

1. Planning standards

2. Design standards

3. Construction/installation standards

4. Technology/product standards

5. Operation standards

6. assessment standards

2. What we have done

Standards

CCHP:

- (**GB/T 33757.1-2017**) Energy saving ratio for distributed energy systems of combined cooling, heating and power—Part 1:Fossil energy driven systems
- (**GB/T 36160.1-2018**) Technical specification for distributed energy system of combined cooling, heating and power—Part 1:Refrigeration and heating subsystem
- (**GB/T 36160.2-2018**) Technical specification for distributed energy system of combined cooling, heating and power—Part 2:Power subsystem
- (**CJJ145-2010**) Technical specification for gas fired CCHP
- Design guidelines for distributed energy system of combined cooling, heating and power (to be released as national standard)
- ...

2. What we have done

Standards

District heating/cooling:

- (GB/T 35574-2017) The norm of energy consumption per unit product of combined heat and power generation
- (GB/T 33857-2017) General principles for energy conservation assessment—Combined heat and power generation project
- (GB/T 38680-2020) Technical guidelines for central heating system using low grade industrial surplus heat
- (GB/T 39091-2020) Guidelines for industrial waste heat comprehensive cascade utilization
- ...

2. What we have done

Standards

Smart DES:

- (GB/T 39119-2020) Integrated energy—Cooperative control overall functions and process requirements of ubiquitous energy internet
- (GB/T 39120-2020) Integrated energy-Ubiquitous energy internet terminology
- ...

2. What we have done

Standards

Distributed energy system:

- (**NB/T 33010-2014**) Operational and control specification for distributed resources interconnected with power grid
- (**NB/T 33011-2014**) Technical specification for test of equipments interconnecting distributed resources with power grid
- (**NB/T 33012-2014**) Function specification for monitoring systems of distributed resources interconnected with power grid
- ...

2. What we have done

Standards

Distributed energy system:

- (**NB/T 33010-2014**) Operational and control specification for distributed resources interconnected with power grid
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2. What we have done

Data collection and on-site investigation-CCHP

1 Data collection

Survey on CCHP done, over 100 questionnaires returned, installed capacity, heating/cooling capacity, fuel consumption, running time



CCHP in an industrial park in Shenzhen

CCHP in an industrial park in Beijing

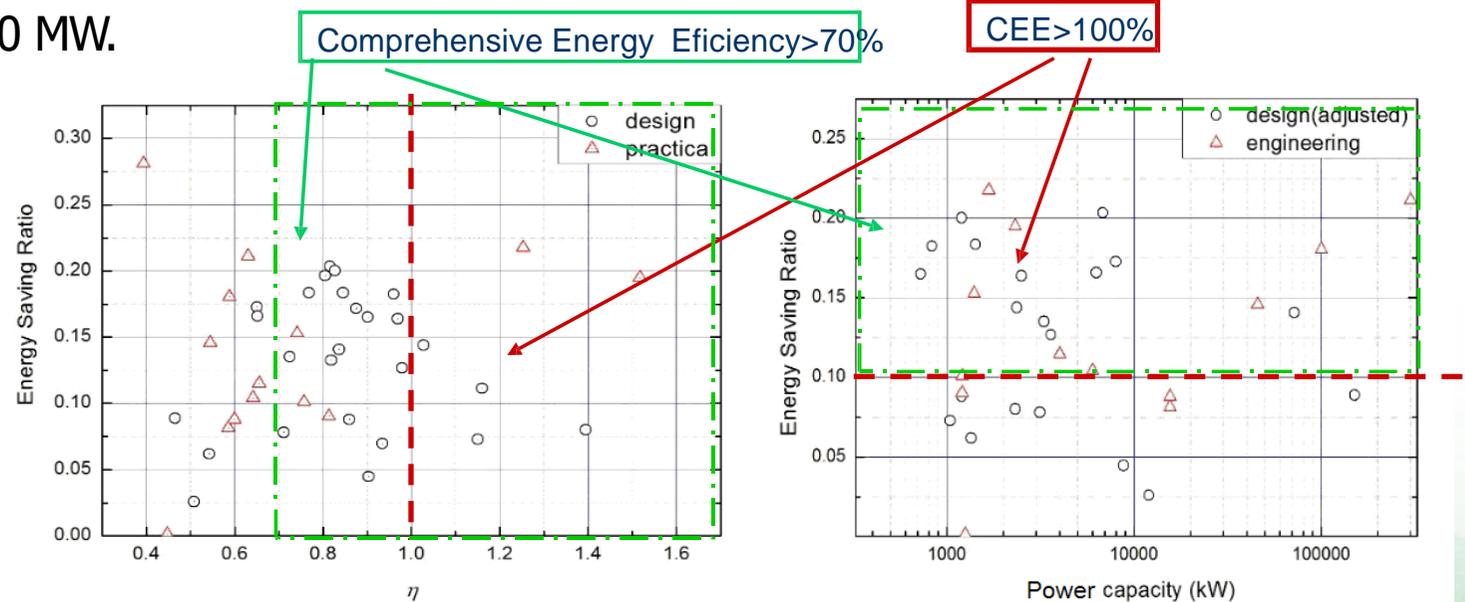


2 On-site investigation

2. What we have done

Data collection and on-site investigation-CCHP

- Data are collected from over 100 projects in China and abroad and the total installed capacity reached 2200 MW.





2. What we have done

Data collection and on-site investigation-Residual heat recovery

On-site investigation and data collection have been done to dozens of industrial residual energy recovery projects in industries of iron&steel, petrochemistry, building material, power in Beijing, Shanghai, Shandong, Hubei and Liaoning, as a result, first hand data and best practices have been collected.



2. What we have done

Data collection and on-site investigation-Smart DES

On-site investigation has been done to dozens of Smart DES in Hebei, Shandong, Shanghai, Guangdong, including different types of projects of industrial parks, commercial building, office building, etc.

2. What we have done

International cooperation and capacity building

June 2017, with direction and support from NDRC and SAC, CNIS hosted the side meeting of 8th Clean Energy Ministerial (CEM8) – International forum on “Strengthening energy conservation and management, Promoting green consumption”, during this forum, a workshop on “District Energy System” was held and more than 100 expert from China and abroad attended.



2. What we have done

International standardization

June, 2017, China host the plenary meeting of ISO/TC301 "Energy management and energy savings", and gave an introduction of Smart DES in China.



3. What we are doing

01 Demonstration project: Sino-Germany eco-park in QINGDAO



Location: Qingdao city, Shandong Province

Area: 11.6 km²

Users: industrial park, residential community, commercial complex

Technical solutions

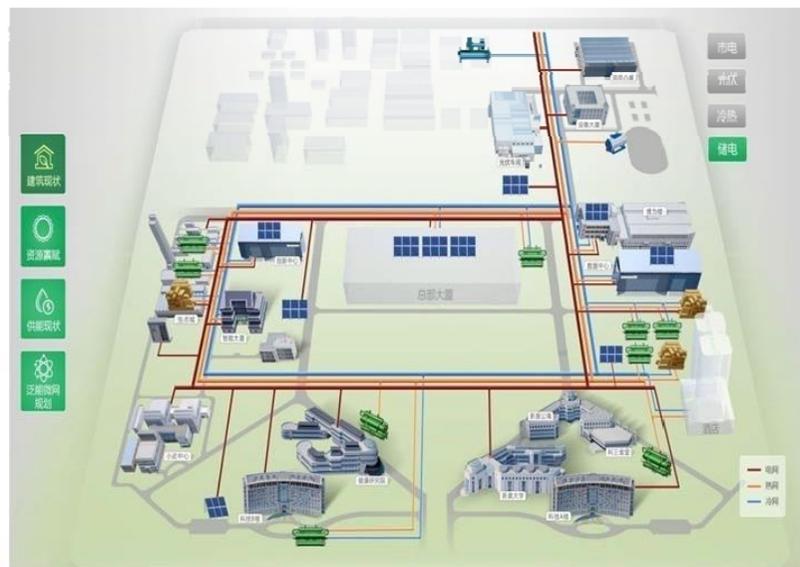
Energy technology: CHP+CCHP+heat pump+energy(heat/cold) storage+PV power+biomass+industrial residual heat recovery, etc.

Non energy tech: IT, IoT

Features: renewable energy+clean fossil energy, smart control/dispatch/trade

3. What we are doing

02 Demonstration project : Ecopark in Langfang



Location: Lanfang city, Hebei Province

Area: 3 km²

Population: 5000

Users: plants, office buildings

Technical solution

Energy technology: CCHP+heat pump+energy(heat/cold) storage+PV power+biomass etc.

Non energy tech: IT, IoT

Features: renewable energy+clean fossil energy, smart control/dispatch/trade

4. What we will do

R&D of evaluation methods and standards for DES

- Methodology->Standards->Demonstration/application
 - R&D of planning methods and standards for DES
 - R&D of evaluation methods and standards for DES
 - Standards system building and improvements

Thank you!

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