

EXECUTIVE SUMMARY

Developing low-carbon district heating (DH) solutions is crucial for Asian countries to achieve carbon neutrality targets in the building and energy sectors. The comparative study in this report, which mainly focuses on the DH sectors in China, Korea, and Japan, can help each side learn from the other's policy and technical strengths, and provide inspiration for the future development of low-carbon DH pathways in Asia and even globally.

China has the largest DH network in the world, and the demand for urban heating is still growing. Over the past decade, China has made a series of policy efforts to control pollution emissions from DH and improve air quality in northern cities. In the future, under the development requirements of carbon peaking and carbon neutrality, China needs to make a further leap from clean to low-carbon DH systems through synergetic policies in the energy and DH sector.

Korea has implemented integrated energy (IE) systems to diversify energy sources and improve energy efficiency, with increasing focus on reducing greenhouse gas emissions. While IE has become the preferred heating method, it must be transformed to use low-carbon fuels and supplement renewable energy sources to achieve carbon neutrality by 2050. This must be done while ensuring stable and safe energy supply and contributing to energy security.

The main findings of the report are as follows:

- China's future low-carbon heating system will be based on low-grade waste heat as the main energy source to replace coal, collected through long-distance heat networks with low return water temperatures, and integrating seasonal thermal energy storage to balance the load across different seasons.
- To establish a low-carbon DH model, Korea needs to enhance the efficiency of the existing DH system and adopt renewable fuels, unused heat including low operating temperatures, and sector-coupling technology while reflecting the resilience advantage of the existing combined heat and power (CHP) based DH model.
- Clean heat sources including various forms of waste heat should be prioritized in China, Korea, and Japan, supplemented with renewable electric heating, while energy-efficient retrofits of buildings should be carried out to reduce energy consumption.

