

Thermo-economic optimization of secondary distribution network of low temperature district heating network under local conditions of South Korea - DTU Orbit (09/11/2017)

Thermo-economic optimization of secondary distribution network of low temperature district heating network under local conditions of South Korea

A secondary distribution network of a low temperature district heating system is designed and optimized for a residential apartment complex under the local conditions of South Korea in the TRNSYS simulation environment. The residential apartment complex is a typical example of Korean residential apartment. The Apartment complex has 15 floors, 4 apartments on each floor and each apartment has heating surface area of 85 m². The supply temperature of the hot water is reduced from 65 °C to 45 °C and the temperature difference between supply and return line is varied from 18 °C to 27 °C. The corresponding heat loss from secondary network, pumping power and area of domestic hot water heat exchanger unit for each supply temperature and temperature difference for required heating load of the apartment complex are calculated. Results indicate that when supply temperature is decreased from 65 °C to 45 °C, area of heat exchanger is increased by 68.2%, pumping power is also increased by 9.8% and heat loss is reduced by 15.6%. These results correspond to a temperature difference of 20 °C, the standard temperature difference in South Korea residential heating system. Economic assessment of the secondary distribution network shows that the supply temperature of 55 °C and 60 °C are economically more feasible than 65 °C and 45 °C.

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