District Heating (DH) plays an important role into the Danish energy green transition towards the future sustainable energy systems. The new, 4 th generation district heating network, the so called Low Temperature District Heating (LTDH), tends to lower the supply temperature of the heat down to 40-50°C with return temperatures of 20-30 °C. This kind of heating system has many advantages and among all of them, it allows utilization of the heat coming from low exergy heat sources, as well as to decrease the grid heat losses. Electrical energy driven heat sources are also integrated into the future LTDH grid as they will have the strategical role of connecting the heating system with the electrical energy coming from the intermittent and fluctuating renewable energy sources such as wind and solar power. In this paper a case study of district heating system is presented and analysed. The goal was to evaluate the possibilities to lower the forward temperature of the heat supply in order to reduce the heat losses of the system. Booster heat pumps are introduced to increase the water temperature close to the final users. A Matlab model was developed to simulate the state of the case study DH network in terms of mass flow rates, temperatures and heat losses. After the model simulation, a new configuration of district heating with the introduction of three booster heat pumps was proposed. The new system's operation is determined based on a non-linear optimization problem in which the objective function was set to minimize the system heat losses. * Corresponding author 0303-1 1 This goal was achieved by lowering the forward temperature to 40°C and relying on the installed heat pumps to boost the water temperature to the admissible value needed for the domestic hot water preparation. Depending on the season, the optimized configuration allows decreasing the network heat losses in the range of 38-54%, higher reductions being achieved during colder seasons.

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