Demand side management for smart district heating

The influence on the district heating network design and operation by using the energy storage capability inside the building is studied on different types of buildings under Danish climate. The building envelope has significant role in buildings energy consumption but also in building time constant. The results show that by the extensive renovation the energy consumption and the peak load could be reduced with more than 55% for two heating systems: radiant floor heating and radiators convective heating. Light renovation case has the peak load and energy consumption decreased with values between 25% and 35%. By making the light renovation, the heating system needs a minimum supply water temperature of 58°C in order to cover the thermal comfort. Through extensive renovation, the supply water temperature could be reduced to 50°C which makes it possible to transform the District Heating Temperature into Low Temperature. The building time constant for the extensive renovation is 86 hours which is double than a light building renovation and 53 hours higher than a non-renovated building. In the end of the paper is developed a formula which has the purpose to validate the results of virtual simulations. The relative percentage difference between the theoretical calculation and the virtual simulation results are between 2.5% and 17.5%.

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