

Lowering district heating temperatures – Impact to system performance in current and future Danish energy scenarios - DTU Orbit (08/11/2017)

Lowering district heating temperatures – Impact to system performance in current and future Danish energy scenarios

CHP (Combined heat and power) production in connection with DH (district heating) systems has previously demonstrated a significant reduction in primary energy consumption. With extended installation of intermittent sustainable sources, such as eg. wind turbines rather than thermal units, the changed distribution of generation technologies may suggest a reconsideration of optimum for DH network temperatures, in order to achieve low cost and minimize carbon emissions. A mixed integer linear optimisation model was used to investigate the changed operation based on changed network characteristics. Utility plants and demand curves corresponded to the current and future scenarios for the DH system of Greater Copenhagen. Performance curves from typical CHP-plant technologies were used to represent the changed operation of power and heat production for changed DH temperatures. The results show that primary fuel consumption is reduced approximately 5e7% at DH design temperatures of 60e70 C. Further reduction in DH temperatures resulted in opposing tendencies, as hot tap water requires electricity to reach the required temperatures. The results are network-specific, as they represent the given network and production units, but similar trends can be expected for other large networks.

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