Scenarios for sustainable heat supply and heat savings in municipalities - the case of Helsingør, Denmark

Local climate action is not only a domain of large cities, but also smaller urban areas that increasingly address climate change mitigation in their policy. The Danish municipality of Helsingør can achieve a substantial CO2 emissions reduction by transforming its heat supply and deploying heat savings. In this paper, we model the heating system of Helsingør, assess it from a simple socio- and private-economic perspective, develop future scenarios, and conduct an iterative process to derive a cost-optimal mix between district heating, individual heating and heat savings. The results show that in 2030 it is cost-optimal to reduce the heating demand by 20–39% by implementing heat savings, to deploy 32%–41% of district heating and to reduce heating-related CO2 emissions by up to 95% in comparison to current emissions. In 2050, the cost-optimal share of district heating in Helsingør increases to between 38 and 44%. The resulting average heating costs and CO2 emissions are found to be sensitive to biomass and electricity price. Although the findings of the study are mainly applicable for Helsingør, the combined use of the Least Cost Tool and modelling with energyPRO is useful in planning of heating and/or cooling supply for different demand configurations, geographical region and scale.

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