

Popular science summary of the PhD thesis

PhD student	<u>Qinjiang Yang</u>
Title of the PhD thesis	<u>Unobtrusive measures for optimal operation of heating delivery systems at lower supply temperatures</u>
PhD school/Department	<u>DTU Construct</u>

Science summary

Buildings account for around 30% of global energy consumption, with most of this energy used for space heating and domestic hot water. In Denmark, about 65% of residential buildings are connected to district heating networks. The transition towards fourth-generation district heating requires a gradual reduction in operating temperatures.

This PhD thesis investigates how low-temperature operation can be achieved in buildings connected to district heating networks using unobtrusive approaches. By combining data from heat cost allocators and smart heat meters, a methodological framework is developed to analyze radiator heat distribution, identify the most demanding apartment in a building, and determine the minimum supply temperature required to maintain indoor comfort. The research also proposes a method to improve heat cost allocator data quality by recovering truncated decimal values, enabling more accurate short-interval analysis. In addition, a future-proof domestic hot water substation design is experimentally validated, demonstrating significantly lower return temperatures under low supply temperature conditions.

Overall, the results show that the current level of building digitalization and existing hardware can support the transition of district heating systems towards lower operating temperatures.

Please email the summary to the PhD secretary at the department