

Comparison of Solar District Heating and Renovation of Buildings as Measures for Decarbonization of Heat Supply in Rural Areas

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Abstract

In this study two different decarbonization strategies for rural heat supply are compared on the example of 180 buildings located in a small village in Germany with about 860 inhabitants and typically mainly old buildings, partly in half-timbered construction. The comparison shows that erection of a solar district heating system with solar fraction of about 67 % leads to similar heating costs as an energy efficient renovation followed by installation of decentralized air source heat pumps for most of the buildings. Both concepts aim to achieve a heat supply that is free from the local use of fossil fuels. While the solar district heating system can probably be realized within a few years and therefore achieves the full CO₂ savings promptly, this would take decades for the implementation of energy efficient renovation and heat pumps due to low renovation rate. Reaching climate-neutrality for the heat supply could thus be accelerated significantly by the construction of a solar district heating system. Moreover, the two decarbonization approaches do not appear to be fundamentally mutually exclusive: subsequent steady renovation of connected buildings will either increase solar share in heat supply or enable connection of new consumers at similar solar coverage rate. However, it should be also noted that with solar district heating alone, not always the same thermal comfort as with reinforced building renovation is achieved.

Keywords: Decarbonization, Energy efficient renovation, Existing buildings, Rural heating, Solar district heating

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