Analyse und Vergleich verschiedener Varianten zur emissionsarmen Deckung des Trinkwarmwasserbedarfs im Quartier

Analysis and comparison of different variants for the low-emission coverage of the drinking hot water demand in districts

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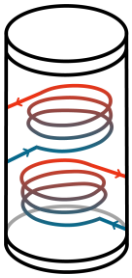
Master thesis/Bachelor thesis
from the field of energy-efficient construction and energetic networking

Topic:

A large proportion of the heat demand in new buildings can be attributed to the production of domestic hot water. Various framework conditions pose particular challenges in the integration of renewable energies for district supply.



In general, the following applies: The lower the temperature level to be achieved, the easier the heat can be supplied by renewable energies. A flow temperature of 35 °C is usually sufficient for surface heating. For reasons of hygiene, the domestic hot water must either be heated to 60 °C or short downtimes in the pipes must be met.
Exergy losses are unavoidable when heating the entire volume of water required for the heat supply. A division into two separate systems, however, is costly and possibly disadvantageous for the storage losses.
Solar thermal energy can be used for hot water preparation. However, this is in competition for space with photovoltaics, which can be used to replace electrical energy from the power grid, which currently still has a high CO_2 factor. PVT collectors generate both electrical energy and heat, but at a lower temperature level than conventional solar thermal collectors. With the electrical energy from the PV cells, heat pumps can in turn be operated, which raise the temperature level of the respective heat source in order to reach the required temperature level for the domestic hot water. However, the annual performance factor of the heat pump decreases as the sink temperature rises.

Within the scope of this work, different variants to cover the domestic hot water requirement are to be designed, modeled and analyzed in the simulation program Trnsys. The investigations can be carried out using a sample district from the DELTA research project (Darmstädter Energie-Labor für Technologien in der Anwendung). The aim is to minimize greenhouse gas emissions in the energy supply.

Source: City Darmstadt

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