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RES:Z
Ressourceneffiziente Stadtquartiere

IWAES II – Integrative Consideration of Sustainable Heat Management of Urban Quarters

The funding measure Resource-efficient urban districts for the future (RES:Z)

Almost 30 percent of Germany's primary energy consumption – mostly fossil sources – is used for the thermal supply of buildings. IWAES starts here and uses thermally activated sewers for the thermal supply of an urban district, which act in combination as a heat sink and source as well as a heat network between the users. The approaches to dimensioning and implementation that have been developed theoretically so far are now being tested in real laboratories and dimensioning aids are being derived using the advanced simulation model.

The German Federal Ministry of Education and Research (BMBF) is funding the project as part of the funding measure Resource-efficient urban districts for the future (RES:Z). The funding measure focuses on the resource-efficient use of water, land, material flows, energy and urban greenery in urban areas. The goal is integrative planning and sustainability-oriented management of urban neighborhoods with the participation and coordination of all relevant stakeholders.

Utilization of wastewater thermal energy

The current ecological, economic and security policy problems in the energy supply show how important it is to utilise local and renewable energy sources. This is the only way the heating transition can succeed. In addition, the management of cooling processes is becoming increasingly important due to climate change.

One component for achieving these goals is the use of wastewater thermal energy. The thermal activation of sewers and the resulting hybrid use is economically and ecologically advantageous and also allows the realisation of a heat balance in urban quarters by means of additionally installed pipes.

Hybrid sewer concept – technical and urban planning aspects

To thermally activate sewers, so-called absorbers are integrated into the sewer. These absorber pipes extract the heat from both the wastewater and the surrounding soil and then transport it to where it is needed. The layout of this "hybrid sewer" was continuously optimised in the first funding phase using numerical simulations.

The simulations show that up to 15 per cent of an urban district's thermal demand could be met purely from wastewater thermal energy.

thermal energy from wastewater. In addition, existing formal and informal planning instruments were analysed with regard to their suitability for integrating the hybrid sewer concept. All findings were summarised in an action guide, which allows stakeholders to easily implement the concept.

Exemplary hybrid channel.

Increased acceptance through validated design aids

In the follow-up phase, the methods and approaches developed in the first phase will be technically tested. For this purpose, the hybrid channel is tested in living labs. This measurement data is used to check and, if necessary, further develop the numerical simulation model from the first phase.

In terms of urban development, operator models for heat networks with hybrid ducts and concepts for increasing the acceptance of the implementation of the concept in urban neighbourhoods are developed. The updated technical and urban development concepts will be applied to selected model projects with representative quarter structures and typologies. Several elements are dealt with in this process. In addition to the dimensioning of the sewer networks, the dimensioning of the hybrid sewers and the network planning, energy master planning is also being carried out. At the same time, the operator models to be developed and the approach to owners will be tested in real and developing urban districts, checked for possible obstacles to implementation and optimised.The manual already created in the first phase will then be expanded or modified to take these new findings into account.

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Resource-efficient urban districts for the future (RES:Z)

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