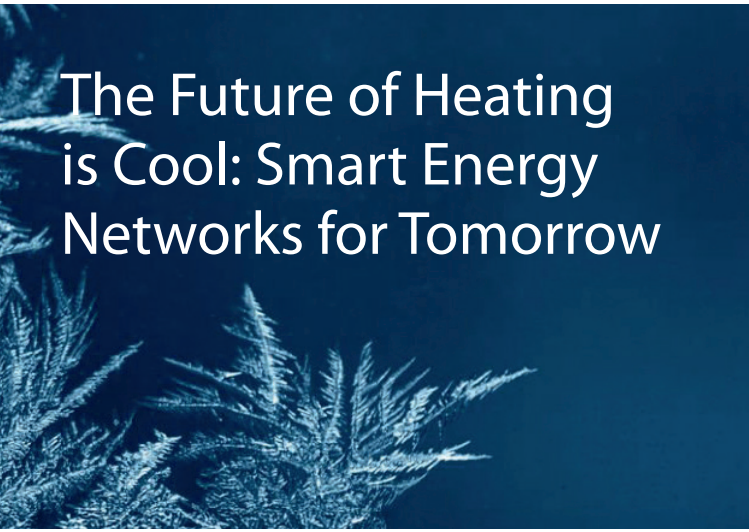
ENERGY CAMPUS CAPUTH



The Future of Heating is Cool: Smart Energy Networks for Tomorrow

The **Energy Campus Caputh**, located in the Blütenviertel Caputh, has been established as a pioneering hub for education and innovation. It serves as a real-world laboratory for sustainable district development and as a venue for the energy and heat transition.

The district integrates living, coworking, community, and sustainability into a holistic environment – powered by forward-looking energy solutions.

Low-temperature thermal networks, combined with seasonal ice storage systems, unlock the potential of low-temperature waste heat for both heating and cooling. In conjunction with heat pumps and renewable electricity, this approach delivers a climate-neutral, highly efficient, and economically viable energy system that actively supports municipal heat planning.

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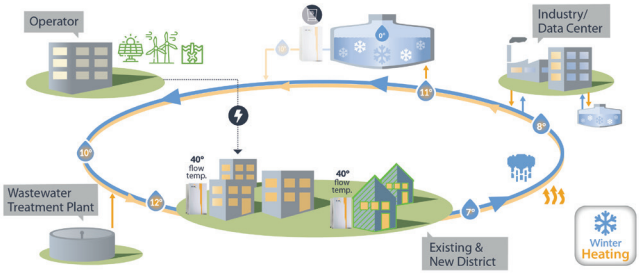
From Waste Heat to Resource: Rethinking Heating and Cooling Infrastructure

To accelerate decarbonization, policymakers have introduced key regulatory frameworks, including the Energy Efficiency Act, the Building Energy Act and the German Heat Planning Act.

These requirements present significant challenges for many companies. While waste heat must be utilized, suitable off-takers are often lacking, as temperatures (around 30°C) are too low for conventional heating networks. Although companies would be willing to provide their waste heat for free in some cases, municipal utilities and network operators have shown limited willingness to participate.



Illustrative diagram of a cold heat network and its stakeholders

Low-temperature thermal networks, in combination with ice storage systems, enable the efficient utilization of low-temperature waste heat. Buildings can be reliably heated in winter and cooled in summer. Supported by heat pumps and renewable electricity, this results in a climate-neutral, highly efficient, and cost-effective energy supply.

Even waste heat below 30°C can be transported over long distances with minimal losses, stored efficiently, and deployed on demand. These networks operate year-round at approximately 10°C, providing both heating and cooling. Compared to conventional high-temperature networks, they offer significantly improved economic performance and do not require complex insulation.

Conclusion: **This technology unlocks the large-scale utilization of virtually all forms of waste heat for integration into municipal energy systems.**

It delivers CO_2-neutral heating and cooling, offers strong economic advantages, and addresses a critical challenge for many companies: meeting regulatory requirements to make waste heat usable.

How It Works – Ice Storage System

Ice storage systems leverage the principle of latent heat, specifically crystallization energy, which is released when a substance transitions from a liquid to a solid state. When water at 0°C freezes into ice at the same temperature, it releases an amount of energy equivalent to that required to heat the same volume of water from 0°C to 80°C.

Winter

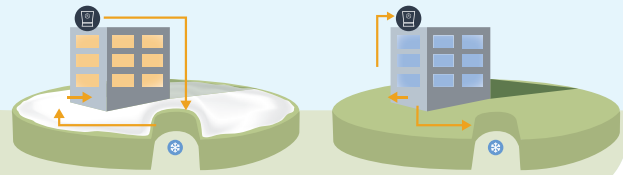
Thermal energy for the building is extracted – via a heat pump – from the ice storage tank[1] and indirectly from the ambient environment. This process provides reliable heating.

[1] As heat is extracted from the ice storage tank, the water in the tank freezes.

Summer

Excess heat from the building is transferred either directly to the ice storage tank or – via a heat pump[2] – to the surrounding environment. This enables efficient cooling.

[2] As heat is absorbed, the ice within the ice storage tank melts.



Technology focus: low-temperature thermal networks

Energy-efficient low-temperature thermal networks, combined with seasonal latent heat storage systems (ice storage), enable the effective use of low-temperature waste heat to heat buildings in winter and cool them in summer.

By integrating waste heat and utilizing heat pumps powered by renewable electricity, this approach creates a climate-neutral, highly efficient, and cost-effective energy solution. It plays a key role in enabling the successful implementation of municipal heat planning strategies.

ZIM Network
To advance these solutions, small and medium-sized enterprises and research institutions have joined forces within the ZIM network "SDKW" - funded by the German Federal Ministry for Economic Affairs and Energy (BMWE).

Coordinated by Steinbeis Innovation & Management GmbH, the network supports municipalities and companies in the development and implementation of innovative, future-oriented concepts.

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