RIFS-Blogpost

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[Renewable Heating for All? Stories From Pioneering

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The entrance to the thermal energy storage facility in Nechlin.

Heating is a crucial component of the energy transition: around one third of Germany's total final energy consumption is used for space

! Zum Aktualisieren der Textelemente, Zitation markieren und dann F9 drücken !

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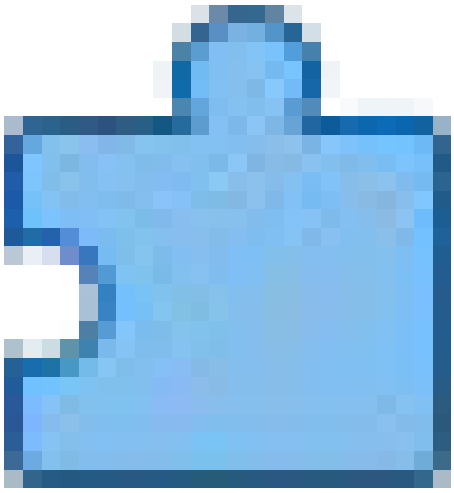
heating and warm water in buildings. However, unlike electricity—where renewable energy sources account for more than 50% of the mix—the share of green energy in heating was less than 18% in 2023. Oil, coal, and especially gas remain widely used for heating. At the same time, energy prices have risen sharply in recent years, leaving many people concerned about managing their heating costs. The heating transition must not only support climate goals but also ensure stable and fair energy prices in the long term.

"We have been saying for a long time that what really helps citizens is affordable heating and, secondly, affordable mobility " (Jörg Müller, Chairperson of the Supervisory Board of ENERTRAG SE, interviewed in the episode "Wärmewende Brandenburg")

Germany urgently needs a rapid transition to renewable and affordable heating sources. But how can this be achieved at the local level? How can municipalities lead the way in transitioning to clean, affordable heating? In this blog and in a new episode of the RIFS podcast "Wandel verhandeln. Nachhaltig in Brandenburg" (available in German only) we explore these questions with local stakeholders from Brandenburg. While the challenges are undeniable, several municipalities in the region demonstrate that diverse decarbonization pathways are both feasible and inspiring.



1.1 Prenzlau goes geothermal

As part of the North German Basin, Brandenburg offers favourable conditions for geothermal energy. Prenzlau, with its municipally-owned energy utility, operates a district heating network that serves the majority of the city's 20,000 residents. Currently, about 82% of the heat is generated by burning natural gas. However, the city has ambitious plans to achieve a share of at least 80% renewable energy in its heating mix by 2030.

In addition to heat generated from biomass and biogas, the municipality aims to tap into the region's hydrothermal potential to achieve this rapid transformation. Plans are underway to install a large-scale heat pump for geothermal energy by 2025. This system will source water from a depth of 1,000 meters, which will then be further heated by the heat pump. The project is expected to provide renewable heating to 5,500 residents. The federal government has contributed over €8 million to the project through the "Bundesförderung für effiziente Fernwärmenetze" programme (Federal Fund for Efficient District Heating Networks). Future heat

production in Prenzlau will increasingly rely on geothermal energy, which is projected to account for 60% of heat supply in district heating. Besides, the plans include a significant share for Power-to-Heat technologies, which would allow to harvest the considerable excess energy produced from wind and solar energy in the region.

The municipal utility had already used geothermal energy on a small scale during the 1980s and early 1990s, but then abandoned it due to the availability of cheaper Russian gas. More recently, the suitability of the technology to provide local energy at low cost was reassessed and its significant potential acknowledged. A driver behind the municipal utility's search for alternative heating sources was the introduction of the Fuel Emissions Trading Act in 2019. The Act, which mandates a steadily rising price for fossil fuels, posed a risk of increasing consumer costs for the city’s predominantly gas-based district heating system.

From the perspective of the local utility, stakeholder participation has been crucial in creating a network transformation plan and preparing the extension of the heating network. Houseowners and housing companies, who collectively own a diverse range of properties, were invited to share their plans and expectations. This input helped the utility create a comprehensive cadastre, which can be used to forecast demand and assess the willingness of houseowners to connect to the grid. Since connecting to the district heating grid is not mandatory in Prenzlau—unlike in some other cities—the utility must actively convince houseowners and housing companies of the benefits of grid connection. These parties still have the option to choose individual heating solutions instead.

The municipality of Neuruppin is also making strides in its geothermal energy projects, which are expected to provide 80% of its district heat in the near future, as we discuss in our podcast.

The geothermal drill site at Neuruppin.
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1.2 Hennigsdorf combines diverse renewable sources and smart storage

Hennigsdorf, near Berlin, offers another compelling example of an ongoing heat transition. This municipality aims to achieve a CO_2-neutral district heating supply by leveraging regional resources.

The local utility harnesses waste heat from an electric steel plant, alongside contributions from a solar thermal plant, a bio-natural gas facility, and a biomass power plant. A multifunctional heat storage facility, using water as the heat transfer medium, plays a critical role in the system. This storage absorbs surplus heat from the steel plant and other sources, stores it, and helps balance fluctuations in heat generation and peak consumption — even on a seasonal scale — allowing the integration of intermittent energy sources such as the steel or solar plants. Plans are also underway to construct a second storage facility, partially financed through crowd-investing. With the capacity to hold 5 million litres of water, this new facility will give the municipal utility considerable leeway with regards to future energy sources. The transition is gathering pace: While 59% of the city was connected to district heating in 2010, nowadays the network supplies 80%. The diversity of energy sources contributes to the short-term goal of increasing the share of renewable energy from 60% to 80%.

The municipal utility highlights the importance of transparency and open communication with the public and stakeholders. These efforts were particularly crucial at the start of the transition more than 15 years ago, as investments initially led to higher heating costs. The crowdfunding initiative for the storage system not only served to spread news of the plans among the local population but also allowed residents to share in the economic benefits generated by the project. Residents can invest in the project, and receive parts of their investment back each year, at an above-market interest rate.

Despite the significant progress made, several challenges remain, particularly political uncertainty regarding future policy support for the heat transition at the federal and state levels.

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1.3 Searching for tailored solutions

Some communities have small populations, others are widely dispersed, which may prevent them from developing a district heating network. In such cases, alternative solutions need to be implemented. For instance, the community of Nechlin in Uckerland harnesses the excess electricity generated by local wind turbines. The community developed a small network that uses wind electricity to heat water, which is then stored and used to heat around 40 households. Other rural areas rely on biogas or biomass as alternative energy sources.

In summary, there is no one-size-fits-all solution. Some municipalities may benefit from utilizing waste heat from local industries, while others can take advantage of favourable hydrogeological conditions for geothermal energy or harness solar or biomass energy. Each community, in collaboration with its citizens and stakeholders, must identify the optimal combination of technologies and practices to suit its specific circumstances.

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