

ENGINEERING
TOMORROW



Article | District heating

Wood chips are the **future** heating solution for Eurasburg

In the Wittelsbacher Land near Augsburg, a local heating network based on wood chips is now operating at full speed and implemented within a short timeframe. See how Danfoss supports the municipality of Eurasburg with a game-changing solution of substations and software. Maybe this model is the future solution for the sustainable heating transformation in rural areas?

In close cooperation between local politicians and local craft businesses, the local heating network already supplies 80 buildings with a solution based on wood chips that replace the old oil-fueled heating systems, and Danfoss has supplied the substations and the software for visualizing and controlling the network.

The much-wanted connection between climate protection and regional value creation is now a reality for the 1,900 inhabitants in Eurasburg. Here, a heating engineer from the neighboring town is responsible for the planning, construction, network operation, and a local wood chip producer acts as the fuel supplier. Wood comes from the municipal forest.



“We’re going for **wood chips**”

But how did a Bavarian-Swabian village come to rely on wood burning in times of the heat pump hype? The local heat transition was initiated long before the current debates began. When they needed a heating solution for the extension of the day-care center in 2018, it was clear to the local political decision-makers that only heating based on renewable energies was an option. The heat pump was “not an issue”, Mayor Paul Reithmeir recalls. “We made the decision relatively quickly in the municipal council: We are going for wood chips. “At that time, the new heating network had not been planned yet – but according

to Reithmeir, the first questions came from the residents: “Can we connect to a wood chip heating system?” The need for a new heating solution in many Eurasburg households was high, as the existing oil-heated boilers were getting old and needed replacement. The idea matured, and they decided to expand the concept and build a local heating network with a central wood chip system. A local town hall meeting made it abundantly clear that there was a great deal of interest in the planned village heating system: the project was an excellent fit for Eurasburg, whose municipal area is almost 60 percent covered by forest and whose forestry

will automatically provide the required fuel in the long term without affecting the forest. “The raw material,” says Reithmeir, “will never vanish”. But there were other concerns:

Heating engineer Michael Gail from neighboring Friedberg explains where these concerns came from: “The existing buildings are mostly old and have never been renovated; they have outdated radiators, neither insulation nor modern windows. Consequently, heat pumps could not be recommended – they would be costly to operate because the heating requirement is too high.”

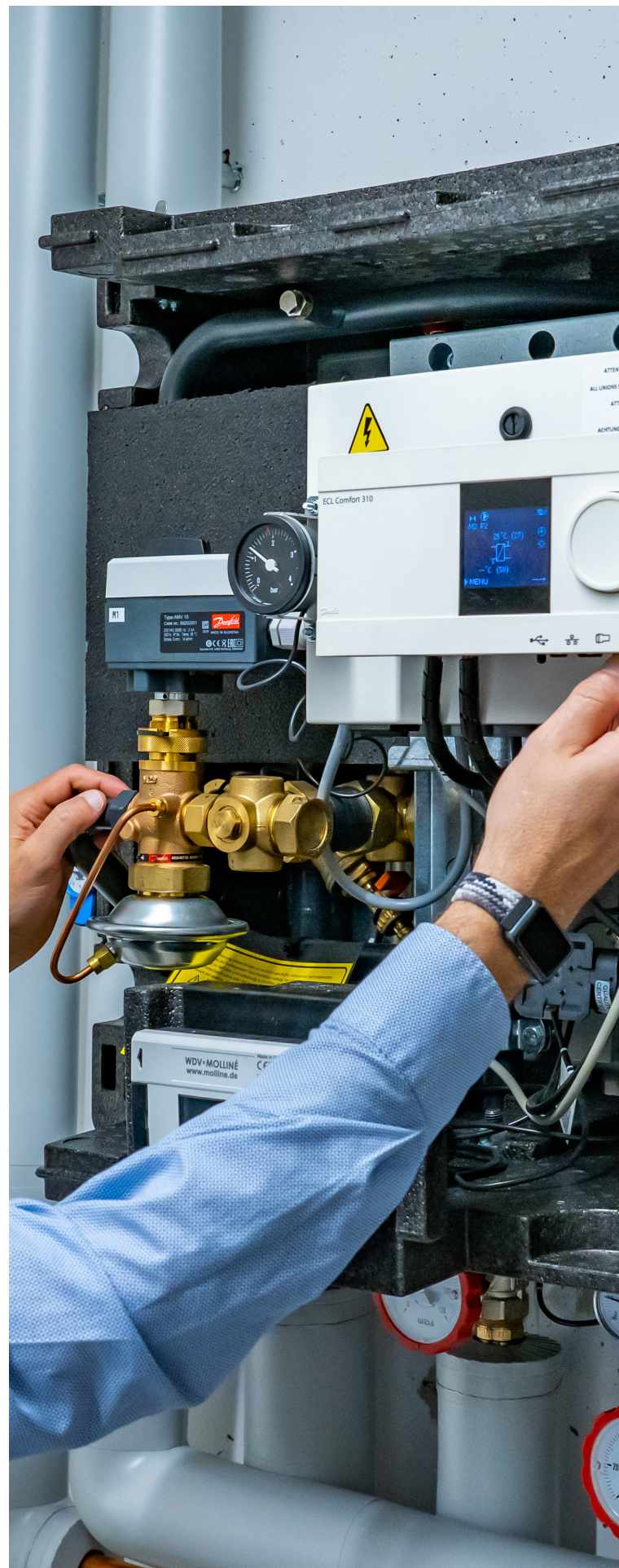
Local **implementation** and **subsidies support**

Consulted by the Eurasburg municipal council as a heating expert, Gail – whose company had already implemented several biogas-based heating networks – spoke out in favor of a local heating network based on a wood chip system. At the time, he had no idea that he would ultimately set up and operate this network himself. He only found the project moderately attractive and finally waved it off at the end of 2019.

However, the municipal council of Eurasburg did not plan to give up its heat transformation project. They opted for a solution like the municipal broadband expansion with implementation under local self-government. Michael Gail, the head of the local heating utility, agreed to implement and operate the planned heating network on their account and was finally given the go-ahead for the project at the beginning of 2020 – on one condition: that they could connect all public buildings in the community. They achieved the pre-financing of the project with the support of the BAFA (Wirtschaft und Ausführungskontrolle) subsidy for the heating building with a wood chip boiler and a KfW subsidy for the distribution network. Around a third of the project costs could ultimately be covered by subsidies. After that, everything happened very quickly: together with local planners and contractors, the Gail company realized the entire network within a few months – from the initial planning to the construction of the boiler house and the laying of the pipeline routes to the installation of the transfer stations at the individual connectors. During the route construction, the heating utility also laid fiber optics and Modbus cables for the IT connection of the transfer stations. By the end of 2020, with a heating load of around 300 kW, the largest customer – the elementary school and multi-purpose hall near the boiler house – could be supplied with heat via a direct line. By mid-2021, they had installed the pipelines and all network connections were in place. Since some participants were initially still utilizing their oil burners, the connections were gradually activated, until all subscribers were connected to the network at the beginning of 2023. The network operating company, MG Energie GmbH, handled the network operation and purchase agreements, initially limited to 10 years with all connectors.

Since the wood chip system is designed for a service life of 30 years, the routes can exist for more than 50 years – and we can expect much longer acceptance periods, especially since the response from the users of the connection has been consistently positive so far,

emphasizes mayor Paul Reithmeir.



80 buildings connected to the heating network

The Eurasburg local heating network supplies 80 buildings, including the primary school and multi-purpose hall, the fire station, town hall, and day-care center.

The solution has a total output of around 1 megawatt, divided into three wood chip boilers, each with an output of 330 kW and running time comparison, as well as three buffer storage tanks, each with a capacity of 10,000 liters, which are connected to form a single storage tank and can cushion peak demand. The division into three boilers plus a buffer system ensures the supply even if one boiler fails – a significant point since the connected buildings usually have no

emergency heating. The utilization of the system is currently around 90 percent, which leaves room for expansion. In the future, they are also considering adding a solar system.

A crucial aspect of the Eurasburger heating network: The connected buildings do not have to meet any special requirements in terms of efficiency. This gives the homeowners time to carry out energy-related refurbishments step by step and at economically acceptable terms. **“We can adjust the temperature so that it also works for non-refurbished buildings,” emphasizes Martin Gail, Junior Manager of Gail and MG Energie.**

On cold winter days, the operators ensure a VLT (flow temperature) of 85 to 90 °C; in more comfortable weather, 75 to 78 °C is sufficient – with a nominal pressure of 3 bar and a pump flow rate of an average of 25 to 30 m³/h (max up to 40 m³/h would be possible). The nominal pressure in the return is 2 bar, the differential pressure is 1 bar. The spread parameters of the network are remarkably good: the average return temperature is only around 48 to 50°C, with a high VLT at a maximum of 55°C. If transport losses are already included, a spread of around 30 Kelvin is achieved – an excellent value that requires excellent heat transfer.



A reliable partner

Gail installed the Danfoss substations, and Danfoss sales representative Michael Ziegler presented them to the local heating specialists:

“Trust was built during our conversation,”

remembers Michael Gail,

“and it was clear to us: This is a partner we can rely upon.”

The appropriate station solutions were then jointly selected for all buildings. “VXe solo stations are utilized in buildings with a heating load of up to 30 kW, and DSA1 mini stations in larger buildings with a heating load of 30 to 100 kW,” explains Ziegler. “For a heating load of more than 100 kW, we have implemented individual, freely planned stations.” High-quality microplate heat exchangers ensure an effective heat transfer in all installed substations. Thanks to independent volume flow controllers with integrated motor control valves, the stations also take on the hydraulic balancing of the network. “We also researched stations from other manufacturers,” says junior manager Martin Gail, explaining the decision

in favor of the Danish district heating expert, “but we preferred the Danfoss stations. Both the stations and the integrated ECL controllers are great.”

To enable optimal visualization and control of the network, all transfer stations were integrated into the cloud-based Danfoss Leanheat® Monitor control software via the Modbus cables. “This software was also one of the reasons we chose Danfoss,” says Martin Gail. “Because it was important to me to be able to read the meter and controller data and make settings at the touch of a button”. Thanks to the cloud connection, it is also possible to access the transfer stations at any time and from any location. “For example, if a customer calls to report an issue, I can use my cell phone or tablet to see what is wrong or what needs to be changed. And that really simplifies the work.” Since the Danfoss Leanheat® software licenses can be expanded in a very differentiated manner, the integration of further stations can also be implemented cost-effectively. Michael Ziegler from Danfoss adds that the user can draw conclusions about optimization potential from the data obtained. “The network can then simply be created more efficiently.”



Independence and regional added value

But even the best station and the most efficient network operation are ultimately of poor use if the heat source falters or dries up. The local wood chip supplier Josef Bertele in Eurasburg ensures this does not happen. In the cold winter months, every 7 to 10 days, he fills the storage of the heating house with around 170 loose cubic meters of wood chips – an amount that corresponds to the value of more

than 14,000 liters of heating oil. Most of the wood supplied comes from the Eurasburger Forest, although Bertele highlights the great importance of trees not being felled for the purpose of producing wood chips. "As an add-on to waste from industrial wood processing, we only use stump and top wood that cannot be processed in the first place – as well as damaged wood, which is just as unusable and often has

to be removed from the forest. Since the wood is constantly growing back and waste products are continuously produced, the use of wood chips ultimately taps into a regenerative energy source without comparison. The CO₂ emissions from the combustion process are far behind those of fossil fuels and only slightly higher than emissions caused by the wood rotting in the forest."



This is **the future!**

Ultimately, a local heating solution was created in Eurasburg that combines climate protection with regional value creation and socially responsible implementation, making the heat transformation a win-win situation for everyone. "The wood chip supplier next door can produce and deliver, the road construction company can outline the district heating grid, the operating company is local and easily accessible," summarizes Martin Gail.

On the customer side, senior head Michael Gail emphasizes that nobody is overwhelmed by costly renovation measures: "Only the old oil heating systems had to be removed." Not surprisingly, other Bavarian communities with comparable rural structures are following the Eurasburger model with interest and are already planning similar projects.

Martin Gail understands this very well:

This model is exciting for the development of the rural communities because the added value remains regional, and the whole thing also promises a certain degree of independence.

The local politicians in Eurasburg agree: "Things could not have turned better out for us," Mayor Reithmeir says and draws a satisfied conclusion: "This is the future." Martin Gail is also convinced that the Eurasburg local heating network will not be the last that his company will implement – and the partner for stations and control software is also already selected: "We will definitely implement our next heating network with Danfoss."



Paul Reithmeir, Mayor of Eurasburg



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