Low energy houses in Windsbach (Germany)

Germany

Type : **Project**
Size : **Local community**
Area : **Residential**

District heating,
Renewable energy

Environmental benefit

100 % renewable energy

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The municipality of Windsbach has planned a new residential housing project, heated by district heating (DH). In total approximately 100 low energy consumption houses are planned. The total heat demand is estimated with 1000 MWh. The peak load will be about 800 kW. The aim is to supply as many houses as possible with the provided district heating. The complete heat is produced with renewable energy. Therefore biogas CHPs and one peak load biogas boiler are installed.

Windsbach uses a decentralized heating network. In such a network, each consumer installs a buffer storage tank. The domestic heat requirement is covered by the stored warm water, which in turn is being replaced with hot heating network water when it has spent its warmth. The heat network may be turned off when there's no heat demand, e.g. during summer nights. This way, heat losses of the network as well as its energy consumption for pumps may be significantly reduced. This concept works especially well in smaller and medium-sized networks with less than one hundred connected consumers.

ENERPIPE develops a compact buffer tank unit with specifically small footprint, able to meet the smaller heat demand of a modern single-family home, and at the same time including the required heat exchangers, pumps and auxiliaries to provide not only heating, but also domestic hot water.
Its dimensions correspond to those of a refrigerator and therefore fit into a small utility room or even a niche in more frequented rooms.

By coordinating the charging cycles of the decentralized buffers, a controller that had been previously developed in the Horizon 2020 STORM project and was specifically adapted to the Windsbach project, is able to decrease the total peak heat load in the grid. To achieve this, a 24h

forecast of the total heat load is calculated together with individual heat load forecasts of all the connected buffers.

The controller will use these forecasts to calculate an optimal charging plan for the total network which is dis-aggregated and dispatched to each decentralized buffer individually. A backup controller ensures that safety and comfort boundaries are never compromised, it will force a charging cycle if the buffer temperatures are too cold and block the charging cycle when buffer temperatures are too high.

To supervise the effects of the innovation and the good operation of the network, each consumer's equipment may be monitored via central computer.
With these two innovations combined, many of the advantages of a decentralized heating network may be combined with the small space demand of a centralized network's heat transfer station, providing a sustainable and affordable solution for residential neighborhoods with many single family houses.

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https://www.tempo-dhc.eu/nurnberg/

More info

Webinar: https://www.youtube.com/watch?v=4_yyN-HHJ4c

Detailed report: https://www.tempo-dhc.eu/wp-content/uploads/2020/03/D3.2.pdf

DHC + description : https://www.euroheat.org/wp-content/uploads/2019/08/RHC-ETIP_District-and-DHC-Vision-2050.pdf

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