IEA Bioenergy

Bioenergy Success Stories

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Biomass heating plant Krumpendorf, Austria

With the power of the sun and the earth

Year of implementation:	2015
Location:	Krumpendorf, Carinthia, Austria
Technology:	Combination of biomass and solar thermal energy
Principle feedstocks:	Residues/wastes in forestry. Overall, wood chips for the use in Austrian biomass district heating (DH) systems are mainly sourced regionally. Forestry residues are transported with agricultural vehicles to a storage to be dried and chipped. Tractors or trucks distribute wood chips to DH plants, with typical sourcing radius 10 km for plants up to 2.5 MW.
Products/markets:	District Heating
Technology Readiness Level (TRL):	TRL 8 – system complete and qualified

DESCRIPTION

District heating in Austria increased from 13 TWh in 2000 to 23 TWh in 2015, while its biomass share increased from 15% to 45% mainly based on wood residues and wood chips. On average about 500 wood chip boilers above 100 kW were installed in Austria every year since the beginning of this century. Installations take place for district heating but also in commercial buildings, multi-story houses as well as industrial sites.

The biomass heating plant Krumpendorf was built in 2015 and is one of the most innovative heating plants in Austria. The special feature of this heating plant is the combination of biomass and solar thermal energy. The total heating capacity is about 3.3 MW, the output of the two biomass boilers is 0.5 MW and 1.5 MW. Since its completion in October 2015, the heating plant Krumpendorf has been supplying 1600 households in the region with district heating. The use of a double-pipe system reduces the heat loss by the district heating network.

Intelligent control technology

The primary idea behind this project is to improve the system efficiency. From the beginning the heat supply system was optimized for energy efficiency. For instance, the residual heat from the flue gas condensation is used with a heat pump. The intelligent boiler utilisation ensures that unfavourable start-up processes and extreme part load operation conditions are avoided.

Interplay of Solar thermal energy and biomass

At off-peak period during the summer months the heat requirement is managed by the solar system. The highest performance of the solar system in 2015 was 110 kW. For this, 19 collectors on an area of 191 m^2 and two buffer storages of 31.000 litres are installed.

Approximately 10% of the annual heat requirement can be covered by the solar system. The total output of the solar system is around 520 MWh/y. The technologies are highly complex and all components are interlinked. A separate low-temperature heat accumulator takes over the temporary storage of residual heat from the flue gas or from the solar heat which is not directly usable. This accumulation of measures leads to an optimized load management in the operation of the boiler plants. This is not only economically interesting, but also in terms of increasing energy efficiency.

Architecture

The architecture is modern and contemporary. The modern design of the facade should show the function of the building and the energetic use of biomass. The plant is also used as a meeting point and training location.

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Figures:

- Produced heat – 9520 MWh/yr
- Sold heat – 8360 MWh/yr

The usable energy of the storage is up to 80% in winter. In the summer, this value is up to 100% due to solar thermal energy.

Calculated CO_2 reduction for all end users is 3180 t/yr. In addition to biomass, 33% of the energy is generated from heat recovery and heat production.

Approximately 3100 MWh/yr come from solar thermal energy and the heat pump.

The use of the solar system and the heat pump results in biomass savings of approximately 4558 m^3/yr (appr. 680 kWh).

Stakeholders involved	Developer and managing director: Johann Hafner Main planning: BC-Regionalenergie Verwaltung und Beteiligung GmbH Involved offices: Innovation TB Gutschi; Aste Energy Planungsbüro für Erneuerbare Energie; Ochsner Energietechnik & Hoval Regelungstechnik; Kohlbach Biomassefeuerungsanlagen **Relevant organizations:** Grants: Kommunalkredit Public Consulting (KPC) - environmental promotion. Besides the case of Krumpendorf, in 2013-2015 the KPC funded biomass district heating systems in Austria with about 40 Mio €. Climate and Energy found - subsidies for solar power Province of Carinthia - co-financing, environmental promotion
Contribution to Sustainable Development Goals	The project contributes to the following SDGs: ensure access to sustainable, regional and modern energy (SDG 7); combat climate change through low-CO_2 fuels (SDG 13); create sustainable jobs in the region (SDG 8); highly innovative technology promotes efficiency and improves ambient air quality by low emission technology (SDG 3); sustainably manage forests and halt biodiversity loss (SDG 15)
Employment:	*No information available*
Replicability and scale-up potential:	22% of the Austrian residents have been connected to a district heating network. Heating demand is expected to decline in Austria, from about 100 TWh in 2012 to 80 TWh in 2025. District heating demand however is estimated to further increase by about 2 TWh in this period. The potential to increase the efficiency of existing and potential new biomass district heating plants in Austria based on the experiences and the innovative approach in Krumpendorf is high. Moreover, in other countries and regions over the world the integration of innovative system design in biomass district heating is also estimated to be highly relevant.
Success factors:	Availability of raw materials Compliance with the legal framework Combination of different techniques Interest of the population One of the key success factors of the case of Krumpendorf was that operators and planners wanted to go beyond the state of the art and show that combining biomass district heating with solar thermal collectors and heat pumps can create a much more efficient system than a biomass boiler alone. This required a high consciousness of stakeholders regarding the relevance of resource efficiency also in the case of biomass use. Moreover, a strong participation of the relevant parts of the municipality turns out to be a crucial element.
Constraints:	High investment, but depending on price development

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More information:	http://www.regionalwaerme.com/fernheizwerke/krumpendorf http://www.meinbezirk.at/klagenfurt-land/lokales/rund-72-millionen-wurden-ins-das-neue-biomasseheizwerk-in-krumpendorf-investiert-m9494874,1530094.html; https://www.klimafonds.gv.at/assets/Uploads/Projektberichte/2014/Solare-Groanlagen/20150827Solare-Groanlagen2014EBSolarthermiehwKrumpendorfB463952.pdf