

SUCCESS STORY:

Heating with the power of the sun and the earth

INVESTMENT CASE

Title:

With the power of the sun and the earth – The biomass heating plant Krumpendorf

Year (commissioned):

2015

Location:

Krumpendorf, Carinthia, Austria

Stakeholders:

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Authors:

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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 3 300 kW, the two boilers have an output of 490 kW and 1 500 kW and a total of 152 households are supplied with heat.

Highest efficiency through intelligent control

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 the unfavourable start-up processes and the 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 2015 was 110 kW. To achieve this, 19 collectors on an area of 191 square meter and two buffer storages with 31.000 litres were installed.

Approximately 9.6% of the annual heat requirement can be covered by the solar system and the total output is around 520 MWh per year.

The technologies are highly complex and all components are interlinked. A separate low-temperature heat accumulator is used to store residual heat from the flue gas and solar heat system. This accumulation of residual heat 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 and technology

The plants 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. For interested people, it is possible to attend a tour through the biomass heating plant.

Since its completion in October 2015, the heating plant Krumpendorf has been supplying 152 households in the region with district heating. The use of a double-pipe system reduces the heat loss by the district heating network.

Fuel type:

- Wood chips with a quality of G50 W30 (Austrian ONORM standard)

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Feedstock origin:

- Domestic silviculture residuals from thinning, tops, branches etc
- Domestic forestry by-products/ residuals: bark, wet wood chips, etc

Comments:

- The regional heat Krumpendorf relies on raw materials from the region - thus from a radius of less than 50km of the heating plant.

Conversion system:

- Boiler combustion, e.g. stand-alone boiler plant including co-firing and combined heat and power

Comments:

- The regional heat Krumpendorf produces heat only for heating and hot water.

Co-fire:

- Heat generator (i.e. boiler) is 100 percent biomass-fired.

Heating system heat sources:

- Heat generator is part of a system with heat pumps
- Heat generator is part of a system with solar heat collectors
- Heat generator is part of a system with other heat sources

Comments:

- In addition to the heat pump and the solar system, heat is generated from the furnace by means of heat recovery (condensation).



The heating plant in Krumpendorf combines biomass and solar thermal energy.

Facts

- Produced heat – 9 520 MWh/a
 - Sold heat – 8 360 MWh/a
 - Storage size – 60 000 litres
 - In winter 80% of the energy storage is utilized, while in summer it reaches 100% due to solar thermal energy.
- The annual CO₂ reduction for all end users is 3 180 tonnes/a. In addition to biomass, 33% of the heat is generated from alternative heat recovery and heat production. Approximately 3 100 MWh/a comes from solar thermal energy and the heat pump. The use of the solar system and the heat pump results in biomass saving of approximately 4558 cubic meters (loose). This value corresponds to an energy content of approximately 680 kWh/m³.

The investment and its technology

The heating plant in Krumpendorf was a totally new project with the special feature of combining biomass and solar thermal energy. The total heating capacity is about 3300 kW, with two Kohlbach boilers of 490 kW and 1 500 kW. A total of 152 households are supplied with heat. The aims of the project are high efficiency of the plant and low emissions, a long life of the boiler installation, low maintenance work and regional services. The plant uses wood chips and sunlight to produce heat. Furthermore, an industrial heat pump is used to recover low-temperature heat to a usable temperature level.

In 2012, the municipality of Krumpendorf am Wörthersee

Relation to Sustainable Development Goals:



Ensure healthy lives and promote well-being for all at all ages



Ensure access to affordable, reliable, sustainable and modern energy for all



Ensure sustainable consumption and production patterns



Take urgent action to combat climate change and its impacts

decided on a sustainable heat supply based on biomass to phase out fossil fuels in the medium- to long-term and contribute to climate protection.

The Regional Heat Group has already built its 17th biomass heating plant in Krumpendorf.

This project aimed to prove that one does not only speak of innovations, but also implements them.

The motive is to ensure a long-lasting, energy-efficient heat supply and a completely new way has been taken. The heating plant is definitely the most innovative and modern biomass heating plant in Carinthia.

Energy efficiency is the buzzword of the hour, which is why the Institute for Energy and the Environment has been opened at the heating plant, focusing exclusively on the topic of alternative energy and energy efficiency. Five engineering firms have rented a site to discuss these issues together in the future.

The heating network, which is currently under construction, will reach a line length of 10 km and provide about 250 clients with environmentally friendly district heating. Worth mentioning in particular is the fact that due to these actions, 250 oil boilers are being shut down. It is a total saving of approximately 1 000 000 liters of heating oil annually!

As a private investor The Regional Heating Group has decided to switch the energy supply to renewable energy in the municipality of Krumpendorf. Thus, the business case was to provide the municipality Krumpendorf with sustainable and cheap raw biomass and to replace the oil and gas plants with a favorable production of heat. The Regional Heat Group stands for regionalism, sustainability and innovation. This was impressively proven at the Krumpendorf heating plant.

In total, € 7.2 million were invested in the heat supply of Krumpendorf. An investment that has paid off sustainably for the next generations. With the use of renewable energy, the regional heat Krumpendorf replaced an annual amount of 850 000 liters heating oil in the municipality Krumpendorf.

Factors behind the decision

Due to the funding provided by the state and federal government, 2015 was the right time to implement the project and switch the heat supply to renewable energies in the municipality of Krumpendorf. The prevailing energy prices in the year of implementation enabled us to score economically and ecologically with our district heating product based on renewable energy. Constant network expansion shows us that the product has been well positioned in the community and that the implementation has been economically favorable for both operators and customers.

The incentives were the federal environmental promotion and the CO financing of the European Union, through these subsidies the project could be financed.

Lessons learned

The project demonstrated that refinancing should only launch upon receipt of the subsidies and after full-load operation of the biomass heating plant. The main cause for this was the distortion of the Cash Flow. These challenges have to be considered for future projects.

Success factors

For a positive investment decision, it is important to secure long-term customer relationships, the supply of biomass and, last but not least, the subsidy agreements are very important.

Constraints

The most important prerequisite for the implementation of the investment is the confirmation of the subsidies by the respective funding agency. All requirements must be fulfilled in order to receive funding. Given that these subsidies are counted as equity capital, the confirmation of the subsidies is essential for the financing.

Replicability potential:

- Low local replicability
- Medium regional replicability
- High national replicability
- High international replicability

Scale-up potential:

- Low local potential
- Medium regional potential
- High national potential
- High international potential

Connection to policy case:

- Location analysis by the Office of the Carinthian Provincial Government

Stakeholders and their roles

1. Johann Hafner – Developer and managing director
2. BC-Regionalenergie Verwaltung und Beteiligung GmbH – main planning
3. Innovation TB Gutschi – involved in planning
4. Aste Energy Planungsbüro für Erneuerbare Energie – involved in planning
5. Ochsner Energietechnik – technology provider
6. Hoval Regelungstechnik – technology provider
7. Kohlbach Biomassefeuerungsanlagen – technology provider
8. Kommunalkredit Public Consulting (KPC) – environmental promotion
9. Austrian Climate and Energy fund – subsidies for solar power
10. Province of Carinthia – co-financing, environmental promotion

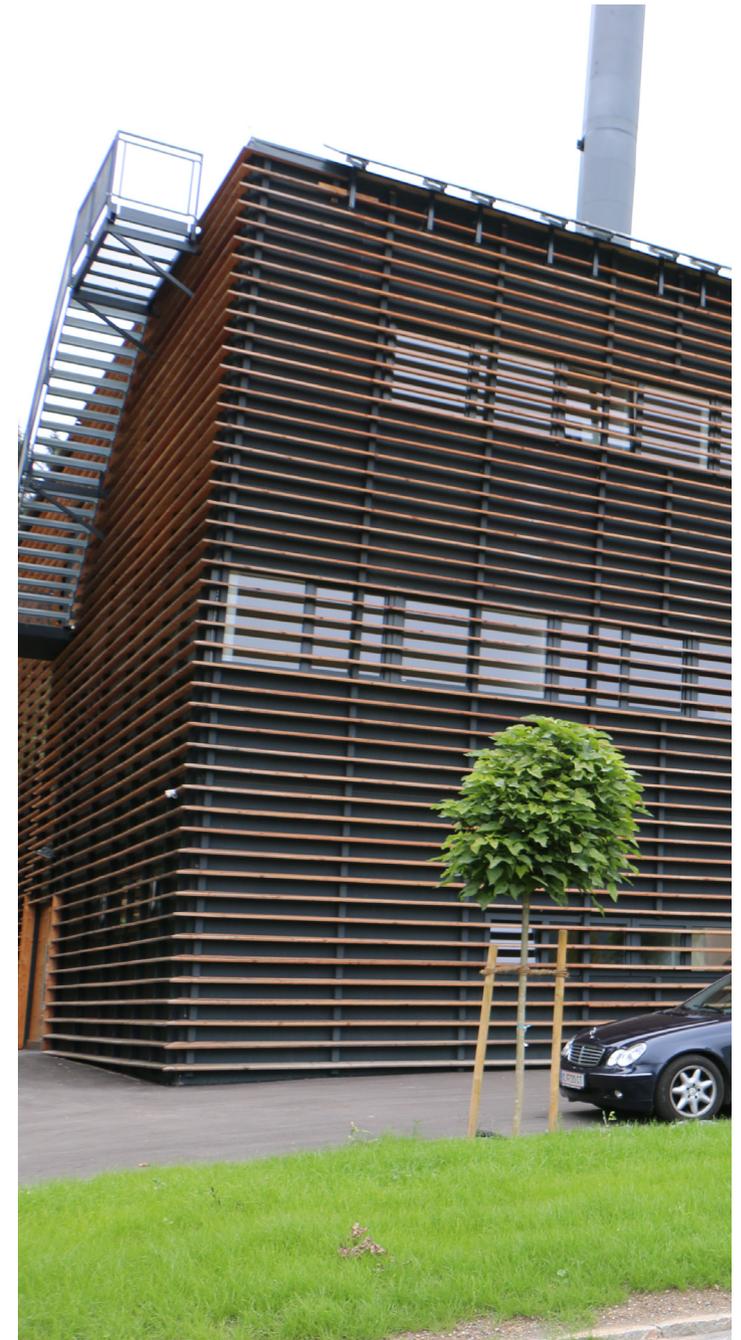
More about the fuel type

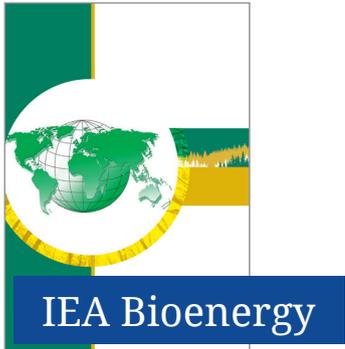
Wood chips with a quality of G50 W30 (Austrian ONORM standard) are used in our heating plants, so less ash is produced during incineration, compared to bark material or industrial chippings.

Above all, the unique mix of technologies consisting of biomass, solar thermal energy and heat pump characterizes the innovative character of this heating plant.

To maximize energy production, a 190m² large solar system on the roof of the heating plant will add to the heat production from biomass, in particular during the summer months.

Biomass is about 70% of the heat production.





Web sites:

www.regionalwaerme.at

www.youtube.com Video: Regionale Wertschöpfung dank Biomasse

www.ri.se

www.energimyndigheten.se/en/

www.iea.org/tcp/

www.ieabioenergy.com

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IEA Bioenergy