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GOOD PRACTICE EXAMPLE

Naturwärme St. Lambrecht: district heat from slash

Biomassehof NATURWÄRME ST. LAMBRECHT

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1. General

Naturwärme St. Lambrecht is an agricultural community that operates a biomass heating plant with the corresponding district heating network since 1993. In its founding year, the community counted 15 members which were responsible for the fuel supply of the heating plant, which had an output power of 1 MW by then. The main plant (the community operates 4 plants with a total output power of over 6 MW by now) has a thermal output of 3,6 MW as of now and is still mainly supplied by its members with wood chips that are almost entirely made from slash – a byproduct of wood harvesting consisting of tree tops, branches and leafs/needles. The heating plant supplies a large part of the St. Lambrecht, a municipality with around 1 400 inhabitants in Styria, with district heat.

Currently, Naturwärme St. Lambrecht counts almost 100 customers, both private households and commercial customers. The community gains a few new customers every year.

Since 2011, Naturwärme St. Lambrecht also operates a biomass trade center and distributes premium wood chips and fire wood directly to end consumers, but to a lesser extent than the heat supply (Metschina 2012).

The regarded supply chain involves one community member (farmer/forest owner), a chipping company, a haulier and the manager as well as an office employee on the part of the heating plant.

2. Utilization of low-quality biomass – availability vs. economic feasibility

A major problem in the supply of slash is the low profit that can be achieved by utilizing this material. In addition, slash often "gets in the way" during the harvesting of timber which leads to higher manipulation and therefore increases costs. Therefore, the right organization of all processes around timber harvesting and the following logistics play a crucial part. Problems often arise if the processes harvesting, chipping and transport are organized by different people. Hence, it is important that it is made clear if slash shall be utilized before the harvesting even begins. This way, the logging company can cut the slash to the right length and concentrate it at the roadside so that the chipper can work at its full capacity. For efficiency reasons, the slash is ideally chipped directly into the transport vehicle to avoid an additional loading process and the corresponding machine to carry it out. Therefore, the transport has to be carried out without delay as well. Due to the relatively short transport distances of 20 km on average from forest to the plant, transport cost, which also play an important role in the supply chain of slash, are kept comparatively low.

The heat delivery community St. Lambrecht demonstrates how a regional concept for heat supply from low-quality biomass assortments that otherwise wouldn´t be used can work quite efficiently. Despite the common problems associated with the utilization of slash, the direct supply of district heat creates a relatively high added value that stays within the region.

3. Framework contract and individual delivery contracts

Every year, Naturwärme St. Lambrecht concludes framework contracts with its members. Every member is allowed resp. committed to deliver a certain contingent depending on in its community share. In the course of the framework contract, a price frame as well as the delivery contingent announced. The contingents are usually released quarterly to avoid an oversupply by the members. In addition to the framework contract, an individual contract is concluded for every single delivery.

4. Supply and delivery of slash

The wood chips from slash used in the heating plant are delivered almost exclusively by the community members and is bought only delivered free plant (supplier pays transport). Hence, the organization for the processes timber harvesting, chipping and transport lies within the responsibility of the supplier, who has to make sure that the supply runs without interruptions as his profit depends it.

If a member wants to deliver slash chips, it has to instruct the logging company to cut the slash to the right length and store in the right place (or the forest owner has to do it if he harvests the timber himself). In particular, it is important that the slash is not contaminated (with sand, stones etc.). In the next step, the slash piles are inspected by an employee of the heating plant and a delivery contract is conducted, which also includes a price frame depending on the quality of the slash,which allows the member to estimate the achievable benefit. Next, a chipping company is hired, which also inspects the slash and an appointment for chipping is made. In addition, a haulier has to be organized for the same date as well. The slash is then chipped directly into a truck, which drives directly to the heating plant afterwards.

Chipping of slash directly into the transport vehicle;
in the left picture the slash concen © WV Steiermark

5. Acceptance of delivery at the heating plant

At the heating plant, the truck is weighed on a calibrated weigh bridge and a wood chip sample is taken for the determination of dry matter. After that, the wood chips are unloaded into a covered storage depot. The sample is dried to 0 % moisture content in a cabinet drier and so the energy content of the sample and furthermore of the whole delivery is determined, which provides the basis for invoicing with the forest owner.

Unloading of wood chips at the plant and chip sample © WV Steiermark

6. Storage

Another problem connected with the use of wood chips from slash is its high water content and the accompanying poor storage property. Therefore, the wood chips are incinerated as soon as possible or, if that is not possible resp. a longer storage is planned, the chips are technically dried. Technical drying is especially important in the warmer seasons, when heating demand is low. For this purpose, the rejected heat from the plant is used.

7. Incineration and heat supply

The wood chips are taken from the storage depot via a wheel loader and loaded onto a walking floor, which feeds them directly into the incinerator. The produced heat is delivered to the consumers through the district heating network also operated by the heat delivery community.

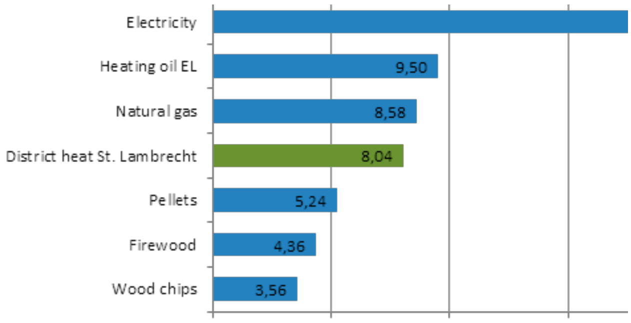
8. Technical data

Plant connection power	3,59 MW
Plant investment cost	872 0000 €
Operating hours	2 700 h/year
Fuel demand	17 000 bcm/year
Produced heat	9 700 MWh/year
Length of district heating network	8,1 km
Network investment cost	2 Mio €
Number of customers	95 (24 commercial, 71 private)

9. Economic data

Price per MWh	67 €
Connection costs	210 €/kW
Basic charge	18,42 €/kW/year
Heat meter charge	96 €/year
Total annual costs (20.000 kWh demand)	2 010 € (Incl. VAT.)

One MWh heat delivered to customer costs 67 € excluding VAT and basic charge up to a purchase quantity of 150 MWh per year. For higher demands, graded commercial tariffs exist. Compared to conventional energy carriers the sole heat price including VAT amounts to 8,04 ct/kWh which is slightly beneath the cost for natural gas (8,58 ct/kWh) and significantly lower than the price for heating oil (9,50 ct/kWh) (proPellets Austria 2013; status: August 2013). For a typical one family house with 13 kW connection power, investment costs amount to 3 280 €, the total annual cost at an annual heat demand of 20 000 kWh add up to about 2 010 € (including VAT).



Comparison of energy carriers in ct/kWh Source: proPellets Austria, ÖBMV, Wallner; Status: August 2013

10. Environmental data

By using district heat from biomass, several negative environmental impacts can be minimized at once. On one hand, single heating systems with low efficiency and relatively high emissions are replaced by one efficient central heating plant with an efficient flue gas cleaning, which leads to a reduction of CO2-emissions. While even the use of district heat from fossil fuels is much more efficient than several small heating systems, emissions are further reduced by the use of biomass, which burns CO2-neutral. Furthermore, transport distances of the wood chips from forest to plant are relatively low at 20 km on average, which also leads to relatively low CO2-emissions. As the heat is delivered through the heating network, the fuel transport to the consumer by truck/car etc. , which is necessary for the supply of single biomass heating systems, is omitted, which saves additional emissions.

11. References

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