

Switzerland**Rolf Jenni***Institution*

Heating and power plant (HPP) Aubrugg (operative since 2010)

Partners:

- EKZ (Power Plants Canton Zürich)
- ERZ (Disposal and Recycling Zürich)
- ZürichHolz AG

In close proximity (few 100 m) the EKZ operates the waste incinerator plant Hagenholz with a long-distance heating grid with which the HPP Aubrugg is connected.

Position

Manager

Feedstock

Wood chips from forests and landscape maintenance work (< 10 %) in mixed deliveries.

Only HPP in Switzerland which uses solely fresh wood.

Average transport distance: 25 km, delivered by the company “ZürichHolz AG” (co-owner of the HPP Aubrugg).

For the coming season a new project is planned. The management wants for the first time to use wood from main roads and motorways during December to February to produce power and heat in the adjacent waste incinerator plant. With the additional heat production linked gas firings (which are only used in winter) will have lower gas consumption. The saved costs for gas can then in turn be used to finance the costs for the woody feedstock. With that a heat production with more renewable energy and less use of fossil fuel can be achieved.

In season 2015/2016 the process will be tested step by step to determine the important factors (especially energy content of the feedstock) to assess how much additional long-distance heating can be produced and accordingly how much natural gas be saved.

It is estimated to achieve around 3000-4000 MWh.

Problem: The wood from main roads and motorways contains high amounts of chlorides (10-1000 times more than fresh wood) which lead to a higher risk for corrosion damages in the boiler. Accordingly, corrosion cycles have to be estimated, respectively costs for more frequent boiler replacements assessed.

If the prices for natural gas keep declining this use of wood from main roads and motorways will not be economical anymore.

Price

In the contract with the supplier “ZürichHolz AG” a price of 43 Swiss Francs/MWh (now approx. 40 Euros/MWh) for fresh wood was set.

Wood from main roads and motorways shows similar prices as forest wood.

Ash Management

The produced ash is delivered to the company „Kies und Beton AG“ in Bad-Ragaz in the canton of Grison. With a new technique the ash (poisonous chrome 6 is reduced) is mixed with other substances resulting in an environment friendly alternative for wall gravel used for the backfilling of excavation pits.



Context	
<i>Supply area</i>	Power for 11 000 and heat for 19 000 average sized households in the cities Zürich and Wallisellen.
<i>Financial aid</i>	CO ₂ -program KliK and since this season (2015/2016) compensatory feed-in remuneration for power KEV (Kostendeckende Einspeisevergütung). To fulfil the required annual efficiency for the KEV a part of the produced heat is credited as electricity; what remains is accounted to the CO ₂ -program KliK. With the KEV the added ecological value is accounted for with higher power prices and thus the entire production can be fed into the grid.
<i>Motivation to build the HPP Aubrugg</i>	In the city a heating plant run with oil was closed down and a replacement was needed. The HPP Aubrugg compensated the full production of the old site with regional and renewable energy. Before the HPP Aubrugg was build, the waste incinerator plant Hagenholz with a long-distance heating grid already existed at today's location.
Steps until the building	
<i>Permissions</i>	It was rather difficult to get the land for the storage side because of the direct proximity of the federal motorway. For future enlargements the land around the motorway has to be held clear and the construction lines of the federal roads office had to be complied with. The project was furthermore delayed by one year (loss of about 2 million Swiss Francs) due to political discussion about rental prices.
<i>Logistics</i>	The first idea was to organise the transport of the feedstock by railway. However this could not be realised because of the high utilization of the rail network in and around the city of Zürich. Today the wood chips are delivered by trucks (3246 loads per year), stored in a nearby storehouse and automatically transported by a conveyor system to the boiler (first in first out).
<i>Investors</i>	Finding investors for 70 Million Swiss Francs was rather difficult. In the end the EKZ, the city Zürich and the Cantonal Bank Zürich provided the needed interest-bearing credits for the project.
Ongoing Operation	
<i>What could have been done better?</i>	A HPP with smaller dimensions would probably have made more sense. The HPP Aubrugg is a middle load plant (Mittellastanlage) which today can barely hold its heat level. This is because the waste incinerator plant delivers its heat and power first into the grid, complemented through the production of the HPP. With that the input of the HPP depends on the daily and seasonal fluctuations of the energy use of the consumers. That's also why the HPP is shut down from the beginning of June until the middle of September. Also there is a yearly loss of performance of 10 MW through renovations of buildings,



which, at the moment, is just balanced through new connections asking for a performance of nearly 10 MW per year.

What is most difficult to keep the plant going? The main problems are the storage side and the transport of the wood chips. From the storage side to the boiler room the wood chips have to cross underneath a bridge supporting the national motorway. This is a long way and the conveyor system performs an additional incline. With a considerable part on fine material in combination with high water contents the probability of disturbances while transporting fresh wood chips over such a long way is rather high.

Operation alternatives With lower steam parameters waste wood could also have been processed. The feedstock is cheaper (0 – 10 Swiss Francs) and several bigger HPP in Switzerland use it (Bern 50 % and Basel 30 %).

Messages

- The used technologies are really good (see also technical report¹) and the plant has a high efficiency (90 % in winter and 80 % over the whole year).
- The HPP Aubrugg saves yearly 25 000 tons of CO₂, which corresponds approximately 9.5 million litres of oil.
- The accumulating ash is used in an environment friendly process which means that the HPP Aubrugg produces no residual materials.
- If the prices for fossil fuels and electricity decrease further and the costs for fresh wood climb higher the financing of the HPP will become more difficult.

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¹ <http://www.hhkw-aubrugg.ch/beschreibung>

