for business bioenergy

Best practice examples of biomass heating across Europe

Training material for B4B seminars

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Overview

3 selected cases from Austria, Netherlands and Denmark

- **Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz, Austria**

- **Biomass heating in a potato processing factory, Odiliapeel, Netherlands**

- **District heating in Gassum-Hvidsten townships; conversion from gas to straw boilers, Gassum-Hvidsten, Denmark**

Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz

- Church institution located in Graz, Austria
- Ca. 30 rooms and seminar rooms
- Replace the oil fired heating system with biomass

Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz

General description of the project

- The biomass heating plant consists of the boiler (capacity 150 kW), the heating house, the chimney, etc. The heat produced is used for space and water heating.

- The plant was planned by Green Energy Contracting GmbH (GECO) They will operate, fuel and maintain the plant for a period of at least 15 years

Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz

Energy conversion

General information	
Technology (e.g. in-house biomass boiler, biomass DH, etc.)	In-house pellets boiler
Year of installation	2013
Net capacity of the biomass boiler(s)	150 kW (heat)
Total annual energy production from biomass	285 – 305 MWh

Biomass Fuel(s)

General information	
Type of biomass fuel(s)	Wood pellets
Annual amount of biomass fuel(s) needed	70 – 75 tonnes / year (absolute dry) 336 – 360 MWh / year
Average humidity of the biomass fuel(s)	8%
Average biomass fuel(s) cost	190 EUR / tonne fresh substance or 207 EUR / t absolute dry substance 39.6 EUR / MWh

Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz

Fuel supply

- Plant operator GECO purchases wood pellets for its clients
- Wood pellets are derived from the regional timber industry
- Pellets are traded by intermediaries and delivered to the end consumers
- Supply contracts valid for a period of 1 year
- Pellet storage at “Haus der Stille” is sufficient for 3 to 4 months
- Guaranteed supply volumes by using different wood pellet traders

Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz

Investment and financing

- The biomass heating plant was invested by the owners of “Haus der Stille”
- The total cost of the investment was approximately EUR 45,000.
- Projects typically are financed by a share of 70-80% borrowed capital.

Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz

Main difficulties / barriers encountered in the realization of the project

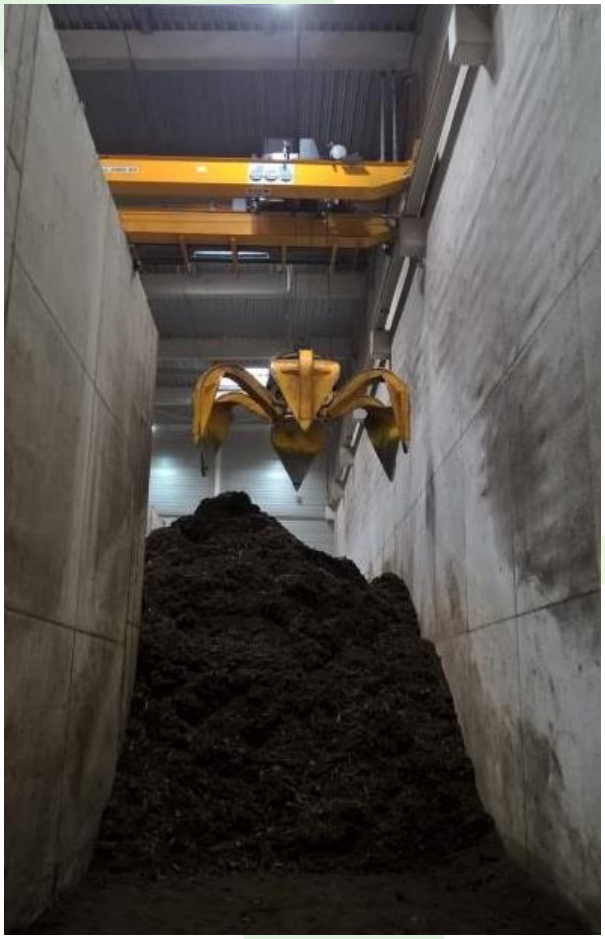
As the plant is situated near the city of Graz, permitting of the pellets plant was complicated and time consuming. At pellet plants installed in the country-side, official channels normally do not constitute such difficulties.

Replacement of the oil heating system with biomass in the Haus der Stille church institution in Graz

Recommendations for other investors / operators

- Instead of making an investment yourself (e.g. EUR 150,000 for a 300 kW pellet boiler) contracting might be an alternative solution
- For the contractor, payback times of 6 to 7 years are possible, depending on framework conditions.

Biomass heating in a potato processing factory, Odiliapeel, Netherlands



- Peka Kroef potato processing plant
- Steam required for processing of potatoes average steam demand of 15 tonnes/hour
- Process steam generated by natural gas to be replaced with biomass

Biomass heating in a potato processing factory, Odiliapeel, Netherlands

Energy conversion

General information	
Technology (e.g. in-house biomass boiler, biomass DH, etc.)	Biomass steam boiler
Year of installation	2015
Net capacity of the biomass boiler(s) – base load and medium load (if any)	8.2 MW (heat)
Total annual energy production from biomass	65,000 MWh (heat)

Biomass Fuel(s)

General information	
Type of biomass fuel(s)	Wood shreds from garden waste, municipal green waste and forestry
Annual amount of biomass fuel(s) needed	28,000 tonnes / year (fresh) 70,000 MWh / year
Average humidity of the biomass fuel(s)	35%

Biomass heating in a potato processing factory, Odiliapeel, Netherlands

Fuel supply

- Wood shreds from garden waste, municipal green waste and forestry are collected in a radius of 50 km distance from the biomass boiler.
- mix of short and long term contracts with biomass suppliers, the duration of which is more than 5 years
- Biomass storage facility is sufficient for 5 days of demand.
- Back-up steam supply in case the biomass plant is out of order for maintenance reasons

Biomass heating in a potato processing factory, Odiliapeel, Netherlands

Investment and financing

- The total investment cost was EUR 7.5 million

Main difficulties / barriers encountered in the realization of the project

- The main difficulty encountered was the complex and time-consuming procedure in order to acquire the necessary permits.

Biomass heating in a potato processing factory, Odiliapeel, Netherlands

Recommendations for other investors / operators

- It is important to make long term contracts for the supply of biomass.
- With an industrial client, it is important that the heat demand profile suits the heat delivery profile of the biomass plant. For example a biomass plant can provide base load; in the case of peaks in demand alternative energy sources must be used.
- For public support, it is essential that people living in the neighbourhood of a bioenergy plant are well informed. Attero has organized in an early stage information meetings and excursions. In spite of this, permits were objected to by some residents.

District heating in townships - conversion from gas to straw boilers, Gassum-Hvidsten, Denmark

- Established 1994 as a co-generation plant running on natural 2 MW electric power and 1.5 MW heat)
- Rural area supplying 192 households
- In 2010 exemption from co-generation obligation → heating plant (gas turbines on stand-by)
- Switch from Natural gas to straw: in December 2013 a 900 kW straw boiler was commissioned

District heating in townships - conversion from gas to straw boilers, Gassum-Hvidsten, Denmark

General information	
Total annual energy sold / delivered	2,700 MWh
Grid losses	3,250 MWh / year[15]
Grid length	Back-bone line: 8 km
Electricity consumption for the grid pumps and the boiler	280 MWh / year
Average price of heat sold / delivered	35.3 EUR / MWh
Duration of the heat delivery contract	Ongoing without notice
Parameters determining the heat delivery contract	By municipal planning, there is a legal binding obligation to connect to the plant and to take the heat; stepping out is not an option.
Type of consumers	Private dwellings

District heating in townships - conversion from gas to straw boilers, Gassum-Hvidsten, Denmark

Fuel supply

- Straw from local farmers (1650 t/a, ca. 3300 big bales)
- On field storage and frarmers bring straw to the plant when needed
- Storage for ca. 2 weeks at the plant
- Straw conveyor can supply plant for ca. 2 days when fully loaded (weekend)
- Delivery contracts with local farmes (4 farmers , 3-year contracts)
- Quality control of straw bales upon arrival (weight and moisture content)

District heating in townships - conversion from gas to straw boilers, Gassum-Hvidsten, Denmark

Investment and financing

- The total investment cost was DKK 7,000,000 (EUR 933,000).
- Loan from KOMMUNE Kredit, loan guarantee from the municipal planning authority.
- The repayment period is 30 years
- The DH plant is owned by the consumers, the Danish variant of a co-operative. There are no external investors.
- Together with 3 other similar local straw fuelled DH plants, Gassum-Hvidsten shares one full time employed heat engineer and two part time employed operating assistants.

District heating in townships - conversion from gas to straw boilers, Gassum-Hvidsten, Denmark

Main difficulties / barriers encountered in the realization of the project

- Straw is a “problematic” fuel with high ash and chlorine content resulting in slagging, corrosion.
- Another issue are particle emissions when running the boiler in the wrong way
- The heating plant teamed up with a Danish boiler producer (LinKa) who is an expert in straw boilers and straw firing
- Plant is running excellent and is a show-case for successful utilization of straw in the district heating sector

Report with best practice examples

Available on B4B project website:

www.bioenergy4business.eu

Link to report:

http://www.bioenergy4business.eu/wp-content/uploads/2015/06/646495_D3.5_Report-summarizing-best-practice-examples-and-conclusions.pdf