ENERGY EFFICIENCY

OPTIMIZED BIOMASS PLANTS

By Jens Dall Bentzen, CEO, Dall Energy

Celebrating six years in business, Dall Energy is forging ahead with next generation biomass technology using innovative combustion and heat recovery technologies.

In April 2014, the companies first biomass plant outside Denmark was fuelled at the factory "Warwick Mills" in New Hampshire, USA. The plant produces steam and hot water while incinerating the ventilation air from the factory.

In the mean time, a next generation is plant being built at Sønderborg district heating company in Denmark. The project in Sønderborg combines a second generation Dall Energy Furnace with a flue gas cooling system which is optimized to extract most possible heat of the hot flue gasses.

The company – founded in 2008 - was formed with the purpose to develop, demonstrate and implement new high-efficient & cost-efficient biomass technologies.

Two-stage furnace

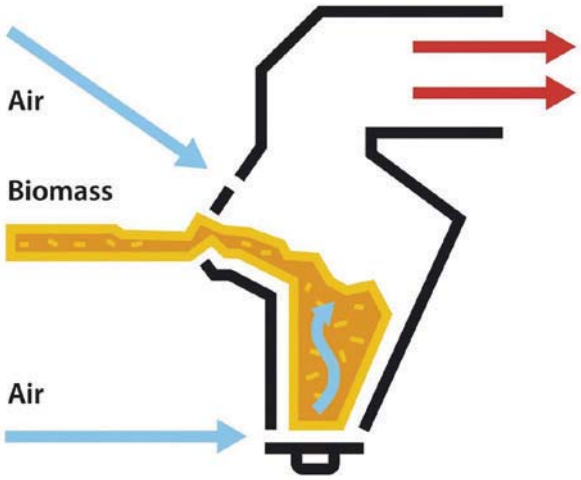
Initially, the company was focused on flue gas condensation but after collecting data of output from biomass furnaces, the company decided to focus on low emission combustion.

In 2008, the company developed the basic principles of a novel biomass two-stage furnace. The basic principle of the biomass furnace is to convert solid biomass to a low-dust gas and then burn the gas. The principle of the furnace results in several advantages:

- Multifuel: - Wet/dry, large/small particles - Low/high ash content
- 90 % less dust
- No hot moving parts
- Regulation: 10 %-100 %
- Low content of CO and NOx
- Low carbon-content in ash.

2 MW pilot

In 2009, Dall Energy received a co-financing grant from the Danish Energy Agency for proof of concept and process verification. A 2 MW pilot plant was built in co-operation with SEM Steel Industry A/S, a Danish manufacturer and supplier of machinery and components to the power and environmental industry. The verification of the furnace was completed in 2010 with very good success: The gasification and combustion process was very stable and the emission of dust, CO and NOx was extremely low.



2 MW plant in USA

The 2 MW pilot has since been shipped to Warwick Mills production facility in New Hampshire, USA.

The owner of Warwick Mills was searching for low emission biomass technology, and he found Dall Energy via a "google search". It was then agreed that the pilot plant should be shipped to Warwick Mills, who should built steam boilers, flue gas condensing system and control system based on Dall Energy specifications. Now the plant is being built, and the commissioning has started.

8 MW demo

The Danish town Bogense is very close to SEM Steel Industry. One day, the operation manager of Bogense visited SEM while the pilot plant was in operation. He was impressed by the low emission and calm combustion. A few months later, it was agreed that Bogense District Heating Company should have an eight MW full-scale demonstration plant installed. EUDP (the Danish Energy Agency's subsidy scheme) would financially support the plant. The company Weiss A/S was turnkey supplier of the plant. The plant consists of a Dall Energy furnace, a Danstoker exhaust gas boiler, and a flue gas condenser from Weiss.

The first tests of the demo-plant were made in 2011. There weres some faults with the plant, but these were solved, and in 2012 the plant was in continued operation.

Reduction of heating price

Due to the ability of using low quality fuel (biomass with high ash and water content) Bogense District Heating Company was able to buy the biomass very cheap. A considerable amount of the fuel, came from garden waste from the gardens of the citizens in Bogense.

Bogense District Heating Company decided in 2012 to reduce the heat prices for the energy sold to the customers by 20 %.

9 MW next generation plant in Sønderborg

The next steps in the development of a high efficient - low emission biomass system was to integrate the Dall Energy Furnace with an optimized flue gas condensing system. Such a project has been prepared at Sønderborg District Heating, Denmark. COWI is overall consultant of the project, and Dall Energy is responsible for the design of the biomass plant.

Sønderborg plant is a second generation plant where more improvements will lead to even higher fuel flexibility and higher energy efficiency. The plant is currently being built and will start up in October 2014.

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