

Report from 4biomass Study Tour, Leinì and Candiolo, Italy

Thursday, 27th May 2010



Roma, 10th June 2010

Partner Meeting at Joint Research Centre in Ispra, Italy and Study tour was held on 26th to 28th of May 2010. The meeting had been organized by ENEA. Part of the meeting was as well a study tour to a 10 MWth biomass district heating plant and to a 990 kW biogas production plant. The study tour with representatives of 4BIOMASS Consortium took place on 27th of May.

Between the two plants visit an informal meeting was held with Ms. Valentina Scioneri of Lamoro Development Agency, Asti, who had been invited by the project leader, to hear about the developments of the European project RUBIRES in which she was involved as partner and to further discuss on cooperation possibilities.

Here below details on both study tours are given in details.

Provana Calore, Leini

The plant working since January 2002 belongs to Provana Calore society and is located in the commune of Leini (situated in the climatic zone "E" with a value of 2,722 degree/day. Provana Calore is member of FIPER, the Italian Producer of Renewable Energy Federation (FIPER), founded in 2001, that brings together and represents the majority of Italian energy electrical and heating's producer by renewable source (<http://www.provana.it/calore.asp>).

FIPER bring together 21 energy heating's producer companies, 39 mountain area's town council of region Piemonte, Val d'Aosta, Trentino Alto Adige, Emilia Romagna. FIPER is recognised as authoritative category representative actor by Italian Agriculture Commission's Chamber and Senate and by local, regional sector authority.



Photo: District Heating plant



Photo: Chips Storage

The plant burns virgin wood chips coming from sawmills and forest scraps.

Currently, the district heating network covers 11 km and supplies 79 users by employing around the 80% of power available from the plant, therefore enlargements of the grid are planned for a final extension of around 12 km, and 90 users connected, in order to exploit the potentialities of the plant.



Photos above show 4Biomass partners in Leini

The thermal power station, made in September 2001, was realized in a new building of 22,40 x 65,00 mt, located in an industrial area.

In the building, two biomass boilers have been installed of Kohlbach brand and K8-5000 type, each one with nominal power of 5000 kW

The plant has a system for the continuous monitoring of the emissions, able to detect and register the values of CO, NO_x, O₂ and fumes temperature.

The boilers generate hot water of temperature to 85-90°C for supplying a district heating network connecting both public and private buildings, which in the past were supplied through fossil fuels (methane, diesel oil, oil fuel), in addition to some buildings recently made, heated exclusively through the district heating grid.

The heat generators taken into consideration are compliant with the directives foreseen in the Decree n° 152 2006, in the respect of the limit values established for the gasses emissions.

The boilers are equipped with all the elements foreseen in the above mentioned Decree, in the respect of the activities and the recovering methods obliged by the law: automatic feeding of fuels, automatic control of air/fuel even in the starting phase, continuous emissions control.

The automatic process of biomass combustion, starting from the extraction of biomass from the stocks to the reduction of smoke gases and the linking to the flue, is controlled through a system of multiparametric control element with Kolhbach processor; the process of the system can be visualized and controlled by a PC.

The average periodic performance of the boilers in the last heating season 2009/2010 was 70%. Considering that in the future a better exploitation of the nominal power of the boilers will be obtained, an increasing performance of the plant can be reasonably foreseen. The number of hours of the seasonal functioning is around 4.800 (200 days for 24 hours).

The plant is equipped with a emergency generator supplied with methane gas with nominal power of 3489 KW. The boiler is BIASI series NTN-AR mod. 3000 with burner of RIELLO brand.

Regarding the emissions to the atmosphere, the fumes are firstly treated by a multicyclone, the ashes coming from this purification go through a star valve to the screw, which carries the ashes to the horizontal ashes extractor, located between the two boilers.

The flue gasses are further treated through the electrostatic precipitator (Scheuch brand), they are distributed though the appropriate walls in the whole section of the precipitator.

The separation of the dusts occurs through electrostatic charge of the particles and though the separation of the particles charged on the electrodes. This system guarantees the compliance with the limits of emissions to atmosphere as foreseen by the D.lgs 3 April 2006 n. 152

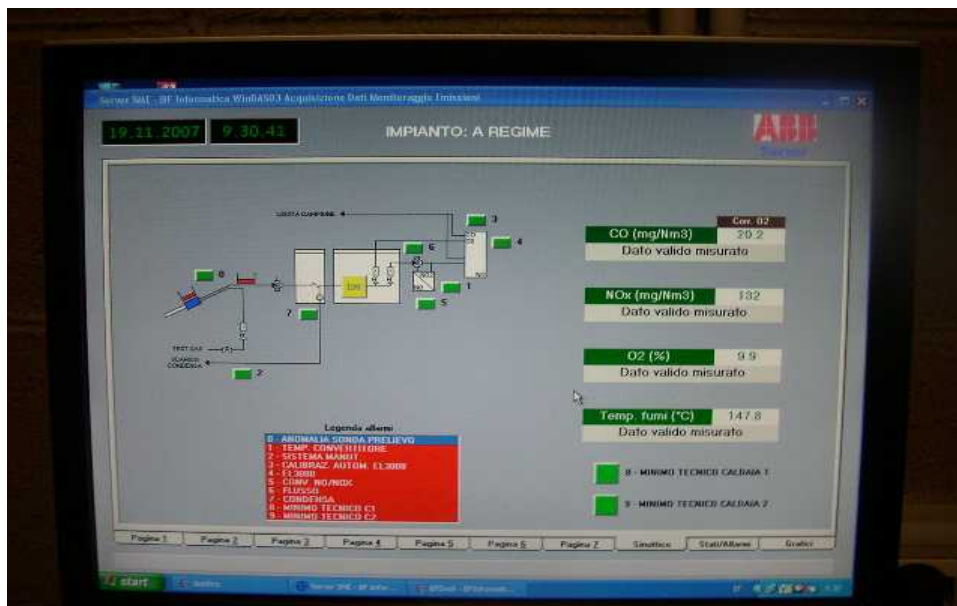


Photo: System of continuous Emissions monitoring (SME)

The district heating network is composed of double tubing with variable diameters from DN250 to DN40; the tubing are composed of a steel (a service pipe) drainage pipe covered by polyethylene.

The operating temperatures are variable depending on the season from 75/80° C in exit and 60/65° C in return, the exit pressure is 5/6 bar and the return is 2/3 bar.

The water circulation is guaranteed alternatively by the four centrifugal pumps (two pumps of 90 KW and two of 30 KW) able to work by programming based on the difference of the grid pressure of the district heating.

The water, of both the boiler and the grid, is decalcified and treated through a deoxygenating product, so that the tubing is preserved from possible encrusting and corrosive events. The primary circuit of the plant, the water heated by the boilers, is physically separated from the water of the grid through the heat exchangers with jointed grates. In the plan there are 4 exchangers, each one of 6000 KW power.

The district heating is equipped with two expansion tanks of 5000 each one. Currently the length of the district heating network is more than 11 km of double tubing. They are currently linked n° 80 users, but actually working 79, since the swimming pool of "Cittadella dello Sport" is not yet working.

Today the volumes that are heated are 440.000 m³, divided as follows:

167.000 m³ private buildings (around 750 apartments);

138.000 m³ in 9 companies;

135.000 m³ in 14 municipal buildings.

The objectives of the 100% of the plant power is foreseen for the 2012, thanks to the several users of the next years, reaching a totality of 90 users and 500.000 m³ heated.

The plant in Leini has allowed to save in 2009:

1.509.030 m³ of methane ;

37.380 It of diesel;

48.102 It of fuel oil.

The avoided CO₂ was 3.154 ton, from 2002 to 2009: 20.708 ton.



Photo: Biomass Boiler

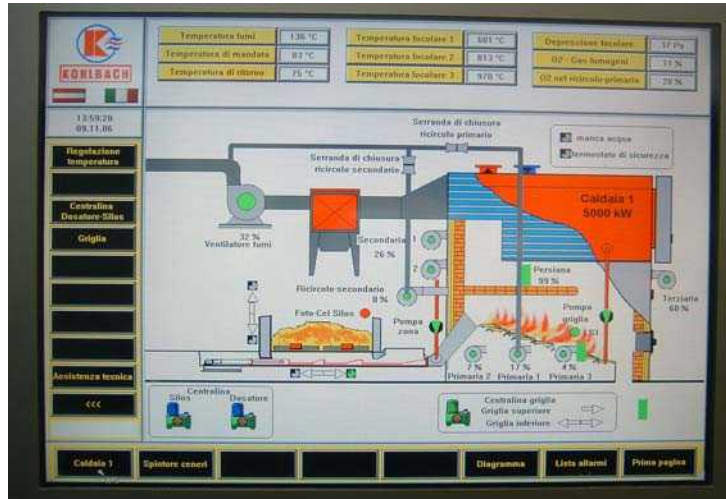


Photo: Plant Parameters Control Panel



Photo: Electro-filter



Photo: User heat exchanger

The study tour proceeded to the second site for the technical visit to a biogas plant:

Cooperativa Speranza "AB Energy Biogas Plant"

The plant is operational since 2008 and was born by the collaboration of the Cooperativa Speranza di Candiolo, in province of Torino and AB Energy, a society of Gruppo AB of Orzinuovi (Brescia), leader in Italy for modular solutions in container from 100 to 10,000 kWe .

In the last years the Gruppo has enlarged its activities with the development of the sector BIO, studied for the energetic valorisation of biogas. The plant represents a typical collaboration between the agricultural entrepreneur that becomes energy producer and a society whose know how and experience guarantee the economic income expected.

The Cooperativa Speranza operates essentially in the zootechnical sector and sells its products directly to customers. The Cooperativa is a cluster of five partner that can share technological resources and machineries.

The plant entered in operation in April 2008 and produces about 8M MWh/a and the same amount of kcals.

The plant is fed with manure and animal slurry, vegetal residues and chopped silomais. All the stuff is loaded into digesters, where the decomposition of the organic matter takes place, producing methane. At the end of this cycle the biogas produced becomes fuel for the cogenerator, producing electrical energy and heat. The remained biomass (digestate) is separated forming a compost and mineral fertilizer which is spread in the fields.

The Cooperativa Speranza, produces an average of 4,200,000 m³/a of biogas which generate electrical energy through the 990 kWe cogeneration unit for a total of over 8,400,000 kWh and thermal energy at an initial power of 588 kWth which will be increased (works are in progress to double the power of the plant) with the installation of a new boiler in order to reach a total production of over 6,780,000 kWth.



Photo: Jenbacher Gas Engine

Project Plant data:

Fuel Consumption 521 Nm³/h

Power input 5257 kW

Installed Power 990 kW

Electrical efficiency 40.8 %

Working hours per year 8,600 h

Working shifts 168 h/set. 7 g/set.

Annual biogas production 4,200,000 m³

Annual electrical energy production 8,400,000 kWh

Annual thermal energy production 6,780,000 kWh

CO₂ emissions saved 5,670 t/a





Photo: Engine and Exhaust Gas Treatment



Photos above show 4Biomass partners in biogas plant in Candiolo.

Roma, 10.06.2010

ENEA – Emanuele Scoditti