From aerobic to anaerobic digestion and additonal benefits

Milan, Italy

Population: 1,337,155	**Total waste: 665,641 t**	Recyclable: 215,668 t
Area: 181.76 km^2		Non-recyclable: 330,158 t
Density: 7,365/km^2		Organic waste: 119,815 t

2015

Success Stories: anaerobic digestion of biodegradeable municipal solid waste in European cities

The City of Milan has signed a service agreement by which it gives the mandate to a private company for the management of environmental hygiene service throughout the city. The main services covered by the contract are: kerbside collection, household waste recycling, streets and public green areas cleaning and washing, emptying baskets and abandoned waste collection. The separately collected waste, such as paper, plastic and glass, is then delivered to specialized installations that provide their proper recycling, while residual waste is forwarded to a waste incinerator.

The collection of kitchen waste began in 2012 and since 2014 100% of the city is covered by collection of food and organic waste, after the final phase of implementation took place. The waste is collected in degradable bags inside 10 l ventilated containers, previously given to citizens, and then deposited in the relevant brown condominium container.

Montello anaerobic digestion plant

Montello started to process organic waste back in the 1990s, with the initial aim of obtaining a simple "sanitation solution" for biowaste diverted from landfills. In 1997, an aerobic composting treatment was developed for the production of "composted mixed soil improver".

The results achieved have led to new technologies and, consequently, investing in pre-treatment and anaerobic digestion phases that would considerably improve the existing intensive aerobic treatment.

Anaerobic digestion, which is also well-known in Italy for a long time for stabilisation of biological sludge, is not very popular in the treatment of waste of organic origin, on contrary to what is happening in the rest of Europe. Yet, the success story in Montello proves the opposite.

Digesters: 45,200 m^3

Instaled power: 12.8 MW$_{el}$

Capacity: 342,000 t/y

Project under construction: biomethane plant

Organic fertiliser: 45,000 t/y

Employees: 98

Anaerobic digestion

The plant, located in Montello, consists of an initial waste pre-treatment phase, followed by anaerobic digestion and a subsequent aerobic composting phase of the digestate, coming from the dehydration of the digested waste, aimed at the production of quality organic fertilizer. The anaerobic digestion, on the other hand results in biogas production, that is used for generation of electrical and thermal energy.

The adopted process is WET type, in a continuous stirred tank reactor, or CSTR, with the use of the biogas produced by the anaerobic digestion process in electro-thermal co-generation groups.

What comes out of the digesters are biogas, which it is then dehumidified and organic fertiliser used for urban areas and parks.

Of particular interest could be that there is a water collection system of first and second rains to decrease the consumption of water required for the process.

The Montello plant also has a project under construction that will result in biomethane production and its injection into the gas grid.

Benefits from anaerobic digestion

The company has identified several advantages and benefits, such as energy production - maximum recovery of both electric and thermal energy, thanks to the high yield of the multi-phase process; wide field of application and flexibility, as the same plant can process different types of organic waste. Plant operation is entirely automatic, including the separation of unwanted components unsuitable for anaerobic digestion and composting. After all, organic material is converted into energy, contributing to a reduction of CO_2 emissions and consequently to a reduction of the greenhouse effect. The plant allows an annual saving of approximately 90.000 tonnes of $CO2_{eq}$.