

## TOUR 1

FEA s.r.l. waste to energy plant – Granarolo dell'Emilia (BO)



Due to the steady rise in the calorific value of urban waste, the disposal capacity of the old plant was slowly declining. The new plant, designed and built in accordance with increasingly restrictive standards under the legislation in force, matches the original disposal capacity of the previous incinerator, but offers vastly superior environmental performance: bear in mind that 37,000 tonnes of oil equivalent (toe) are saved each year due to the thermal energy and electricity generated by the plant.

The new facility consists of two energy recovery treatment lines which are able to process up to 600-700 tonnes of solid waste per day, equivalent to 198,000 tonnes per year, and to feed 130 million kWh/year into the national grid, corresponding to the annual consumption of some 50,000 households.

In addition, the plant is able to supply 30 million Mcal/year to the district heating network, equivalent to the heating requirements of around 3000 households.

The benefits delivered by this latest generation waste to energy plant are numerous, both in terms of performance (waste treatment and electricity generation) and in terms of the reduction in environmental footprint, thanks to the use of best available techniques (BAT).

The disposal capacity of the new plant has increased by 50% and the electricity sold to the national grid has more than tripled.

The plant was awarded quality certification (ISO 9001) and environmental certification (ISO 14001) in 2002, and on 24 July 2009 obtained EMAS registration in accordance with Regulation (EC) No. 761/2001 (IT-001143).

## COLARI CDR thermal gasification central – Malagrotta (RM)



With the presence of oxygen, incineration of Refuse-derived fuel (RDF) in the Malagrotta power plant, occurs at very high temperatures. This incineration process utilizes all the energy contained in RDF, while drastically reducing the environmental impact.

In the gasification process the RDF is subjected to a partial combustion and, the energy produced allows the transformation of carbon compounds. The result of this process is a synthesis gas (syngas) hydrogen-rich. The gas is then used for the production of electricity. The emissions of pollutants in the atmosphere are considerably lower than the law limits .

The heart of WTE plant is the gasifying reactor, where the temperature can reach 1,600 °C. The burning materials are converted into synthesis gas while the remaining inert materials are then used by the bitumen industry and used as pavement surface,. The synthesis gas, is utilized for electricity; that allows the system a considerable energy recovery.

The gasification process allows the Malgrotta plant to sustain the concentration of pollutants, especially for the most dangerous ie dioxins, way below the limit. At the same time, the mineral materials derived from the combustion is completely reusable as inert.

The technology used by Malagrotta WTE plant leads us to believe that it is one of the best in the world.

## A2A S.p.A. waste to energy plant - Acerra (NA)



The Acerra plant is among the most important waste to energy plants in Europe. It is able to treat approximately 600.000 tons per year of pre-treated municipal waste. As a result, the plant produces about 600 million Kwh per year, enough to supply 200.000 households.

A2A plant is located in Acerra's Municipality and its operation area covers about 9 hectares.

The plant is composed by 3 independent operation lines. Each one treats about 27 tons per hour. Each line consists in:

- Thermal (waste to energy line with steam production)
- Smoke purification

The A2A waste to energy plant was built utilizing the best availability technology. As a result the emissions are far less than 50% of the limits set by European Directives.

The waste collected in the area is selected and pre-treated in the Caivano plant and then transported into the Acerra WTE plant.

## TOUR 2

### Publiambiente S.p.A. C. MBT, Composting, Landfill and Biogas Extraction – near Empoli (FI)



Our visit to the Publiambiente S.p.A. plant near the town of Empoli, a short distance west of Florence, provide us with a mix of technologies for treating both mixed waste and organic waste from source separate collection. At the end of the cycle a landfill operates to ensure disposal of treated residual waste and a biogas extraction system produces electricity.

The site is divided into three sections:

1. Mechanical and biological treatment of mixed waste, this part of the plant handles approximately 40.000 to 50.000 tons annually, recovering the metallic fractions. The organic fraction is composted and used as daily cover for the landfill.
2. Composting. The plant treats 90.000 tons annually of source separate waste collected from kitchens and gardens from various Tuscany provinces. It produces 16.000 tons of quality compost which is ceded to manufacturers of gardening and potting soils and to farmers for agricultural use.
3. Landfill. The landfill operation accepts only treated waste deriving from the Publiambiente SpA MBT plants of Montespertoli and Pistoia, and currently accepts 90.000 tons annually. The landfill produces biogas which is used in a cogeneration plant, producing 4.000 MWh/year.

### SESA S.p.A. anaerobic digestion and compost plant – Este (PD)

It is an integrated system of anaerobic digestion, composting and water treatment that has in the same site systems, composting facilities, sewage treatment and pit, which is also used for the humidification of piles during composting.

Produces electricity, recovers heat and power district heating network.



The biogas produced by anaerobic digestion of F.O.R.S.U. (digesters of 7,000 m<sup>3</sup>) feeds five (total power of 5,312 kWe) i.c. groups of the cogeneration plant that serves the district heating network of the municipalities of Este and Ospedaletto Euganeo.  
 Potential Total Authorized 300,000 (t/y) (also referred to the potential of composting section)



The composting plant is the organic fraction of municipal solid waste, namely kitchen waste and green waste from urban.  
 The composting process is anaerobic decomposition of organic matter with that occurs with accelerated biooxidation system in biocelle under electronic control of the plant.  
 You get a compost (compost quality *Terra Euganea*<sup>®</sup>) biologically stable and rich in humus, active microbial flora, which can be considered a agronomicamente amendment because it improves the chemical-physical and mechanical properties of soil with composting effect.  
 It is used in agriculture, distributed to full field for horticultural crops, vegetables, orchards, vineyards, corn, wheat, etc.

### ETRA S.p.A. Camposanpietro biotreatment center



Camposanpietro Plant, is composed of three units:

- the **sewage section**,
- the **organic waste treatment section**,
- the **energy production section from renewable sources**

### **Organic Waste treatment Unit treats:**

- organic fraction of recycling materials: about 16,000 tons per year;
- slurry: about 25.00 tons per year
- wastewater sludge: about 8,000 tons per year.

The plant through the anaerobic digestion of organic compounds produces biogas and slugs. Since the biogas contains about 60% of methane, it is utilized to produce electricity and heat. The facility produces more the 3 million kWh of electricity per year and more than 5 million kWh/year of thermal energy. On the other hand, sludge is processed for compost production.

### **ETRA S.p.A. Vigonza biotreatment center**

The Vigonza Plant, is divided in two unit:

- the wastewater biological-purification section
- the composting area.



The composting units treats 34,000 t/yr of yard waste, sludge and fruit and vegetable Market scraps. The final product is a fertilizer, soil amendment (compost) that can be used for agricultural purpose or in the plant nursery industry

The Treatment steps are:

- shredding and piling up yard waste
- indoor mixing sludge with organic matters
- Indoor controlled bi-oxidation process with air purification system
- Outdoor piling compost

The process is 75 days long.