TRAINING MATERIAL

Title:

Technology for N&P recovery as compost starting from green waste and pre-digested mixed-waste with "ACEA Pinerolese" anaerobic digestion and composting process (ID:209)

Training:

What is the technology?

Recognized internationally as a case of excellence in the treatment of the organic fraction, the technology is in the Integrated Ecological Pole of ACEA Pinerolese. It is configured as a single interconnected plant for services relating to water, sludge/digestate treatment, thermal and electrical energy recovery. It represents an example of integration of the anaerobic-aerobic treatment of the organic fraction of solid urban waste (FORSU) for an annual capacity of 60,000 tons (of the OFMSW only).

Who is the vendor of the technology?

The vendor of the technology is ACEA PINEROLESE, based in Pinerolo (TO), Italy.
The ACEA PINEROLESE company, within the Integrated Ecological Pole, currently manages not only the entire cycle of waste collection in favor of a basin of 47 Municipalities of the Province of Turin, in Italy, but also the treatment of organic waste, serving roughly 1 million inhabitants.

Which other technologies are provided by the vendor?

As far as the waste sector is concerned, the company's services, include the collection of municipal solid waste, separate collection, waste disposal, public hygiene, organic waste treatment.

Which are the advantages of the technology and the problems addressed?

The Integrated Environmental district is a plant system created to provide an adequate and sustainable response to a complex environmental issue: disposal of waste. The ever increasing quantity of waste generates a serious problem, which cannot be solved exclusively with traditional methods. ACEA's commitment to research, design and development of advanced technologies at the service of the environment places the company among the most active in the sector.
The advantages recognized in the integrated anaerobic-aerobic system and the key factors that determined the choice were:
- the existence of internal technologies and skills within the company;
- the possibility of producing energy from renewable sources;
- the lower impact due to odors, which are significantly limited in a "closed" process;
- the least amount of surface occupied per unit of tons treated;
- the reduction of the quantity of mass to be treated during the composting phase, with the same input material;
- greater recovery efficiency, both in terms of matter (production of compost from digestate) and energy (biogas);
- the reduction of the organic fraction sent to landfill, in compliance with EU regulations;
- a lower production of CO_2 emitted compared to aerobic treatment only.

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How does the technology work?

The completely innovative idea behind the ACEA Ecological Pole consists in the physical and logistical integration of the plants that make up the district, where each treatment phase is closely interconnected with the next, with a view to enhancing the intrinsic "resources" still present in the waste (technology for N-P recovery in agriculture), limiting emissions and optimizing yields, both from an environmental and economic point of view. The ACEA Integrated Ecological Pole is made up of a plurality of plants, physically and logistically interconnected:

- waste enhancement plant, in turn characterized by two lines → one for the treatment of the organic fraction and one for the treatment of the residual dry fraction;
- composting plant certified ISO 9001 and ISO 14001;
- ISO 14001 certified landfill (located about 3 km from the Polo);
- wastewater treatment plant.

The integration between the aforementioned plants is determined by three distinct flows;

- the flow of water → the residual waste of the first three plant units (anaerobic digestors, composting site and landfill) are fed to the wastewater treatment, which, in turn, supplies purified water to the treatment line of the organic fraction;
- the flow of biogas → the gaseous mixtures from the wet line of the anaerobic digestion plant, from the landfill and from the waste water treatment are stored inside the gasometer for subsequent energy recovery;
- the sludge flow → the digestion process of the wet line of anaerobic digesters is converted into the digestate which is brought to the composting plant and constitutes its "raw material".

ACEA PINEROLESE's system allows to enhance the intrinsic qualities of organic waste, obtaining two important resources: digestate for the production of quality compost and biogas, from which thermal and electric energy derives.

The process adopted was covered by a patent during 2002 and the experience gained has allowed the company to obtain SOA certification in the reference category. The process consists in the combination of anaerobic and aerobic digestion and it is a biological process that takes place in the presence of organic masses. It is a fermentation by particular bacterial families. The system designed by ACEA reproduces and optimizes the normal biological transformation process, maximizing its benefits. First of all, organic waste from separate waste collection undergoes, a series of volumetric reductions and mechanical selections, which prepare the mass for the peculiar phase of the process: biodigestion. These operations allow to remove any undesirable fractions, such as plastic and metals. The refined mass is diluted with water and transferred to the intermediate tanks, where it is heated. At this point, the mixture is pumped into the digesters, where the peculiar phase of the process takes place: the biological anaerobic digestion. This fermentation generates two by-products: biogas, conveyed to the gasometer, and digestate, transported to the composting plant for the aerobic phase, which will lead to the production of Florawiva quality compost.

At the anaerobic digestion plant the first phase of the process consists of an anaerobic process (in the absence of oxygen), which allows to associate the recovery of material (compost) with an innovative energy recovery system (biogas). First of all, the organic waste coming from the separate collections undergo, , a series of volumetric reductions and mechanical selections. These operations allow the removal of any undesirable fractions, such as plastic and metals. The refined flow is transferred to intermediate tanks, where the material is diluted with water and the material is preheated. After the preparation phase, the mixture is pumped into the digesters. The process involves constant handling of biomass. The extraction of the sludge takes place from the conical bottom of the digester, by gravity mixing. Digested organic waste (digestate) it is dehydrated and then sent to the close composting system. The biogas obtained from fermentation it is conveyed to a gasometer and temporarily stored. The water used in the process is partly recirculated, while the remaining portion is sent to the waste water treatment plant.

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It is a technology that can be applied to any differentiated municipal and green waste streams by converting it into biogas and high quality compost.
The type of inputs used are the organic fraction of solid urban waste and green wastes (as bulking materials). The composting process utilizes de-hydrated effluents from the anaerobic digestion of organic fraction of municipal solid waste, of green residues from separate urban collection and dehydrated effluents from the wastewater treatment plant. The outputs are digestate, which is composted producing compost, and biogas.

Which are the authority permits and in which EU countries?
In 2007, the composting plant obtained ISO 14001 certification, or "environmental certification", which certifies the company's commitment and interest in limiting the environmental impact of processes, products and services and certifies the reliability of the environmental management system applied. Also in 2007, the plant was certified according to ISO 9001: 2000, the world standard that ascertains the quality of the company quality management system, designed to keep company processes under control, directing them to customer satisfaction. Florawiva® compost produced by Acea Pinerolese is a certified quality product by the CIC (Italian Compost Consortium).

How much does it cost?
Please ask directly to the vendor.

For more information: https://nutriman.net/farmer-platform/technology/id_209

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