VEOLIA

Anaerobic digestion

Innovation serving green energy

With anaerobic digestion, a system with a real future, innovation is at the heart of the production of green energy.

WHAT IS ANAEROBIC DIGESTION?

Anaerobic digestion uses bacteria to transform organic waste into energy in the complete absence of oxygen. This transformation occurs in nature, in marshes, for example. In order to be useable on a larger scale, the process has been tamed and optimized in closed tanks called digesters.

The micro-organisms digest the organic fraction of the waste and convert it into biogas, a source of renewable energy. The residual organic matter (fraction not degraded during the process) forms the digestate that is dewatered, composted and used as a fertilizer by farmers.

ANAEROBIC DIGESTION: WHY AND FOR WHOM?

France has committed to sourcing 23% of the country's electricity consumption from renewable energy by 2020.

Additionally, through France's Grenelle Environmental Forum laws, the government has asked producers to sort and recover 75% of organic waste since 2012.

Anaerobic digestion, an innovative treatment system in France, delivers two types of recovery from organic waste in a virtuous carbon circle: agronomic with the production of compost, and energy in the form of biogas, electricity or heat. This technology is widely used in Germany, Denmark, Sweden, the Netherlands, Belgium, Italy and Switzerland.

It provides an answer to one of the current challenges facing the farming sector: design new models of production taking into account environmental constraints and improve competitiveness. Anaerobic digestion is not just used by the agricultural sector. It targets all types of organic waste, whether it is derived from farming, food and beverage industries or municipalities, such as green waste from parks and gardens and the by-products from wastewater treatment plants.

HOW DOES ANAEROBIC DIGESTION WORK?

Example of the Veolia process used at the Artois anaerobic digestion plant

1. **Waste delivery.** The waste is delivered in bulk and liquids are stored in storage tanks. Pasty and solid waste is directly transferred to the preparation pits. Packaged waste is first unpackaged to extract the organic matter.

2. **Anaerobic digestion.** All this waste forms the energy mix which is fed into the hydrolysis tank. For three days, hydrolytic bacteria degrade the waste. After hydrolysis, the energy mix is fed into a digester. For 30 days, methanogen bacteria produce methane from the energy mix. The digestate, or residue from this fermentation, is delivered to a post-digester to complete the degassing process. The biogas storage tank above this post-digester is used to control supply to the cogeneration motor.

3. **Energy recovery.** The biogas, 60% methane and 40% CO2, is treated prior to its use in a cogeneration motor. Each year, this process produces several million cubic meters of biogas. The biogas is used as a fuel to produce electricity that is then fed into the French national grid.

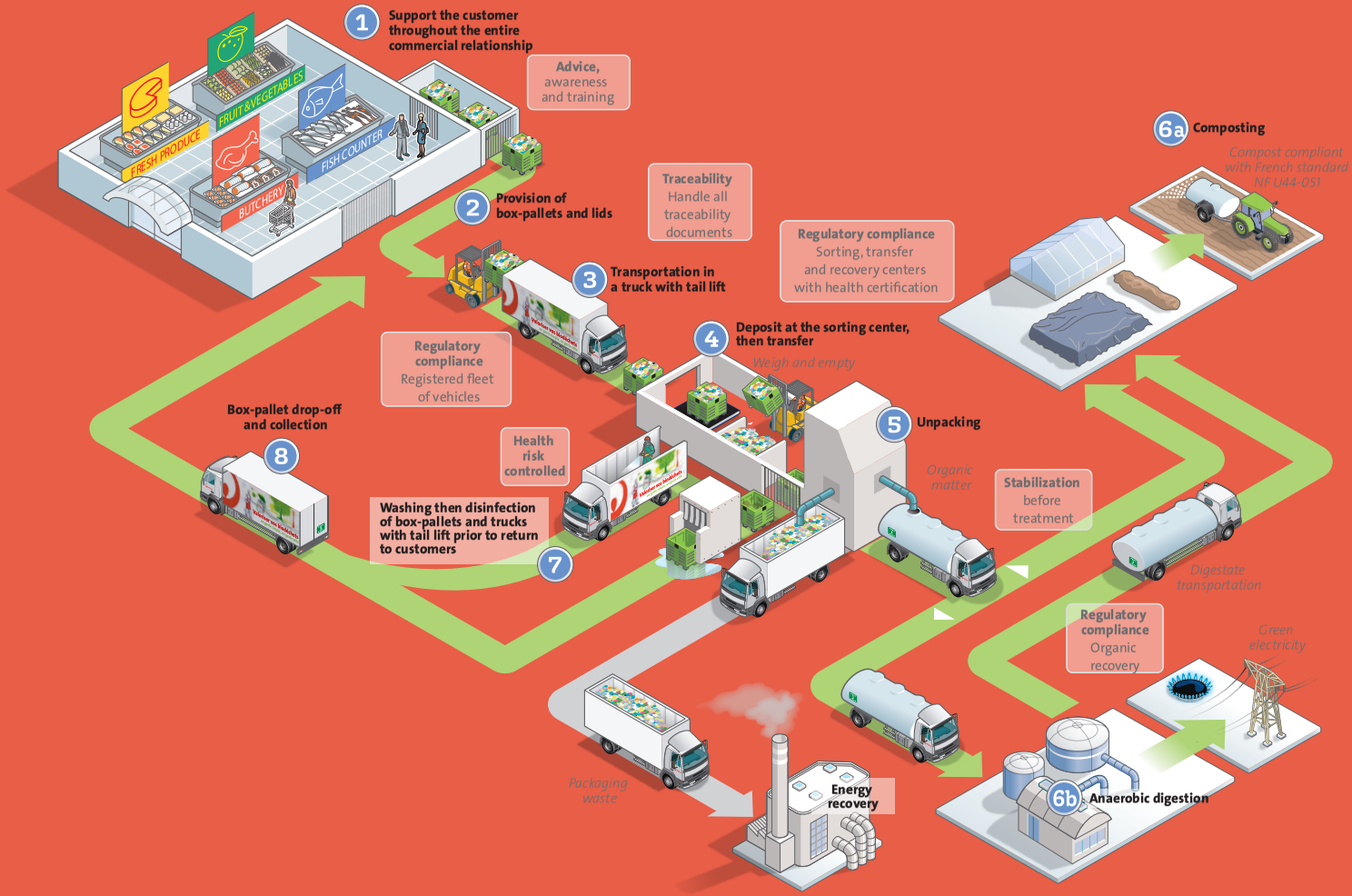
4. **Agricultural recycling.** The digestate undergoes stabilization heat-treatment at 70°C for one hour prior to being dewatered in a centrifuge. At the exit from the centrifuge, the solid fraction of the digestate is composted ready for recovery as a fertilizer that can replace the chemical fertilizers used by farmers.

WHAT DOES ANAEROBIC DIGESTION MEAN FOR VEOLIA?

With anaerobic digestion, Veolia is stepping away from the linear production and consumption approach and moving towards the circular economy, **an economy in which the waste discarded by some systematically becomes valuable resources for others**.

The Artois anaerobic digestion plant is a perfect illustration of the convergence between environmental services and energy efficiency from anaerobic digestion at Veolia.

Since April 2012, on a 9,000-square meter site in Graincourt-lès-Havrincourt (northern France) the Artois anaerobic digestion plant recovers all types of organic waste from farming (agricultural biomass, endive roots, etc.), industry (biological sludge, flotation grease, production waste, meat waste and restaurant grease), municipalities (grass clippings, municipal canteen waste and treatment plant waste) and the mass retail sector. This anaerobic digestion plant recovers 25,000 metric tons of waste a year and generates the equivalent electricity consumption of 6,500 people. The 7,000 metric tons of digestate, or organic material not degraded by the process, is composted and used to fertilize the surrounding farmland.


1 Support the customer throughout the entire commercial relationship
Advice, awareness and training
FRESH PRODUCE
FRUIT &VEGETABLES
FISH COUNTER
BUTCHERY
2 Provision of box-pallets and lids
Traceability
Handle all traceability documents
3 Transportation in a truck with tail lift
Regulatory compliance
Sorting, transfer and recovery centers with health certification
6a Composting
Compost compliant with French standard NF U44-051
4 Deposit at the sorting center, then transfer
Weigh and empty
Regulatory compliance
Registered fleet of vehicles
5 Unpacking
Organic matter
Stabilization before treatment
Box-pallet drop-off and collection
8
Health risk controlled
Washing then disinfection of box-pallets and trucks with tail lift prior to return to customers
7
Digestate transportation
Regulatory compliance
Organic recovery
Green electricity
Packaging waste
Energy recovery
6b Anaerobic digestion

Did you know?

Abandoned or poorly recovered organic waste releases methane as it degrades. The impact of this methane is 21 times more harmful that the greenhouse gas effect of CO2, so it needs to be captured and recovered.

At the Artois anaerobic digestion plant, the manager takes deliveries from five or six “sources” to produce biogas from fermented organic waste. In particular, this waste comes from highly methane-producing food and beverage industry by-products, plus the waste from municipal canteens, meat waste, endive roots and grass clippings as well as wastewater treatment sludge.

An innovation developed by Veolia in partnership with Ondalys, the Flash BMP® (Biochemical Methane Potential) solution measures the methane-producing potential of organic waste in a few days, with a level of precision equivalent to that of conventional methods. This method is based on an instant near-infrared spectroscopy optical reading. This innovation was transferred in 2014 to the Artois anaerobic digestion plant and to Veolia’s CAE (Environmental Analysis Center). It is applicable to a great variety of products: food and beverage industry waste, agricultural waste and effluent, municipal waste, etc.

Resourcing the world

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