Tunnel Composting Integrates AD In Sogliano, Italy

Luigi Castelli, BioMRF Technologies Inc.
Manuele Lesa, Atzwanger S.p.A.
Christine McKiernan, BIOFerm Energy Systems

BIOMRF™ ECOMASTER BIOFERM

REFOR13
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Sogliano Ambiente

Sogliano Ambiente S.p.A.

Owner and Operator of the Sogliano AD/Compost facility, is a leader provider of environmental services:

- Organic Waste Biogas Recovery
- C&D Waste Treatment
- Sorting of MSW Recyclables
- Landfill Gas to Energy
- Solar Power Generation
- Off-shore Wind Farm (under development)
- Landfill Disposal
- Solid Waste Transportation

ATZWANGER

Atzwanger S.p.A.

has designed and built the biological systems of the Sogliano AD/Compost facility. Located in Bolzano, Italy, Atzwanger is an international EPC contractor:

- Solid Waste MBT Plants
- Waste-to-Energy
- Water and Waste Water Treatment
- Power Plants (Fossil / Renewable Fuels)
- Municipal Swimming Pools and Aquatic Parks

BIOFerm Energy Systems

A company of the Viessmann Group (2.5 billion $ revenues), with offices in Madison, Wisconsin, BIOFerm has provided Atzwanger with the dry digestion technology used in the Sogliano facility. BIOFerm has proprietary technologies for producing biogas from organic waste, agricultural biomass and manure:

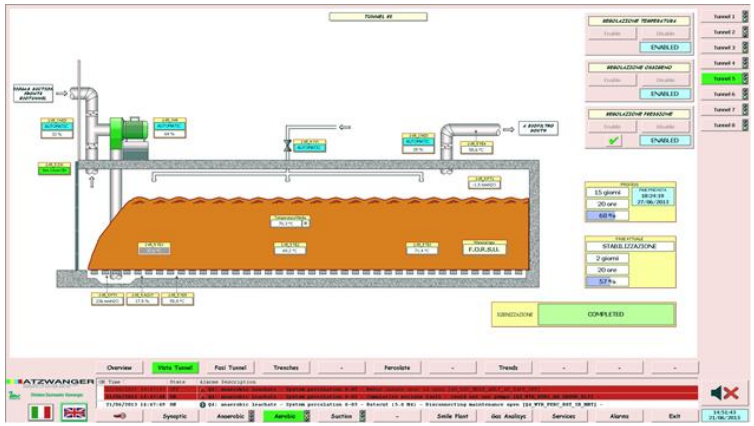
- Dry Digestion
- Semi-Dry Digestion
- Wet Digestion

BIOFERM

Tunnel Composting

The Sogliano plant uses the Ecomaster Tunnel Composting Technology to process the digested material and produce, after ASP maturation, a finished compost product.

BioMRF™ is the North America and Caribbean licensee of the technology.



Plant Capacity

Source Separated Organic Waste
43,300 tons/year

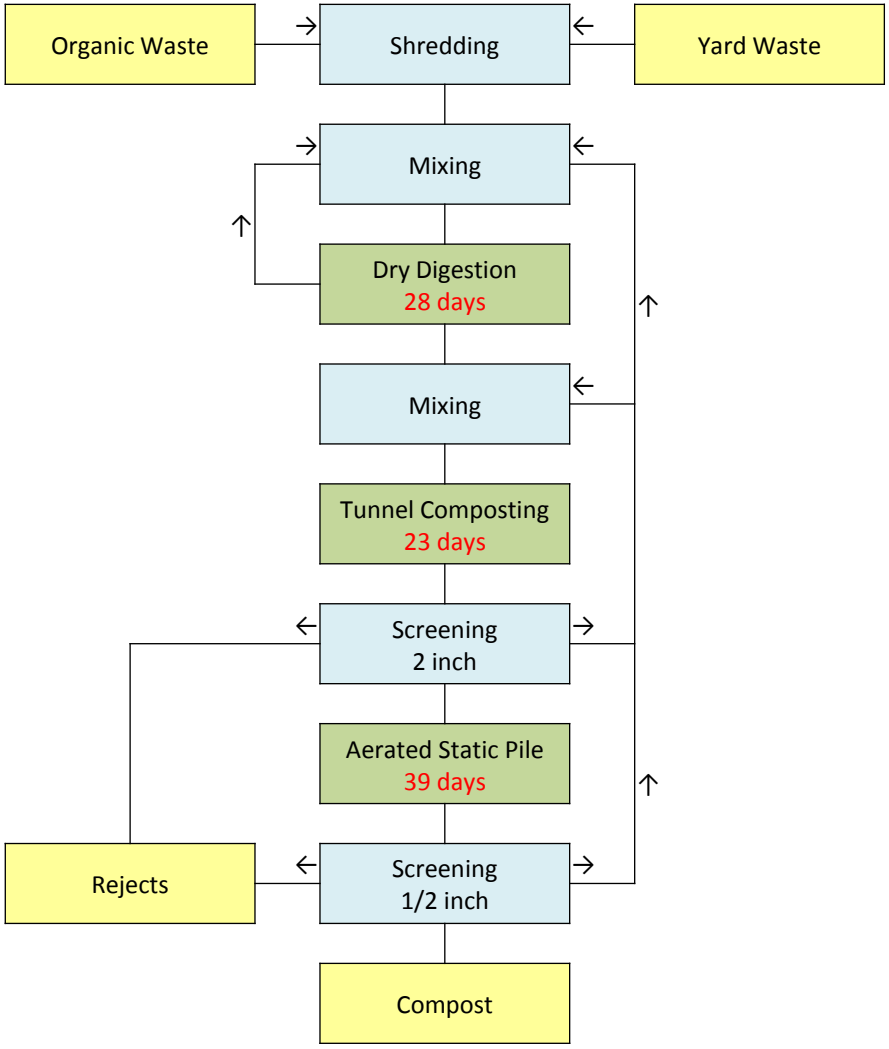
Yard Waste (Structural Material)
11,000 tons/year

Mechanical Process

- Low Speed Shredder
- Mixing by Wheel Loader
- Trommel Screens

Biological Process

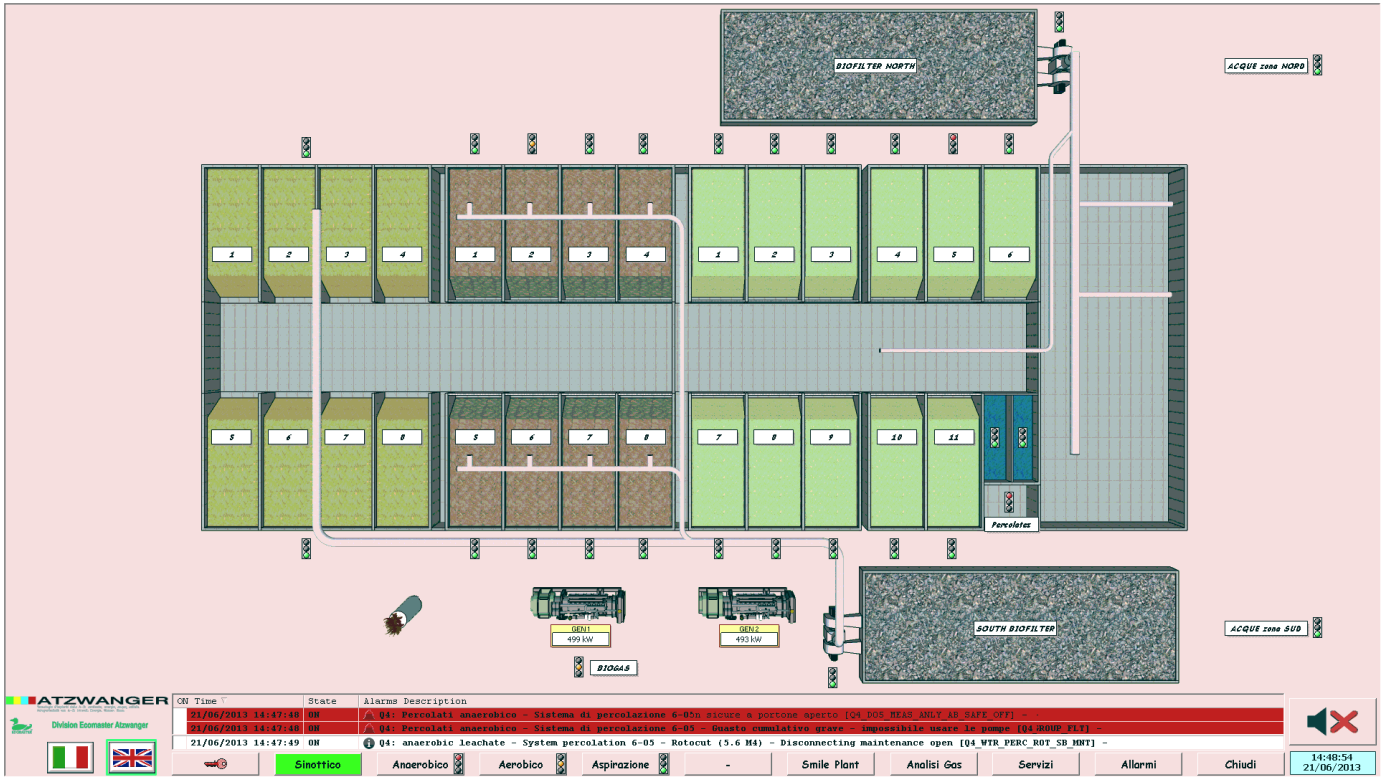
- Dry Digestion
- Tunnel Composting
- ASP Curing




ASP
Composting Tunnels
Dry Digesters
Waste Receiving
Biogas Holder
Percolate Tanks

Biological Treatment System

- 11 Anaerobic Digesters (23 ft x 98 ft)
- 8 Aerobic Tunnels (21 ft x 98 ft)
- 8 Aerated Pads (21 ft x 98 ft)



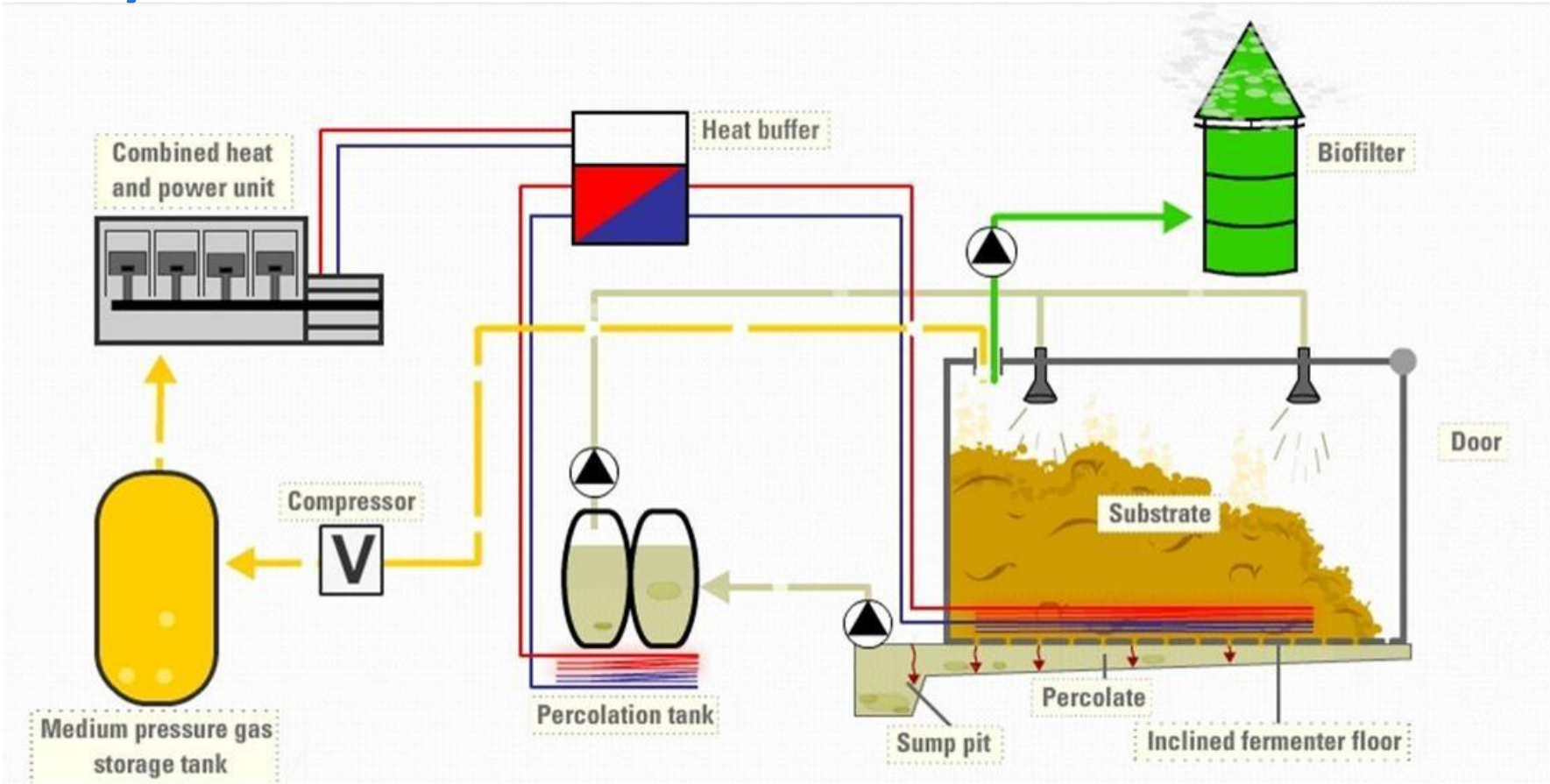
Pre-Treatment

- Receiving
- Shredding
- Mixing
- Digester Loading

Dry Anaerobic Digestion

- Percolation
- H_2S Biological Removal
- Biogas Cooling
- Biogas Storage
- Digesters Ventilation

Dry AD Process

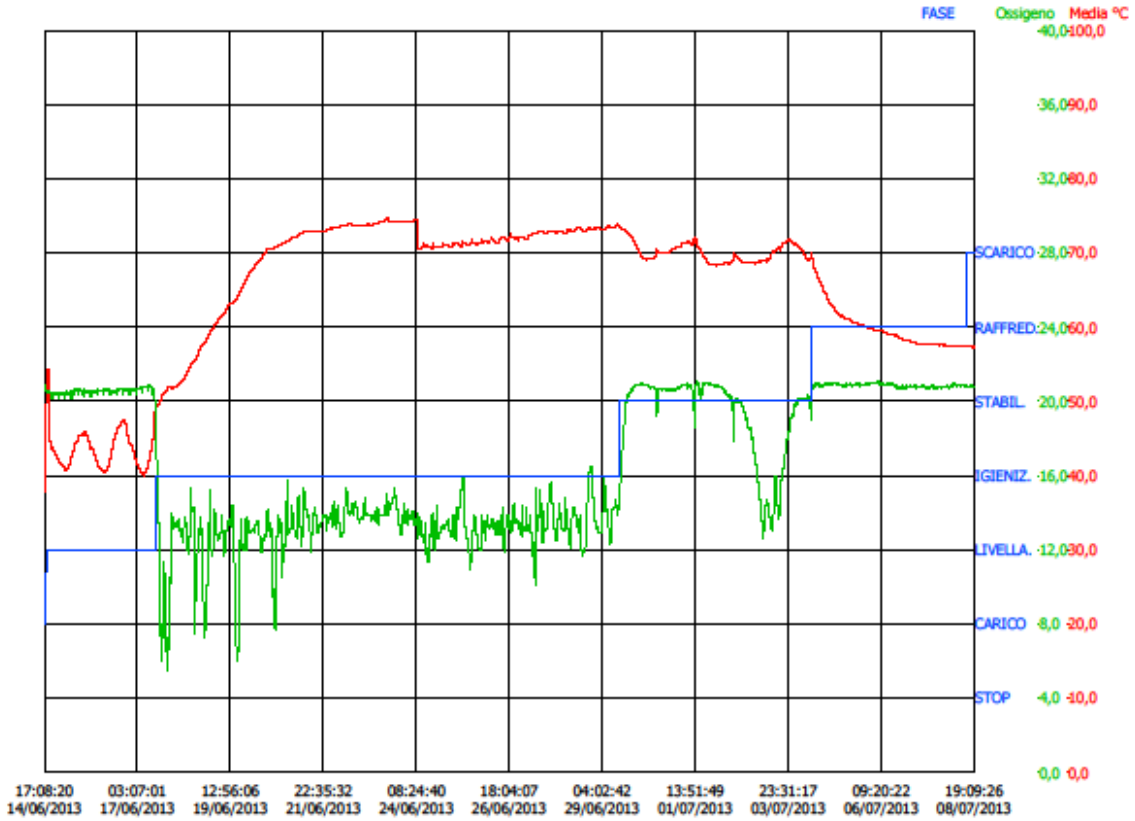


Tunnel Composting

- Gas/Liquid Proof Vessels
- Pathogens Control
- Stabilization
- Waste Water Recycling
- Fully Automated Process

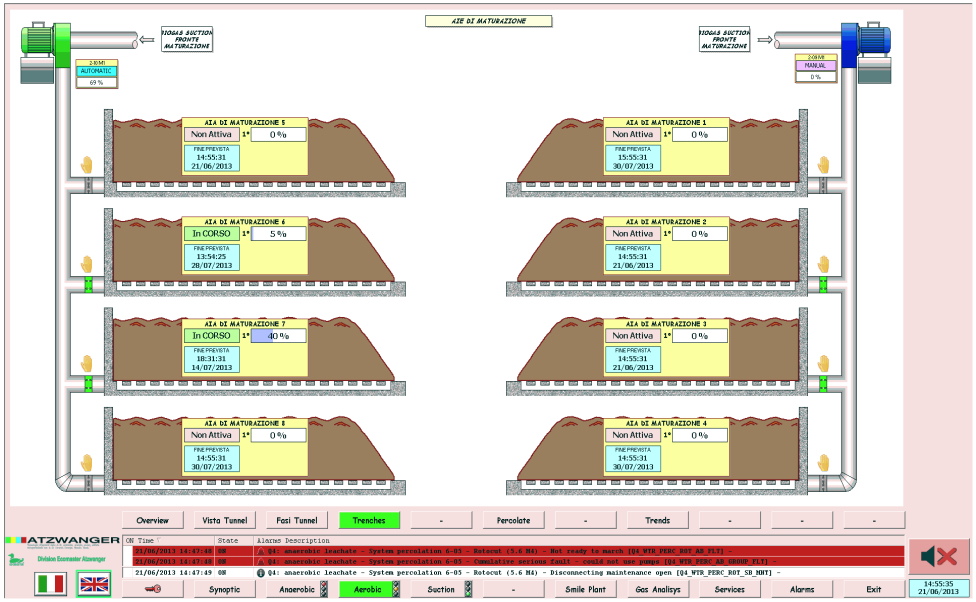
Pathogens Control

- Up to 160°F
- Insulated Doors
- Fresh Air Mixing and Metering
- Time and Temperature Control
- 100% Material Exposed
- Hygienization Records



Aerated Static Pile

- Compost Curing
- Drying Facilitates Screening
- No Outdoors Storage
- Hall Ventilation



Compost Stability

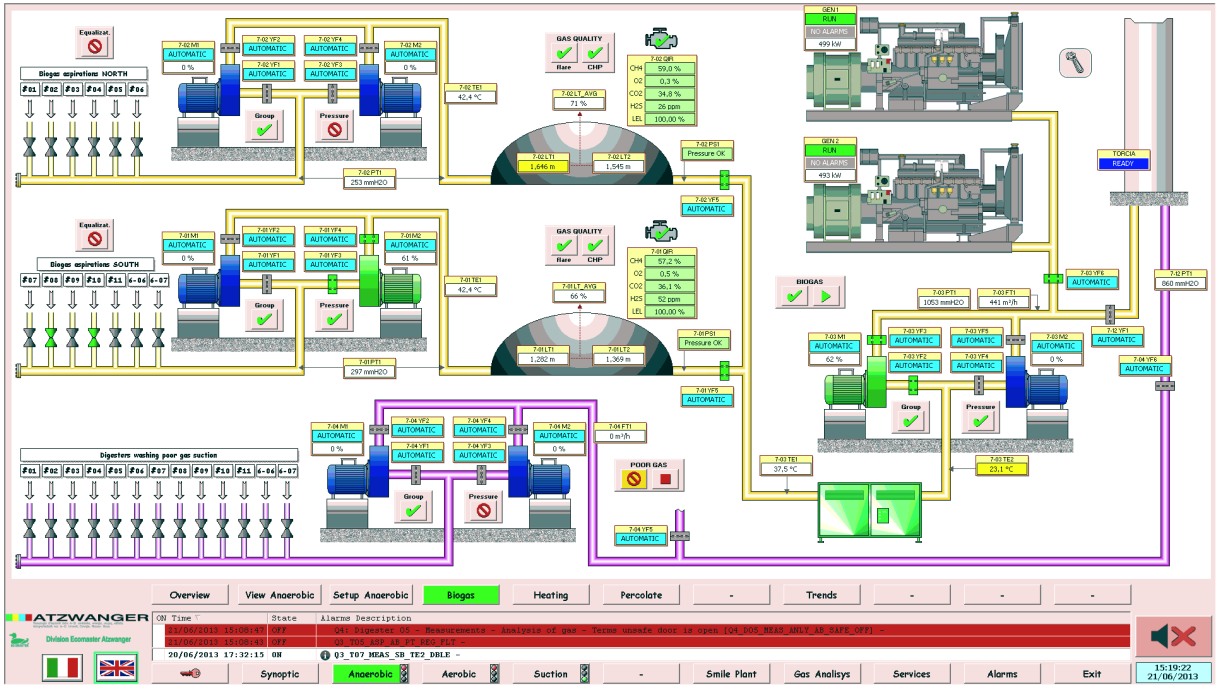
Sample	Solvita® Index	Condition
Digested Material (from anaerobic digester)	2	Putrescible fresh compost
Composted Material (from aerobic tunnel)	5	Ready for curing
End Compost (from ASP - screened)	7	Finished compost

Odor Control System

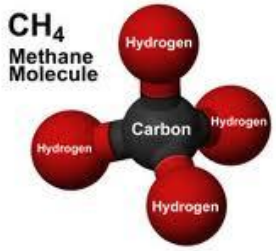
- 2 Scrubbers
- 2 Biofilters (8,000 sq.ft each)

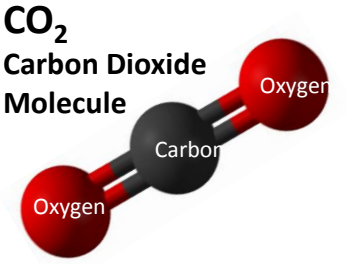
Biogas System

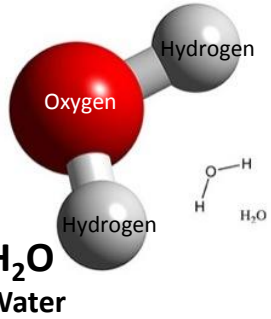
- Digester Biogas Collection
- Digester Air Cleaning
- 2 Gas Holders
- Biogas Cooling
- 2 CHP Units
- Gas Flare



Biogas Composition







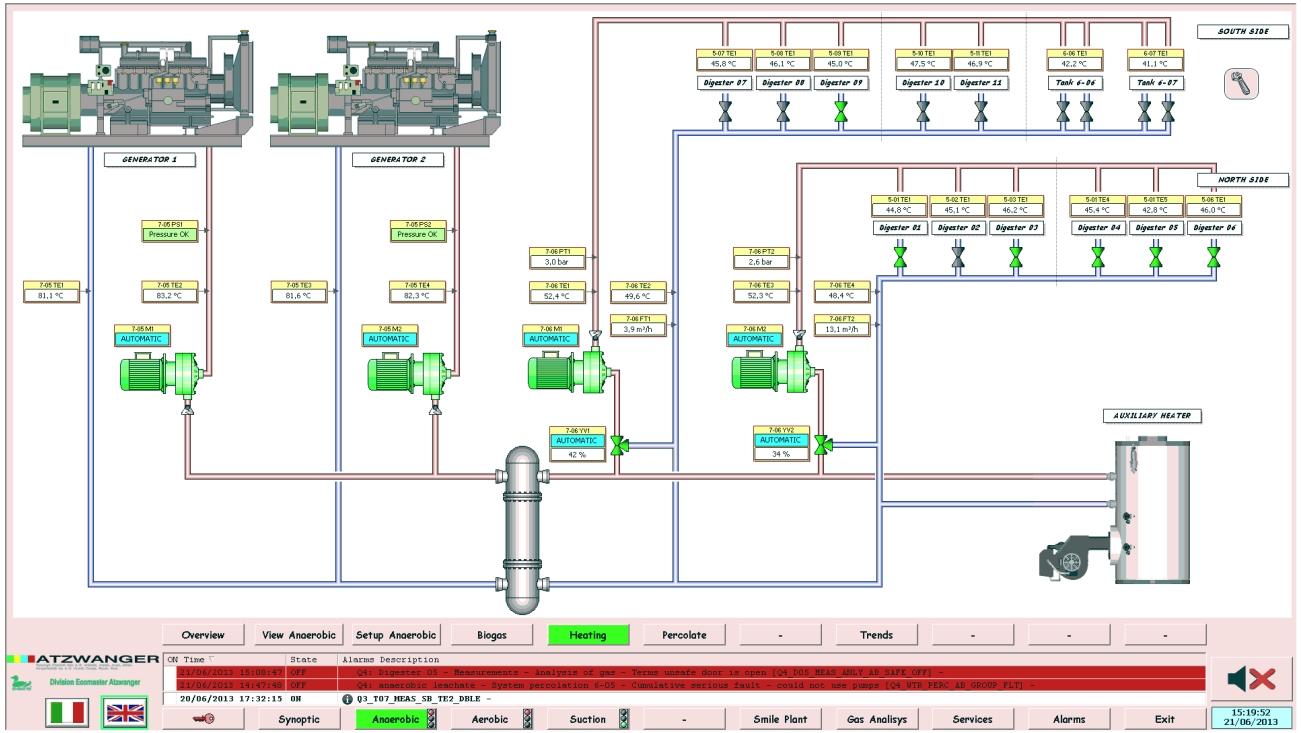
- In an anaerobic environment and with the presence of bacteria, organic matter will undergo a Physical, Chemical and **Biological Process**.
- With the right temperature, the bacterial **Anaerobic Digestion** will take place while converting the complex organic matter into much simpler gaseous compounds.
- Anaerobic digestion generates **Biogas** with a high fraction of CH_4 and CO_2 and a small portion of some other gases (NH_3, H_2, H_2S, etc.).
- Cleaned and upgraded biogas, called **Biomethane**, is achieved through the removal of CO_2 and other impurities in the Biogas.
- Conditioned biomethane is ready-to-use:
  - **Gas Grid Injection**
  - **CHP Cogeneration**
  - **CNG-Vehicle Fuel**

Biogas Utilization

- Moisture Removal
- Two 499 kWe CHPs
- Electricity to Grid
- Heat to Digestion Process
- TOC Removal
- NOx Removal
- Emergency Flare

Human Machine Interface

- User Friendly
- Data Aquisition
- Events Record
- Bi-Lingual



Production

- Biogas: > 90 Sm^3/ton of Organic Waste
- Electric Energy: > 8,000,000 kWh/year
- Compost: 12,000 tons/year

Gate Fees and Product Sales

- Organic Waste: 90 $ / ton
- No Gate Fee for Structural Material
- Electricity to Grid: $ 0.36 /kWh
- Internal Use of Heat
- Free Compost to Local Community

Compost Uses

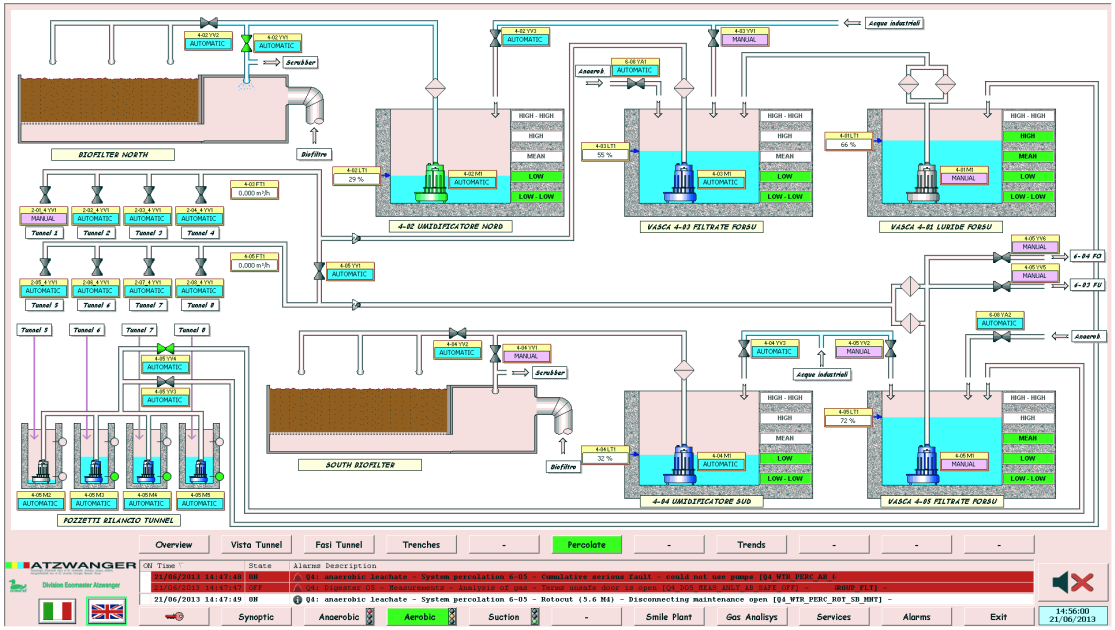
- Bio-Farming
- Agriculture
- Landscaping

Compost Lab Test

Parameter	Unit	Result	Quality Compost Decree 75/2010 - Italy	Category A Biosolids CCME - Canada
Lead	mg/kg DW	19.3	140	150
Cadmium	mg/kg DW	0.02	1.5	3
Nickel	mg/kg DW	14.6	50	62
Copper	mg/kg DW	54.3	150	400
Zinc	mg/kg DW	113	500	700
Mercury	mg/kg DW	0.3	1.5	0.8
Chromium VI	mg/kg DW	< 0.1	0.5	0
Chromium	mg/kg DW	28	70	210
Plastic, glass, metals	mg/kg DW	0.1	0.5	no sharps > 3 mm
Stones > 5 mm	mg/kg DW	4.6	5	0
Salmonella	in 25 g WM	0	0	0
Escherichia coli	CFU/g	< 10	100	< 1000 fecal coliform
Germination index	%	100	> 60	0

On-Site Waste Water Treatment (Future)

- Evaporation With CHP Heat
- Nitrogen Removal
- Production of Fertilizer
- RO Purification (Semi-Permeable Membrane)
- Discharge to Surface Water



Environmental

- Fully Enclosed Biological Process
- Air Emissions Control
- No Waste Water Discharge
- Low Speed Biofilter Fans
- Sound Proofed CHPs
- No Outdoors Storage
- Green Walled Building

PV Power Plant

- 1,200,000 kWh/year to Grid
- 998 kW (Peak)
- 65,600 sq.ft

Questions ?

luigi.castelli@biomrf.com
m.lesa@ecomaster.it
mcch@biofermenergy.com