



BIOGAS  
TREATMENT

# Biogas solutions



*MTA solutions for  
the Biogas market.*

  
Cooling, conditioning, purifying.

# EnerDryer

Biogas is a renewable and environmentally friendly energy source. Biogas is obtained thanks to the anaerobic digestive reaction of renewable raw materials including biomasses, animal waste and agro-industrial waste disposals. This biological process does not deteriorate the overall CO<sub>2</sub> balance and represents a positive contribution to the reduction of greenhouse effects.

The correct purification and desiccation of Biogas are of fundamental importance in optimizing the energetic and economic properties within co-generators (CHPs). MTA meets the specific technical needs of Biogas plants thanks to an extensive range of dedicated Biogas solutions, including the innovative EnerDryer, dedicated low pressure heat exchangers, a comprehensive range of water chillers and RWD Dry Coolers.



## EnerDryer: the Biogas dryer

Specifically designed for the desiccation of the Biogas destined towards the co-generator, EnerDryer is a compact packaged solution suitable for outdoor installation. EnerDryer is mounted on a robust galvanized steel frame, and features an industrial water chiller featuring an integrated pump and accumulation tank, plus a thermally insulated drying module. The drying process is carried out by the combination of a gas/water exchanger and an energy saving economizer, plus a separation/condensate discharge system.

All parts in contact with the Biogas are in stainless steel, ensuring stable and secure operation and an extended working life. (For details on EnerDryer see back page.)



## CoolPro Aftercoolers (WE/WF)

WE and WF aftercoolers are the result of nearly 30 years experience in the treatment of compressed air and gasses. Beyond the standard range, MTA offers fixed and removable tube bundle aftercoolers, energy saving economizers and demister separators, all specifically developed for Biogas applications. MTA has applied dedicated design solutions, together with the application of stainless steel grade 316 or 304, to ensure excellent low pressure operation and a high level of protection against potential corrosion from the acidic condensates.

The following international certifications are available: PED 97/23, ASME VIII, TEMA, EN 13445-3, AD-2000, VSR, AS1210 (Australia), GOST R (Russia).



## Biogas treatment

The gas produced by anaerobic digestion processes must, before either being fed into the co-generators or entering the distribution lines, be appropriately dried and filtered in order to both protect the system from corrosion and optimize the overall energy yield.

**Biogas from renewable agriculture sources** - Biomass originating from various sources (animal waste, energy crops) is fermented, in the absence of oxygen and at a defined temperature, within specific digesters. The result is a mixture made up of 50-70% methane and 30-50% carbon dioxide, the so called 'Biogas'. The combustion of this Biogas allows thermal and / or electrical energy to be obtained, this by means of a co-generator (CHP).

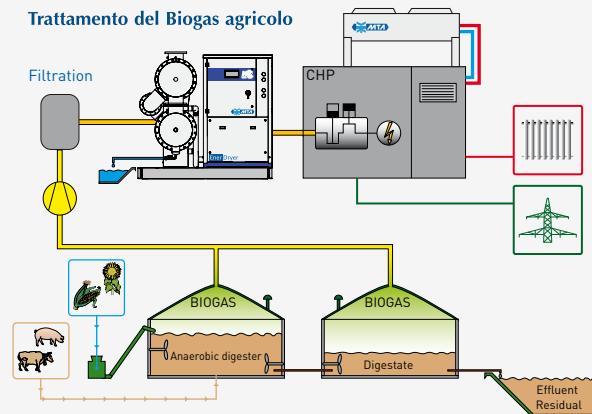
Before being utilized the Biogas must however be accurately purified to eliminate dangerous substances such as H<sub>2</sub>S, siloxanes and, most importantly, water vapour, which can reach concentrations of up to 100g/m<sup>3</sup> of gas.

**Biogas from organic wastes** - The anaerobic decomposition of organic substances within landfill disposals leads to the production of Biogas, which is extracted by means of recovery wells and blowers. Before being fed to the co-generator (CHP) this Biogas must be cleansed of its polluting agents and water vapour.

**Biogas from sewage plants** - Organic disposals from industrial, urban and agricultural origins, rich in biopolymers, are purified by means of anaerobic digestion. This process reduces the polluting impact, leading to the production of Biogas. This Biogas is saturated in vapour and rich in polluting agents, all of which must be removed before combustion in the co-generator (CHP).

**Application of MTA Biogas solutions** - EnerDryer dryers, liquid chillers and tube-bundle heat exchangers are applied in the water vapour removal phase, with the vapour being condensed by cooling the Biogas down to a temperature of about 5-10 °C by means of a water/glycol mixture. Once condensed, the resulting liquid is efficiently separated from the Biogas by means of demister separators and then removed by dedicated drains. RWD Dry Coolers are applied both for co-generator cooling and as a freecooling source in the liquid cooling circuit.

Trattamento del Biogas agricolo



Agricultural Biogas



Landfill Biogas



Sewage Biogas

### Liquid chillers

The heat exchangers applied in Biogas drying generally utilize liquid chillers to cool down the process fluid.

MTA, worldwide leader in industrial process cooling, offers liquid chillers designed for heavy duty operation, and assuring excellent operational reliability 24 hours a day and 365 days a year. The vast range of chilling solutions, with cooling capacities up to 1800 kW, ensure MTA chillers offer the perfect solution to each and every specific installation need. Freecooling versions are ideal in those processes, such as Biogas cooling, where the cooling demand is constant throughout the whole year, taking advantage of low ambient temperatures to provide energy savings of up to 50%.

### RWD Dry Coolers

RWD Dry Coolers, featuring finned coils and axial fans, use the ambient air as a cooling source, consequently they can be matched both to liquid chillers to create freecooling of the Biogas, and to the co-generator for its heat dissipation needs. All RWD models can be installed externally, and are designed to allow the integration of the main hydraulic components, such as manifolds, pumps and 3-way valves.

The microprocessor control offers a simple and easy to use graphic interface, and automatically controls the fan section via a step activation logic which operates proportionally to the inlet fluid temperature, thereby ensuring a perfectly stable liquid temperature.



# ENERDRYER packaged solutions for Biogas treatment

**EnerDryer** is the result of nearly 30 years experience in the cooling of compressed gases, an experience which has allowed MTA to fully understand the specific needs of the Biogas market.

MTA uniquely offers heat exchangers and chillers entirely designed and manufactured in-house; **EnerDryer** is a 100% MTA product, fully packaged and ready to use.

MTA's presence in over 80 countries ensures **EnerDryer** benefits from service support on a worldwide scale, adding peace of mind. **EnerDryer** has been specifically designed for the Biogas market, and represents the optimal solution to Biogas treatment needs.

## Operation

The gas first enters the economizer, where it is pre-cooled by the cold outlet gas (this also protects the dew point by post-heating the outlet gas). On exiting the economizer the gas passes through the first demister separator, where condensate formed at this stage is removed. The gas then enters a second heat exchanger, where it is cooled to a dew point of maximum 10 °C by a water-glycol mixture passing in counter-flow. A second demister separator removes all residual condensate created. The water-glycol mixture is cooled by an industrial grade liquid chiller featuring a completely closed liquid circuit.

## Features

- Compact packaged design mounted on an easy to install frame.
- Designed for external installation.
- Plug and play, arrives ready to operate.
- Eurovent certified chiller section ensures guaranteed performance.
- Gas side entirely in stainless steel.
- Integrated economizer heat exchanger reduces energy consumptions and safeguards the dew point.
- Two high efficiency stainless steel demister separators with twin condensate outlets ensure lowest dew points and highest operating efficiency.
- Insulated heat exchangers for maximum system efficiency.
- Special and personalised versions on request.

## Benefits

- Improved CHP motor and gas turbine performance, with enhanced efficiency and reduced gas utilisation.
- Increased CHP motor-oil longevity.
- No condensate formation in the gas lines.
- Eliminates corrosion problems created by the combination of condensate, carbon dioxide and hydrosulphuric acid.
- Reduced system down-times and lower maintenance costs.
- Supplies dry gas to the activated carbon tower, thereby improving its performance and longevity.
- EnerDryer's "cleaning" effect purifies the Biogas.

|                                       | <b>ED 220</b>      | <b>ED 330</b> | <b>ED 440</b> | <b>ED 550</b> | <b>ED 650</b> | <b>ED 860</b> | <b>ED 1060</b> | <b>ED 1400</b> |
|---------------------------------------|--------------------|---------------|---------------|---------------|---------------|---------------|----------------|----------------|
| Gas volume flow                       | m <sup>3</sup> /h  | 236           | 354           | 472           | 590           | 698           | 923            | 1138           |
| Gas volume flow (*)                   | Nm <sup>3</sup> /h | 220           | 330           | 440           | 550           | 650           | 860            | 1060           |
| Gas mass flow                         | kg/h               | 262           | 394           | 525           | 656           | 775           | 1026           | 1264           |
| Gas outlet temperature (summer)       | °C                 | 26,7          | 27,3          | 26,7          | 27,9          | 28,7          | 28,1           | 29,6           |
| Gas outlet relative humidity (summer) | %                  | 30            | 29            | 31            | 27            | 26            | 28             | 25             |
| Total condensate removed              | kg/h               | 7,9           | 11,8          | 15,6          | 19,9          | 23,5          | 30,7           | 38,4           |
| Power consumption (**)                | kW                 | 4             | 6,5           | 6,5           | 8,4           | 8,4           | 10,8           | 15,5           |
|                                       |                    |               |               |               |               |               |                | 19,5           |

All data refers to operation at: gas inlet temperature 35 °C; ambient temperature 35 °C; summer dew point <10 °C.

(\*) Normal intake conditions: T = 0 °C; P = 1013 mbar.

(\*\*) Refrigeration compressor power consumption.

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MTA products comply with European safety directives, as recognised by the CE symbol.



GOST Certification.



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