

Landfills • Anaerobic Digesters • Agriculture

BIOFUEL



**Two Systems for Generating
Energy by Safely
Converting Methane Gas**

PL  **Industrials**
Custom Systems

ESC **CORPORATION**

BIOFUEL

ESC Corporation and PLC have the two systems you need to convert your methane gas into clean, reusable fuel.

ESC Corporation provides innovative technologies in regenerative & conventional biogas treatment systems for solutions to tomorrow's issues in the biogas recovery industry. Biogas is produced through the natural decomposition and fermentation of biomass and natural materials. This breakdown, sometimes aided by natural digesters that help speed up the process of the chemical breakdown, creates methane and carbon dioxide. The natural biogases that are produced from this reaction are siphoned off and then converted into a flexible fuel source.

ESC specializes in turn-key projects that includes design engineering services and equipment fabrication in the biogas recovery industry. We specify equipment that has the best ability to remove impurities from the biogas, making the cleanest gas or liquid streams.

ESC conversion systems remove the abrasive and corrosive compounds that can shorten the life of equipment.

- Generators Siloxanes < 50 ppbv
- Fuel Cells Siloxanes < 50 ppbv
 30 ppbv Sulfur and <10 ppbv Halogenes
- Microturbines Siloxanes < 5 ppbv
- Turbines Siloxanes < 50 ppbv
- Boilers Siloxanes < 100 ppbv
 Varies, depending on the type of boiler

Conventional System

Flow Capacity	Recirculation Required at ≤ 25% of Full Flow
Installation Costs	\$1,500 to \$3,000/SCFM (varies by flow)
Method	Large Fixed Capacity Media Media Disposed When Spent
Operating Costs	Varies - \$150 to \$600 /SCFM per Year
Adjustability	Flow 100 to 15,000 SCFM
Media	Hydrogen Sulfide Removal Iron Sponge, SulfaTreat, Bioscrubber



ESC non-regenerable fuel cell system for Turlock, CA. This system removes the Hydrogen Sulfide, Siloxanes, halogenated VOCs, moisture from a 325 SCFM digester gas stream. At full power, the fuel cells generate 1.4 megawatts of electricity.

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Regenerative System

<i>Flow Capacity</i>	<i>Closed Loop 1% to 100% of Full Flow SCFM</i>
<i>Installation Costs</i>	<i>10% More Than Conventional</i>
<i>Method</i>	<i>Small Media Capacity Media Regenerated When Spent</i>
<i>Operating Costs</i>	<i>90% Less Than Conventional</i>
<i>Adjustability</i>	<i>Flow and Pressure 1 psig to 150 psig at Flow</i>
<i>Media</i>	<i>Siloxanes, VOCs Removal Activated Carbon, Specialty Carbons</i>

PLCIndustrials has designed and manufactured automation control systems for more than 20 years. The systems are used in airports, ship terminals, parking facilities, tunnels, bridges and much more, all across the country. ESC Corporation partnered with PLC to develop the controls for this patented biogas conditioning process. Critical to the success of this system is the careful control of all the information available. These process inputs include temperature, pressure, flow, and oxygen levels. The analog measurements are read into the robust programmable logic controller. The controller then solves the sequence of output logic and executes the outputs. Variable frequency drives control motor blowers and compressors. Analog and digital signals control the cleaning process and ball valves to route the gas to various vessels.

The system interface is a 12" touch screen which allows the operator to easily configure the control system, initiate automatic and manual sequences, monitor status of all of the devices and address any alarms. The programmable logic controller, variable frequency drives, and touch screen display all communicate via ethernet.

PLCIndustrials
Custom Systems



ESC CompHeat regenerative system for Naniamo, Canada. The CompHeat System footprint is up to 5 times smaller than conventional biogas treatment systems.

PLCIndustrials

Custom systems to suit any processing or manufacturing application

We have the expertise in the design and manufacture of custom industrial controls including leak detection, monitoring and motor control. Programmable logic controller-based panels are a specialty of PLCIndustrials. From engineering and programming all the way through manufacturing and testing, we work with our customers to ensure easy installation and operation.

For the past 20 years, PLC Multipoint has quietly been making a name for itself as a creator and producer of the industry's finest lighting sensor controls. We've also built quite a reputation as the one resource to solve the most complex control problems. Along the way we've compiled a tremendous amount of expertise in these areas and have utilized this expertise to create our own line-up of lighting control systems and industrial operating systems.

PLC Business Groups

PLCBuildings *Lighting Control Systems*

PLCSensors *Control Devices*

PLCTransportation *Control Systems*

PLCIndustrials *Custom Systems*

Today, ESC is involved in the design, engineering, construction, and installation of equipment manufactured from fiberglass, carbon steel, and stainless steel. ESC is well-positioned in the emerging technology to purify biogas from landfills and municipal anaerobic digesters. This low BTU methane from renewable sources contains chemicals that are detrimental to power generation equipment and boilers, and must be removed for economical operation. ESC has undertaken several medium to large sized projects in the last year for removal of both hydrogen sulfide and siloxanes, the two most prevalent contaminants in biogas.

ESC has several pending patents that are improvements to already accepted technologies for gas cleaning. These technologies will revolutionize the industry, and provide cost effective treatment alternatives for many applications, especially those with poor payback sites.

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