



**YOUR WASTE  
OUR RESOURCE.  
OUR TECHNOLOGY  
YOUR ENERGY.**

# COMPANY PROFILE

“  
INNOVATIVE  
TURNKEY  
SOLUTIONS  
FOR THE PRODUCTION  
OF SUSTAINABLE  
ENERGY  
”



**2009, JANUARY 1<sup>ST</sup>** SEBIGAS becomes part of S.E.C.I. Energia, the sub-holding company of the MACCAFERRI INDUSTRIAL GROUP, a business corporation active since 1879 around the world in a range of industrial sectors that provide products, services and technologies among the most advanced on the market.

**2013** SEBIGAS moves headquarters and builds an in-house biological research laboratory to further develop its expertise and create a more competitive and flexible response to customer requirements.

**2014** SEBIGAS expands into Brazil with the establishment of SEBIGAS do Brasil. Maintaining its own technological profile, SEBIGAS do Brasil develops innovative, high-efficiency solutions for the industry of sugar and bioethanol production.

**2015, OCTOBER 1<sup>ST</sup>** SEBIGAS becomes a division of EXERGY, society of the MACCAFERRI INDUSTRIAL GROUP operating in the renewable energy sector, giving rise to an even more competitive organisation on the market. The merger enhances the technical know-how, financial potential, competences and long-held experience of the two companies operating in all major markets around the globe.

**2009 TO 2012** SEBIGAS strengthens its presence in Italy, constructing 37 plants in 2012 alone.

**2013, OCTOBER 4<sup>TH</sup>** SEBIGAS initiates a process of internationalisation with the sealing of the joint venture SEBIGAS UAC in Thailand.

**2015, APRIL 1<sup>ST</sup>** AGRIPower is founded as a spin-off of SEBIGAS. The company is focussed on the management and maintenance of biogas plants across the country.

**2017** With the success achieved in the European market thanks to its products SEBIWASTE and AGRISEBI, SEBIGAS becomes part of the sub holding SECI Energia and no more a division of EXERGY, to reach higher goals in the international biogas sector.

**2020, JUNE 24<sup>TH</sup>** SEBIGAS is acquired by the Chinese TICA GROUP

SEBIGAS was established as a company specialising in the **DESIGN OF BIOGAS PLANTS**. Recognised quickly as having great potential, the company has been acquired in 2020 by the Chinese TICA GROUP. The goal of SEBIGAS is to offer agricultural, industrial and municipally-owned enterprises innovative turnkey solutions for the production of sustainable energy.

Today SEBIGAS offers **INTEGRATED SOLUTIONS** to meet the widest-ranging demands of the market. Financial strength, technological expertise and flexibility in execution with a focus on research and development in the field of biology and engineering are the strengths that characterise SEBIGAS products.

SEBIGAS operates either as an **EPC CONTRACTOR** for the construction of turnkey plants and provides technology and engineering in the role of **TECHNOLOGY PROVIDER**. It also offers project financing, plant maintenance, biological consulting and all ancillary services for the full development of a project, from the embryonic stage to full execution.

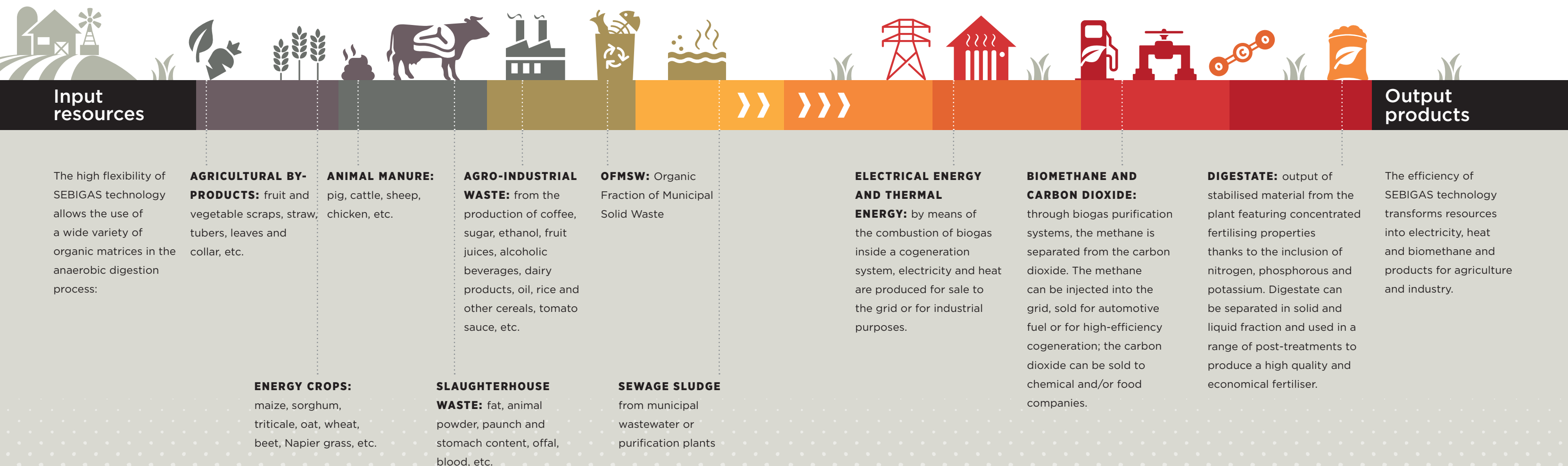


# WHAT IS BIOGAS

“  
**BIOGAS IS PRODUCED THROUGH A PROCESS OF ANAEROBIC DIGESTION OF A RANGE OF ORGANIC SUBSTRATES DERIVING FROM AGRICULTURAL, LIVESTOCK AND INDUSTRIAL SUPPLY CHAINS**  
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Anaerobic digestion is a natural biological process by which, in a temperature-controlled environment deprived of oxygen and aided by the presence of microorganisms, the biomass decomposes and releases biogas.

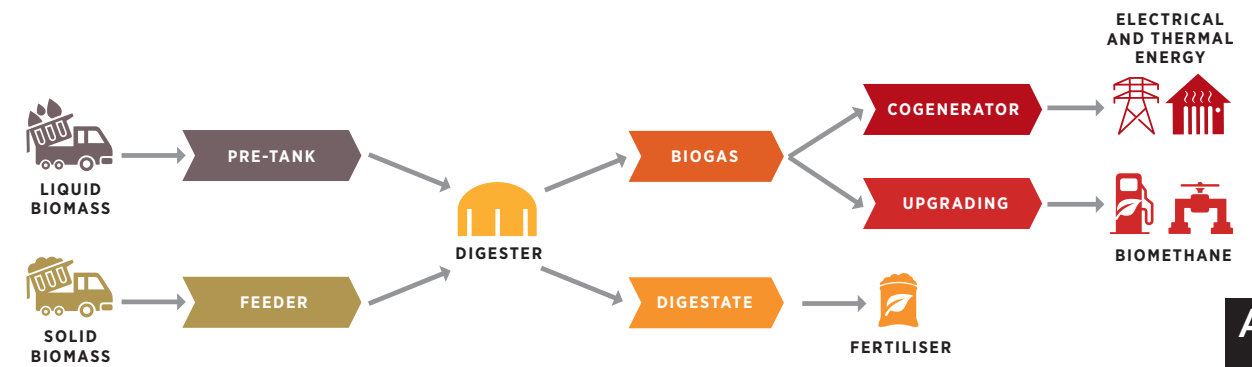
The biogas produced is a mix of gas, mainly composed of methane and carbon dioxide.



# TECHNOLOGY



“  
**INTEGRATED  
 SOLUTIONS  
 TO MEET THE  
 WIDEST-RANGING  
 DEMANDS  
 OF THE MARKET**  
 ”



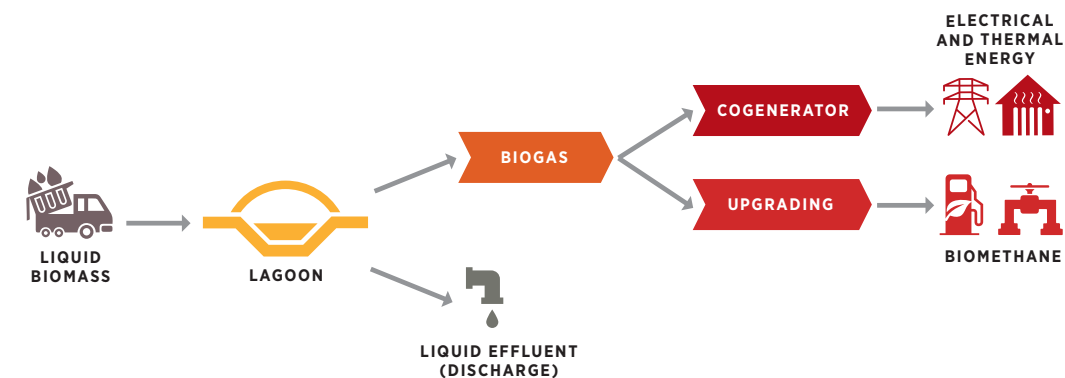
## Anaerobic digesters

SEBIGAS provides CSTR (Continuous-flow Stirred Tank Reactor) biogas plants. This technology is based on a semi-continuous flow of fresh biomass that enters the reactors, mixed at controlled temperature, and exits as biogas and digestate.

### PLANT DESCRIPTION:

- › Organic substrates are fed to the digesters using a pre-tank or a feeder, depending on the type of biomass;
- › The digester is the reactor where anaerobic digestion takes place. It is fed with organic substrates and is continuously mixed to ensure the optimum production of biogas. It also

- has a gasholder to guarantee a storage volume for the produced biogas;
- › The biogas is used to produce electrical and thermal energy by means of a cogeneration system, or biomethane by means of a purification system;
- › The output digestate can be used in agriculture as fertiliser.



## Anaerobic lagoons

SEBIGAS provides a technology based on lagoons mixed with the capture of produced gas to treat:

- › Liquid effluents from the processing of sugar, ethanol, palm oil
- › Wastewater from tapioca or sago processing
- › Pig liquid manure
- › Other liquid organic waste.

### PLANT DESCRIPTION:

- › Liquid effluents are taken from the production facility and pumped into the lagoon;
- › The lagoon is the reactor where anaerobic digestion takes place. Its content is mixed using a specific technology that guarantees an adequate production of biogas. The biogas is stored inside a gasholder;
- › The biogas is utilised for the

- production of electrical and thermal energy by means of a cogeneration system or else biomethane by means of a purification system;

Result of the anaerobic digestion process is a reduction in pollutants of the incoming effluent and thereby a lower environmental impact while obtaining an energy benefit.





# APPLICATIONS

## SEBIFARM

<b>TARGET</b>	Livestock farms that have availability of agricultural waste and by-products.
<b>ADVANTAGES</b>	Transformation of wastes into energy source with increase in profitability for the enterprise.
<b>PLANT SIZE</b>	From small plants with installed power of 60, 100, 250 and 300 kW up to large-sized plants from 600 kW to over 2 MW, in replicable modules.

## AGRISEBI

<b>TARGET</b>	Agricultural enterprises that have availability of by-products and energy crops.
<b>ADVANTAGES</b>	Transformation of products and by-products into an energy source with increase in profitability for the enterprise.
<b>PLANT SIZE</b>	From small plants up to large-sized plants from 600 kW to over 2 MW, in replicable modules.

## SEBIMILL

<b>TARGET</b>	Mid- to large-sized enterprises in biofuel and food processing that have availability of solid or liquid organic wastes deriving from their own industrial production.
<b>ADVANTAGES</b>	Environmental: diminishes the quantity of wastes and their organic content. Energy: integrates the revenues of their core business with the sale of energy or biomethane.
<b>PLANT SIZE</b>	Large-sized plants from 1 MW up.

## SEBIWASTE

<b>TARGET</b>	Municipally-owned enterprises, distribution chains, supermarkets and slaughterhouses.
<b>ADVANTAGES</b>	Disposal of the Organic Fraction of the Municipal Solid Waste (OFMSW) by converting it into a source of energy and investment.
<b>PLANT SIZE</b>	Large-sized plants from 500 kW up.





To date SEBIGAS has designed and built **OVER 70 BIOGAS PLANTS IN 3 CONTINENTS**. As a partner it is :

## EFFICIENT



### HOURS OF PLANT DOWNTIME

Implementing well researched solutions that improve performance and permit maintenance without plant stoppage, SEBIGAS installations function at their maximum power over 99% of the time, guaranteeing a stable and high energy production.

## TAILORED



### CUSTOMIZED PLANT DESIGN

Boasting an extremely flexible technology adapted to each type of organic substrate, SEBIGAS can design ad hoc plants that respond to the specific requirements of the customer.

## RELIABLE



### MILLION EURO

The strength of a Chinese Group with tradition in industrial manufacturing, combined to the experience in the biological and technological R&D, makes SEBIGAS market leader in the design and construction of high quality biogas plants.

## GLOBAL



### COUNTRIES IN THE WORLD

With offices around the world but its technological core in Italy, SEBIGAS is a reliable brand recognised internationally for its concrete solutions.



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REGISTERED OFFICE IN ITALY:  
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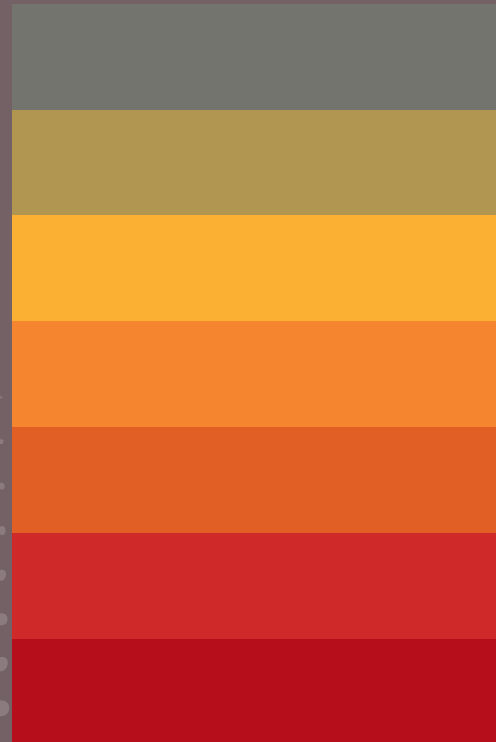




# SEBIFARM



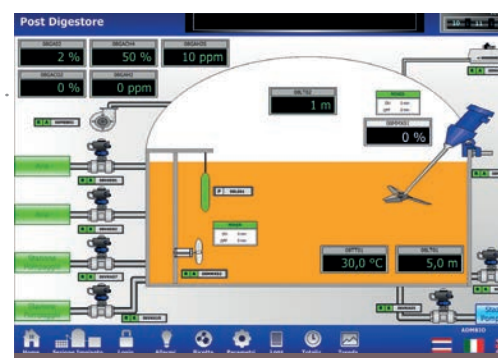
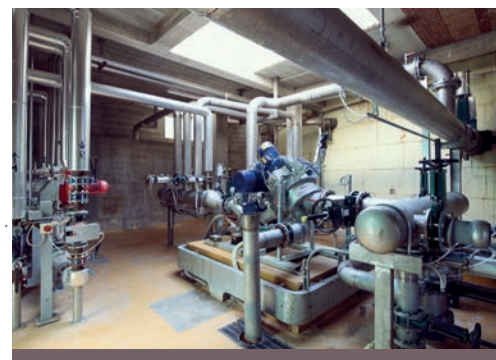
**BIOGAS FROM 100 KW TO 2 MW  
FOR LIVESTOCK FARMS**



The **SEBI FARM** line is the product of years of experience in the construction of large and small plants operating primarily with manure to exploit the waste from livestock breeding.

Each **SEBI FARM** plant provides the customer with:

- a **PRE-TANK**, which mixes the biomass uniformly and is equipped with specific technical features to avoid future maintenance to digesters due to the inlet of foreign materials.
- a **FEEDING SYSTEM** with high efficiency suited to all types of matrices; it shreds the straw and removes the inert materials contained in the stable manure.
- **DIGESTERS** sized and designed in-house by SEBIGAS to optimise gas production by maintaining a volume suited to the biomasses available or to the size of the selected plant.
- **SEBI BOX**: extraction system with no stoppage or loss of gas, which facilitates and speeds mixer maintenance.
- **SEBI SMART CONTROL**: customisable control system for easy management with respect to traditional plants; for example, it permits automatic flows from and for each tank of the plant without the need for an operator to be present.
- A **HIGH QUALITY** of materials and mixing solutions with a compact and customisable plant design.





SEBIGAS provided a biogas plant consisting of a feeding pre-tank and two digesters. The plant operates with only by-products of the farm, i.e., cow effluent and manure and 1% of waste from corn drying. This is the first SEBIGAS plant developed using technology designed to separate matrices with a high content of inert materials before inlet into the digesters.

**📍 LOCATION**  
**PIOSSASCO (TURIN)**

**⚡ INSTALLED POWER**  
**635 kW**

**⬇️ INPUT RESOURCE**  
**COW EFFLUENT AND MANURE, WASTE FROM CORN DRYING**

**📅 IN OPERATION SINCE**  
**2012**

**🏠 LAYOUT**  
**2 DIGESTERS**



**📍 LOCATION**  
**MORES (SASSARI)**

**⚡ INSTALLED POWER**  
**100 kW**

**⬇️ INPUT RESOURCE**  
**COW EFFLUENT AND MANURE**

**📅 IN OPERATION SINCE**  
**2014**

**🏠 LAYOUT**  
**1 DIGESTER**

The solution designed by SEBIGAS is a biogas plant featuring only one digester designed to digest cow effluent and manure. The resource fed into plant is 100% from livestock waste produced by the farm, signifying the virtual cycle of cow breeding.

SEBIGAS provided a biogas plant consisting of a feeding pre-tank and a mono-digester. The plant functions with only by-products of the farm, i.e., cow effluent and manure mixed with straw. Design of the plant incorporated features intended to maximise hours of operation, limiting stoppage only for routine maintenance of the cogeneration system.

**📍 LOCATION**  
**NIELLA TANARO (CUNEO)**

**⚡ INSTALLED POWER**  
**300 kW**

**⬇️ INPUT RESOURCE**  
**COW EFFLUENT AND MANURE WITH STRAW**

**📅 IN OPERATION SINCE**  
**2015**

**🏠 LAYOUT**  
**1 DIGESTER**



# AGRI SEBI

**BIOGAS FROM 100 KW TO 2 MW  
FOR AGRICULTURAL ENTERPRISES**

The **AGRI SEBI** line is the result of the SEBIGAS's consolidated experience in the biogas sector. The company strives to meet its goal of designing a plant suited to the requirements and potentialities of each and every customer.

This line is designed to valorise different types of organic matrices: **AGRICULTURAL BY-PRODUCTS** and **SILAGE**.

Usually, local regulations require the principal use of by-products, higher than 70% in weight with respect to the total of products fed into the plant.

“  
**LINE DESIGNED TO  
 VALORISE DIFFERENT  
 TYPES OF ORGANIC  
 MATRICES: AGRICULTURAL  
 BY-PRODUCTS AND SILAGE**  
 ”





The biogas plant, in operation in the Eridania sugar factory, allows the valorisation of by-products normally unused from sugar processing, such as sugar beet collar, leaves and pulp. The electrical energy produced is sold to the national grid, whereas the thermal energy recovered is designated for the sugar factory to perform its activity.

**📍 LOCATION**

**SAN QUIRICO (PARMA)**

**⚡ INSTALLED POWER**

**999 kW**

**⬇️ INPUT RESOURCE**

**SUGAR BEET PULP, LEAVES AND COLLAR**

**📅 IN OPERATION SINCE**

**2010**

**🏠 LAYOUT**

**2 DIGESTERS**



**📍 LOCATION**

**BRESCELLO (REGGIO EMILIA)**

**⚡ INSTALLED POWER**

**999 kW**

**⬇️ INPUT RESOURCE**

**MELONS, SUGAR BEETS, SILAGE**

**📅 IN OPERATION SINCE**

**2012**

**🏠 LAYOUT**

**2 DIGESTERS**

Plant facility that produces energy using silage in co-digestion with fruit and vegetable by-products that do not possess the characteristics for market sale, but from which excellent energy yields may be obtained. Downstream the cycle is concluded by reutilising the digestate on land intended for raising crops, thereby eliminating the use of synthetic fertilisers.

The SEBIGAS solution is a biogas plant featuring two primary digesters and a post-digester designed to digest pig manure and Napier grass, a tropical plant with low costs of cultivation and several harvests per year. The automatic feeding system minimises the need for the operator to be present in the plant.

**📍 LOCATION**

**CHIANG MAI (THAILAND)**

**⚡ INSTALLED POWER**

**1,487 kW**

**⬇️ INPUT RESOURCE**

**NAPIER GRASS AND PIG MANURE**

**📅 IN OPERATION SINCE**

**2014**

**🏠 LAYOUT**

**3 DIGESTERS**





# SEBIMILL

## BIOGAS FROM LIQUID EFFLUENTS IN ANAEROBIC LAGOONS

SEBIGAS developed **SEBI MILL**, a tailor made technology for the anaerobic digestion of by-products from:

- Sugar production (vinasse and filter cake)
- Bioethanol production (vinasse and filter cake)
- Palm oil production (POME)
- Manioca/Cassava/Tapioca/Sago palm processing
- Distilleries
- Pig farms

The process has been studied and optimised to ensure the highest transformation of the organic content of the liquid effluent into biogas, achieving a remarkable reliability rate, if compared with similar solutions.

Thanks to the cooperation with MACCAFERRI, leader in environmental engineering solutions, SEBIGAS provides the design and construction of anaerobic lagoons with the best drainage, waterproofing and gas-tight solutions.

## Anaerobic lagoons

- ⚙️ TECHNOLOGY**
- The anaerobic digestion of the organic content of the liquid effluents occurs through the biomass recirculation in an active sludge layer with controlled flow rates.
  - Digestion volumes are adequate to the typical high effluent flow rate of industrial processes in order to ensure the biological stability of the anaerobic digestion.
  - Effluent distribution system is fitted to perform the best contact between the active sludge and the fresh biomass in order to enhance the biogas production.

- ⬆️ ADVANTAGES**
- Simple technology with several references in operation.
  - Low installation investments and reduced operation costs.
  - Tailor-made solutions, based on the customer biomass availability.
  - Safe operation of the plant, thanks to a specific design, developed to reduce risk in event of seasonal storms, typical of tropical areas.



SEBIGAS technology enables the effluents of the sugar and bioethanol industries (vinasse and filter cake from sugarcane processing) to be exploited by converting the organic matter into biogas and reducing their environmental impact. The digestate output from the process has a pH suitable to its usage as fertiliser.

- MILL CAPACITY**  
**4,000,000 t/y OF CRUSHED SUGARCANE**
- DAILY FLOW RATE**  
**10,000 m<sup>3</sup>/d OF VINASSE**
- EFFLUENT COD**  
**25,000 mg/l**
- BIOMETHANE PRODUCTION**  
**59,000 m<sup>3</sup>/d**
- INSTALLED POWER**  
**10 MW**



- MILL CAPACITY**  
**60 t/h OF FFB - FRESH FRUIT BUNCH**
- DAILY FLOW RATE**  
**700 m<sup>3</sup>/d OF POME**
- EFFLUENT COD**  
**60,000 mg/l**
- BIOMETHANE PRODUCTION**  
**12,500 m<sup>3</sup>/d**
- INSTALLED POWER**  
**2 MW**

The palm oil industry can doubly benefit from the installation of SEBIGAS technology with a reduced pollution load of POME (Palm Oil Mill Effluent) and the production of renewable energy (electricity or biomethane).

The wastewater derived from cassava mills can be treated in the SEBIGAS anaerobic lagoons with biogas production. Besides being an energy source, the plant allows a reduction of the greenhouse gas emissions.

- MILL CAPACITY**  
**100 t/d OF CASSAVA STARCH**
- DAILY FLOW RATE**  
**1,500 m<sup>3</sup>/d OF CASSAVA WW**
- EFFLUENT COD**  
**15,000 mg/l**
- BIOMETHANE PRODUCTION**  
**6,000 m<sup>3</sup>/d**
- INSTALLED POWER**  
**1 MW**



# SEBIWASTE

**BIOGAS FROM 500 KW UP  
BY OFMSW**

One of the current challenges for the biogas sector is to achieve more efficient transformation of the Organic Fraction of Municipal Solid Waste (OFMSW) for purposes of energy production. SEBIGAS can supply biogas plants fed by OFMSW by utilising a wet anaerobic digestion system specially researched by the in-house R&D Department capitalising on its technical and biological experience in the sector.

To better manage these substrates, heterogeneous and rich in impurities, SEBIGAS has implemented tailored modifications in the choice of the equipment and the design of the digesters.

## Advantages of OFMSW anaerobic digestion

- Significant reduction of disposal costs, together with a decrease in environmental impact related to the waste management
- Sustainable production of electricity, heat and biomethane, together with the revenue related to its sale
- Production of a quality compost for agriculture purposes

“  
**ANAEROBIC  
 DIGESTION SYSTEM  
 SPECIALLY RESEARCHED  
 BY THE R&D  
 DEPARTMENT**  
 ”

## Example of a biogas plant fed by OFMSW

↓ OFMSW QUANTITY

**25,000 - 30,000 t/y**

♻️ BIOMETHANE PRODUCTION

**250 Sm<sup>3</sup>/h**

⚡ INSTALLED POWER

**1 MW**



## Plant features

### 01 PRE-TREATMENT

The pre-treatment line removes unwanted elements from the mix and creates a slurry suitable for wet anaerobic digestion. In this area of the plant, specially designed equipment that is simple and easy to operate performs the following functions:

- › Bag breaking (plastic and biodegradable)
- › Sifting
- › Inert material removal
- › Sand removal
- › Pasteurisation
- › Homogenisation of the organic suspension

### 02 ANAEROBIC DIGESTION

Thanks to its highly specialised experience, SEBIGAS utilises the wet anaerobic digestion process as the technological core of its plants. Digestion occurs inside digesters that have the following advantages:

- › Conical bottom to facilitate an easier removal of the sediments
- › Effective mixing system
- › Easy maintenance of all components

### 03 LIQUID FRACTION TREATMENT

The fermented substrate exiting from the digester is sent to the dehydration stage (separation solid/liquid).

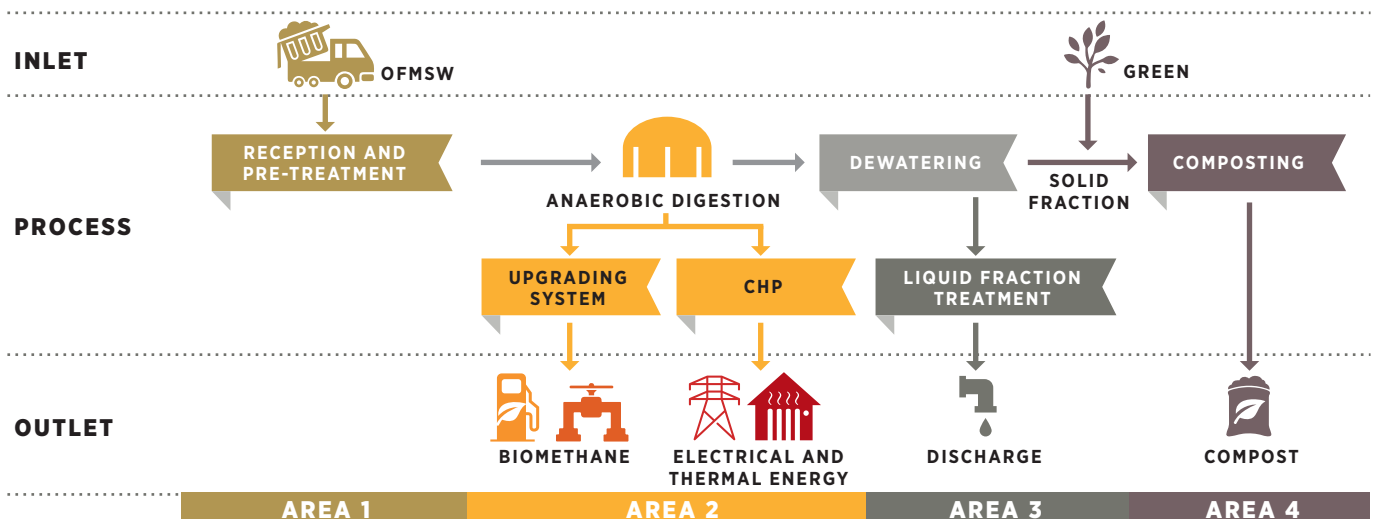
Through a series of stages including aerobic biological treatment, membrane separation treatment (ultra-filtration and osmosis) and evaporation, a clean waste adhering to stringent industry standards may be obtained.

The various technological steps, taken singularly or in a series, allow a reduction of volumes, the capture of excess heat, in addition to significant savings in disposal costs.

### 04 DIGESTATE COMPOSTING

The separated solid fraction is mixed with lignocellulosic material (green) followed by activation of the bio-oxidisation process. During this approximately 20-day process, the material is periodically turned and maintained in aerobic conditions to ensure that the biological stabilisation of the biomass is completed.

When the bio-oxidisation process has concluded, the material is taken and the maturation phase starts. The material is later stored in heaps in preparation for its end use in agriculture or to be packaged.





## SEBIBIOCH<sub>4</sub>

### PURIFICATION PLANTS FOR BIOMETHANE PRODUCTION

The biogas produced in anaerobic digestion can be converted into biomethane by using special refinement methods, which perform the separation of carbon dioxide and the mix of minor gases from the predominant current of biomethane.

The technologies utilised for the conversion of biogas into biomethane include:

- › Water scrubbing
- › Chemical absorption
- › Membrane separation

SEBIGAS can provide complete systems, selecting the technology to implement according to the design requirements of the plant.

- › Plant size
- › Specification of gas (biomethane and offgas)
- › End use: injection into the grid, automotive fuel and high-efficiency cogeneration

“

**BIOMETHANE PRODUCTION  
FOR INJECTION INTO THE  
GRID, AUTOMOTIVE FUEL  
AND HIGH-EFFICIENCY  
COGENERATION**

”





## Water scrubbing

**PRINCIPLE** Higher solubility of  $\text{CO}_2$  in water compared to  $\text{CH}_4$ .

**TECHNOLOGY** The compressed biogas flows into a processing column counter-currently with a liquid flow. On exiting the column, we will have a liquid phase enriched in  $\text{CO}_2$  and a gaseous phase mainly consisting of  $\text{CH}_4$ .

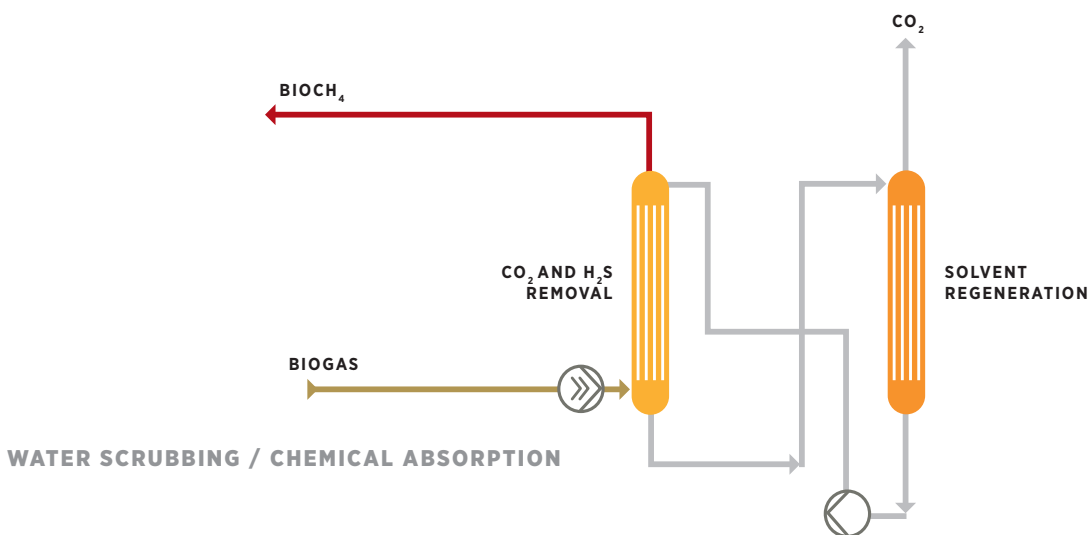
**ADVANTAGES** Besides the  $\text{CO}_2$  the process can remove  $\text{H}_2\text{S}$  (hydrogen sulphide) and  $\text{NH}_3$  (ammonia).

## Chemical absorption

**PRINCIPLE** Reaction of the solvent with the  $\text{CO}_2$ .

**TECHNOLOGY** The  $\text{CO}_2$  is absorbed in the liquid phase and chemically reacts with the solvent. The solvent bound to the  $\text{CO}_2$  is regenerated by a heating process. If  $\text{H}_2\text{S}$  is also present in the raw biogas, it will also bind to the solvent and therefore higher temperatures will be required for regeneration.

**ADVANTAGES** Electricity consumption is lower compared to other technologies thanks to the low pressures involved; however heat consumption is required for solvent regeneration.

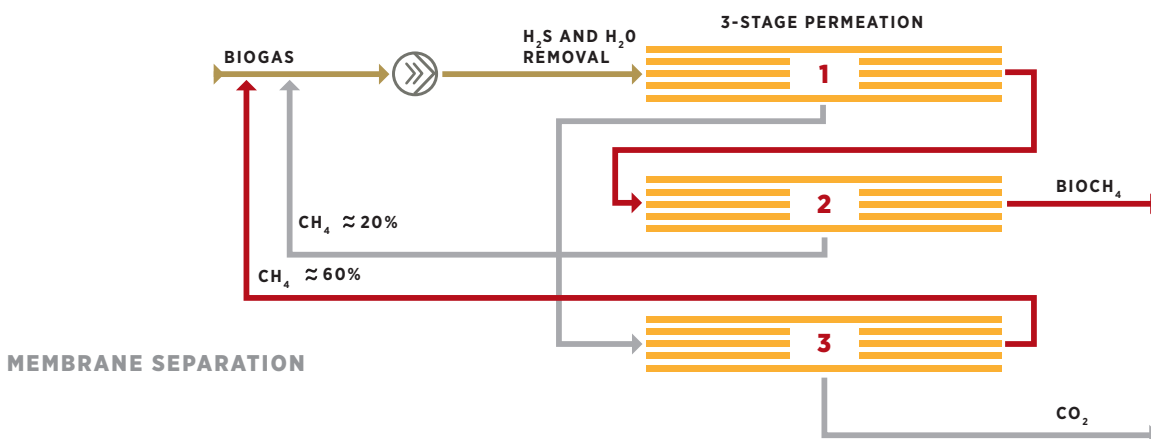


## Membrane separation

**PRINCIPLE** Pressure difference between the two sides of the membrane.

**TECHNOLOGY**  $\text{CO}_2$ ,  $\text{O}_2$ ,  $\text{H}_2\text{O}$  and  $\text{H}_2\text{S}$  are removed from the raw biogas by means of selective permeation through a hollow fibre membrane.

**ADVANTAGES** Easy management that boosts the cost/benefit ratio. Procedure operates at high pressures that reduce the subsequent compression phase before being injected into the distribution network.



MEMBRANE SEPARATION



## SEBIDRYER

DRYING SYSTEM  
FOR THE DIGESTATE

SEBIGAS provides a drying system for the digestate, which allows the valorisation of by-products of anaerobic digestion by making use of the excess heat produced by the cogeneration system.

There are numerous advantages of the drying process:

- › Reduction of digestate storage volumes;
- › Production of a granular organic fertiliser with a high concentration of nutrients (N-P-K);
- › Production of a solution of ammonium sulphate, containing up to 6% of ammoniacal nitrogen;
- › Recovery of thermal energy, with possible incentive premium in accordance with regulations;
- › Increase in the overall energy efficiency of the plant.

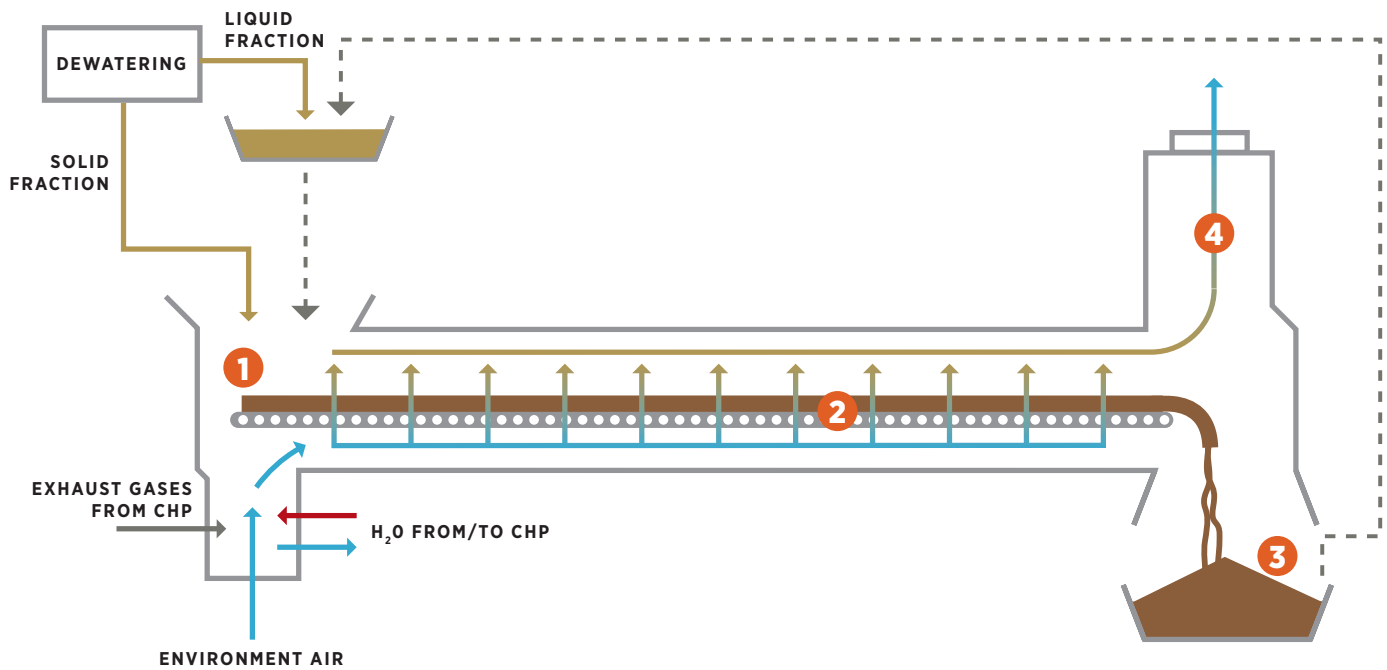
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**THE DRIED DIGESTATE  
AND THE AMMONIUM  
SULPHATE CAN BE  
VALORISED  
AS FERTILISERS**

”







## Dryer characteristics

# 01

**PERFORATED CONVEYOR BELT**, where the solid digestate is distributed. A hot air current arriving from the cogeneration system hits the digestate, producing progressive evaporation of its water content.

The dried digestate and the ammonium sulphate, produced by the drying process, can be valorised as fertilisers for direct or indirect use in agriculture.

# 02

A mechanical handling system allows the advancement of material into the **DRYING CHAMBER**, moving the material towards the **DISCHARGE HOPPER**.

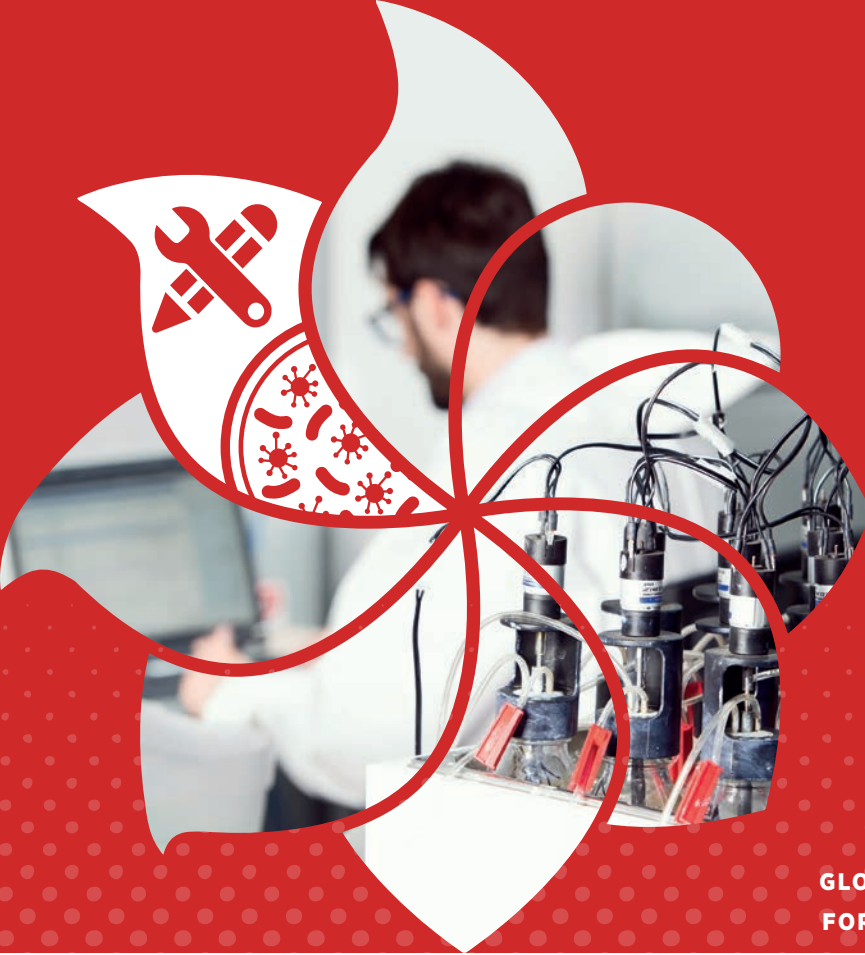
# 03

From the discharge hopper, a system of screws transfers the end product to the **STORAGE AREA**.

If necessary, the separated liquid fraction can also be treated thanks to the easy operation of the system, leading to a significant increase in the overall drying efficiency (dashed line of the diagram).

# 04

The flow of exhaust air, full of moisture and pollutants, is conveyed into a **SCRUBBER** where it undergoes a biological and chemical scrub, which is necessary for reduction of dust and ammonia; there is a consequent recovery of nitrogen in the form of salt.



# SEBISUPPORT

**GLOBAL ASSISTANCE  
FOR BIOGAS PLANTS**



## **CUSTOMISED SERVICES FOR PROJECT DEVELOPMENT, ENGINEERING AND CONSTRUCTION, O&M AND BIOLOGICAL ASSISTANCE**

SEBIGAS offers a wide range of services with a flexibility that provides comprehensive customer support in the design and construction of the biogas plant in an effort to meet the specific requirements of each project. With its experience of constructing over 60 plants, SEBIGAS is a solid partner you can rely on for every aspect of the project: from development to the search for investment funds to engineering, construction, mechanical and biological maintenance services. With the support of the MACCAFERRI holding company, active in 52 countries, SEBIGAS is able to offer customised services, with local, rapid and reliable support around the world.

### **Project development**



#### **FEASIBILITY STUDY AND FINANCIAL ANALYSIS**

SEBIGAS works alongside the customer, providing feasibility studies for the evaluation of the investment from a technical, environmental and economic standpoint to obtain an exhaustive view of all the factors at play.



#### **PERMIT FORMALITY SUPPORT**

SEBIGAS supports the customer during the phases that involve obtaining relative plant licenses and permits, from the environmental impact assessment to connections to the national grid.



#### **PROJECT FINANCING**

SEBIGAS assists the customer in accessing financing and incentives in support of the project thanks to the economic and financial stability of the MACCAFERRI GROUP.



## Engineering and construction



### EPC - ENGINEERING PROCUREMENT CONSTRUCTION

SEBIGAS offers an EPC service for the design and construction of turnkey biogas plants.



### TECHNOLOGY PROVIDER

SEBIGAS supports the customer and the local partners providing technology and engineering for the construction of biogas plants.



### REVAMPING OF EXISTING FACILITIES

SEBIGAS revamps existing facilities both to improve their cogeneration performance and to install an upgrading system for the production of biomethane.

## O & M



### ELECTRO-MECHANICAL MAINTENANCE

Through its offer of preventive and corrective maintenance SEBIGAS delivers a full plant assistance including electrical, mechanical and cogeneration system support.



### SPARE PARTS SERVICE

Thanks to its large warehouse, SEBIGAS is able to meet customers' demands for replacing equipment or their parts.



### PLANT FACILITY MANAGEMENT

SEBIGAS has an outstanding record in running 18 biogas plants and can provide a complete plant facility management service.



### OPERATOR TRAINING

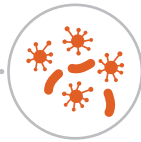
If the customer decides to manage the plant independently, SEBIGAS can provide a plant management course covering all the technical and biological aspects.

## Biological services



### NEW SUBSTRATES ANALYSIS

SEBIGAS performs biological tests to obtain the exact percentage of methane that can be produced by new biomasses both for research and development and according to the specific requirements of the customer.



### CHECK-UP AND BIOLOGICAL ASSISTANCE

SEBIGAS guarantees each customer full biological assistance and check-ups by verifying the soundness of its material storage, adapting the feeding recipes, and monitoring the digestion process and accuracy of the mixing. In addition, it provides laboratory analyses on substrates, digestant materials and digestate, thereby ensuring a significant reduction in costs.



### REMOTE DATA COLLECTION AND ANALYSIS

Thanks to the software SEBI SMART CONTROL developed by SEBIGAS, the plant facilities are monitored remotely for a simple and effective management, whenever and wherever needed.



### SALE OF CUSTOMISED MICRONUTRIENTS

SEBIGAS offers the series of trace elements SEBI SOLUTIONS, whose formula reflects the specific biological requirements of each plant in order to improve, for example, the stabilisation of decomposition processes, the efficiency of methane production, the activation of desulphurising bacteria or speed in the biological restart phase.



**BIOLOGICAL  
OPTIMISATION  
OF BIOGAS PLANTS**

**SEBI SOLUTIONS**

To allow a correct development of the bacteria populations active in biogas production, the digestate content must have a balanced composition of micronutrients. These substances play a fundamental role in the biochemical reactions of anaerobic bacteria and a shortage of one or more may cause a significant slowing in their activity, leading to a reduction in the production of biogas.

**SEBI SOLUTIONS** represents a wide range of customised products for the biological optimisation of the plant, either tailor-designed as an integration of the biological consulting services or standard-designed for recurring problems. The products are easy to use and can be mixed with the material to be fed or else added directly into the digesters without removing them from their package. The products are designed to protect the health of operators and the environment.

**SEBI SPECIAL** is a solid product designed directly in the SEBIGAS laboratories.

It is formulated ad hoc based on a chemical characterisation of the fermenting digesting material, the plant type and the characteristics of the incoming substrates. SEBI SPECIAL is studied for a constant dosage over time and is closely tied to the periodic analyses performed on the digesting material to ensure the achievement and maintenance of ideal conditions for the anaerobic digestion process.

## **SEBI SPECIAL**

### **DESIGNED TO ENSURE**

- High constancy of biogas production and biological stability
- Achievement and maintenance of optimal concentration of macro and trace-elements

### **ADVANTAGES OF SEBI SPECIAL UTILISATION**

- The specific formulation avoids over-dosage or chronic shortage of macro- and trace elements that is common with standard products



## SEBI FLUID

**SEBI FLUID** is a liquid concentrate rich in high bioavailable compounds that provide the basal trace-element requirement for biogas plants. In case of overt nutritional deficiencies, the dosage, required in small quantities, is effective within 12-24 hours.

**SEBI TAMP** is a solid product, useful for the rapid reabsorption of accumulated acid in case of severe indigestion; it serves to restore the proper biological balance in a short amount of time. SEBI TAMP is also useful during a change in the feeding material quality and helps to avoid biological imbalances due to variations in the operating conditions.

**SEBI DES** is a mineral solid product designed to reduce the concentration of  $H_2S$  in biogas, a common situation related to instable biological processes or diets rich in proteins. By preventing the accumulation of  $H_2S$ , SEBI DES avoids a loss of efficiency of the substrates, ensuring a better production of methane. No less important is its action to protect the motor and the motor oil.

**SEBI PLUS** is a complete solid product very useful in start-up phases or when biological instabilities arise due to a general shortage of macro- and trace-elements. SEBI PLUS buffers the accumulated acid and integrates the principal macro- and trace-elements essential for microbial activity.

### DESIGNED TO ENSURE

- › Stabilisation of decomposition processes
- › Activation of methanogenic bacteria in the digesters
- › Synchronisation of the different phases of the anaerobic digestion process
- › Increase of methane production efficiency

## SEBI TAMP

### DESIGNED TO ENSURE

- › Reabsorption of the accumulated acid in the form of organic acids
- › Increase in the buffer capacity of the system
- › Stimulation of bacterial flora and reabsorption of organic acids accumulation
- › Restoration of acceptable pH values for the biological process

## SEBI DES

### DESIGNED TO ENSURE

- › Stabilisation of  $H_2S$  concentrations in biogas to acceptable levels for the combustion and biology
- › Activation of sulphur oxidising bacteria
- › Prevention of metal structures from acid attack, usual with the use of liquid products generally on the market

## SEBI PLUS

### DESIGNED TO ENSURE

- › Maximum speed in start-up phase and biological restart (e.g., due to prolonged suspension of feeding)
- › Combined action of buffering, addition of macro- and trace-elements, and inhibiting of hydrogen sulphide formation useful in difficult biological conditions
- › Activation of methanogenic bacteria