



# MicroCHP BioGS-1.0

Energy for everyone, environmentally sustainable

# OUR PRODUCT



**BioGS-1.0** is a **micro-CHP** system for domestic and small utilities use with high technological content. It can satisfy all the energy needs of the user, until complete **self-sufficiency**.

## Key elements

Electrical energy production  
(till 24 kWh a day)

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Thermal energy production  
(till 160 kWh a day)

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Very low CO<sub>2</sub> and particulate  
matter **emission**

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Supplied by **waste biomass**

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Biochar production





# TECHNOLOGICAL INNOVATION

## Main operating features

- **High automation** and ability to start and stop according to external energy requests
- **Flexibility to various types of input biomass**, coming from agricultural, livestock or industrial waste, and insensitivity to resins and other substances normally not tolerated by biomass boilers
- Accurate **combustion control** in order to minimize exhaust emission
- Simple construction and reduced number of components in order to have a **simple installation and maintenance**, according to domestic needs
- Both **off-grid** and **grid connected** energy supplying and **integration** with other energy sources
- **Remote control**





# SAVINGS ON ENERGY COSTS

BioGS-1.0 is a **complete and sustainable energy system** that makes the user autonomous in terms of production of

**Electricity**

**Heating**

**Hot water**

## Saving on electrical and thermal energy cost

**-46%**

compared to  
methane supply

**-73%**

compared to  
LPG supply

**-81%**

compared to  
oil supply



Considering the consumption of an average Italian house  
and feeding BioGS-1.0 with type B wood pellets.

Data source: Autorità per l'Energia Elettrica e il Gas



# ENVIROMENTAL **IMPACT**

BioGS-1.0 has an extremely **low environmental impact** tanks to drastically reduced CO2 emission and a waste product of the process useful as ground improver.



**100g**

Carbon sequestration every kilogram of processed biomass.

**-300g**

CO2 emission reduction per kilogram of input biomass compared to direct combustion.

**PM10 <0,9 g/GJ**

Low Particulate Matter emission



# DISTRIBUTION AND PARTNERSHIP



## Rural contexts

Countryside and mountain residences

Farms

Farmhouses

Greenhouses

Off-grid utilities



## Direct consumers

Utilities with high energy costs:  
over 7 million Italian families use  
LPG for heating and hot water

Consumers sensitive to  
environmental sustainability  
issues

Countries with low solar radiation  
and high thermal demand



## Industries

Companies with  
dry organic waste  
(carpentry, food  
processing,  
furniture factories,  
etc.)

We wish to establish collaborative relationships with **companies interested in the production and commercialization** of BioGS-1.0, in order to continue our research and development both on this product and on other versions and sizes.



# MARKET POSITIONING

BioGS-1.0 is a one of a kind.

It combines the use of waste materials with **low polluting** emissions, **high efficiency** and **carbon segregation** in solid form.

**There are no similar products on the market in terms of size, environmental impact and type of energy source.**



Main competitors are:

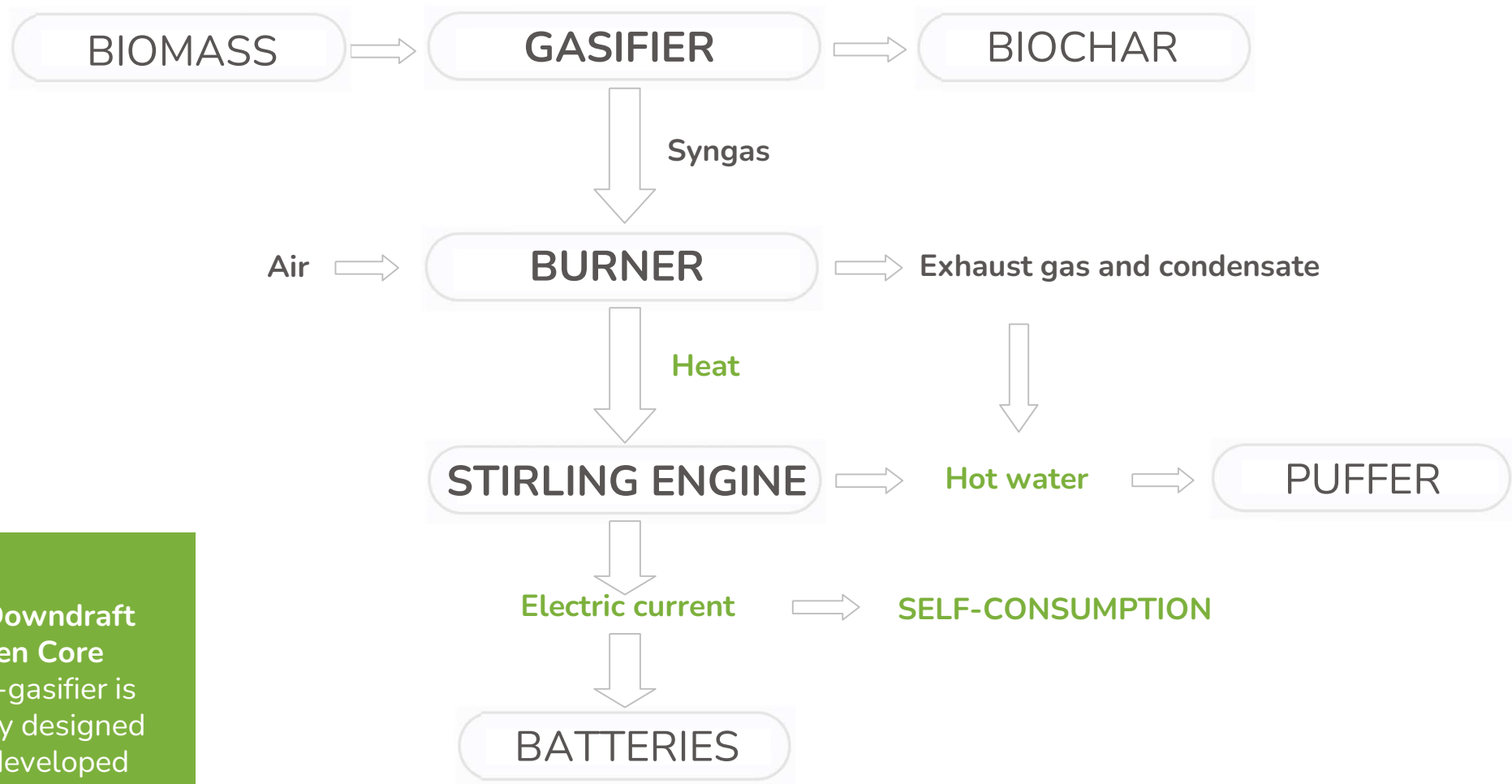
Methane microCHP  $\Rightarrow$  non-renewable energy source

Combination of photovoltaic (or wind) and solar thermal  $\Rightarrow$  non-programmable electrical and thermal generation



# HOW DOES IT WORKS

BioGS-1.0 is the first domestic cogenerator based on **pyrolytic gasification**, the thermochemical process through which a mixture of combustible gases is extracted from biomass.



The Downdraft  
Open Core  
micro-gasifier is  
entirely designed  
and developed  
by us.



# PROCESS IN DETAIL

## Gasifier

By means of the **Downdraft Open Core gasifier**, a low-carbon gas fuel mixture, called syngas, is extracted from the biomass.

**Biochar** is the waste product and contains carbon not extracted from biomass. It represents the CO<sub>2</sub> emissions saved and is an excellent ground conditioner, useful for improving the physical characteristics of the soil.

## Burner

The burner, as well as the entire system, works thanks to the **air sucked in by the exhaust fan**: the depression generated in the combustion chamber allows the syngas and air to flow inside.

Combustion is controlled by a **Lambda probe** and the combustion chamber is optimized for **heat exchange** with the Stirling engine.

## Stirling engine

Syngas is used to provide heat to the engine, which generates electrical power.

The Stirling engine, compared to an internal combustion engine, has **lower noise, low vibrations** and **higher efficiency** at very low power output.

External combustion allows to optimize processes and **reduce polluting emissions and particulate matter**.

The whole system is equipped with proprietary electronic control.



# DATA SHEET

**Dimension:** 100x52x130 cm (LxWxH), tanks excluded

**Surface occupation:** < 4 sqm

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**Electrical power:** 1.0 kW

**Thermal power:** 6.0 kW

**Global efficiency:** > 95 %

**Electrical output voltage:** 230 VAC

**Electrical output frequency:** 50 Hz

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**Biomass consumption:** 1.9 kg/h

**Biochar production:** 0.2 kg/h

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**Water input temperature:** 6 - 50 °C

**Max exhaust temperature:** 70°C

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Externally accessible input biomass tank

Externally accessible output biochar tank

Need of a dried and calibrated input material (pellet or micro-woodchips)

Need of technical hot water tank (puffer)

Electrical connection both directly to the grid or by hybrid charger/inverter with battery storage

# WHO WE ARE

**KiRa Technology** is an **Italian SME** specialized in **energy conversion**, owner of the registered brand **FaPe**.

We are an innovative and dynamic family-run company. Since 2014 we have been creating **highly sustainable** energy systems, based on the principles of the **circular economy**. We love the environment and we work to minimize our negative impacts on it.

We believe that each of us can and should be part of the change, to make the world where we live a better place.

## Fabio Pellegrini

Mechanical engineer with experience in energy systems controls.

Mechanical design, simulation, development and testing.

## Piergiorgio Pellegrini

IT manager and programmer with experience in green building.

Development of control software.





# KiRa Technology

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