

# BG MAX Range

*Enhancing Biogas production ... naturally.*



# Substrates in focus



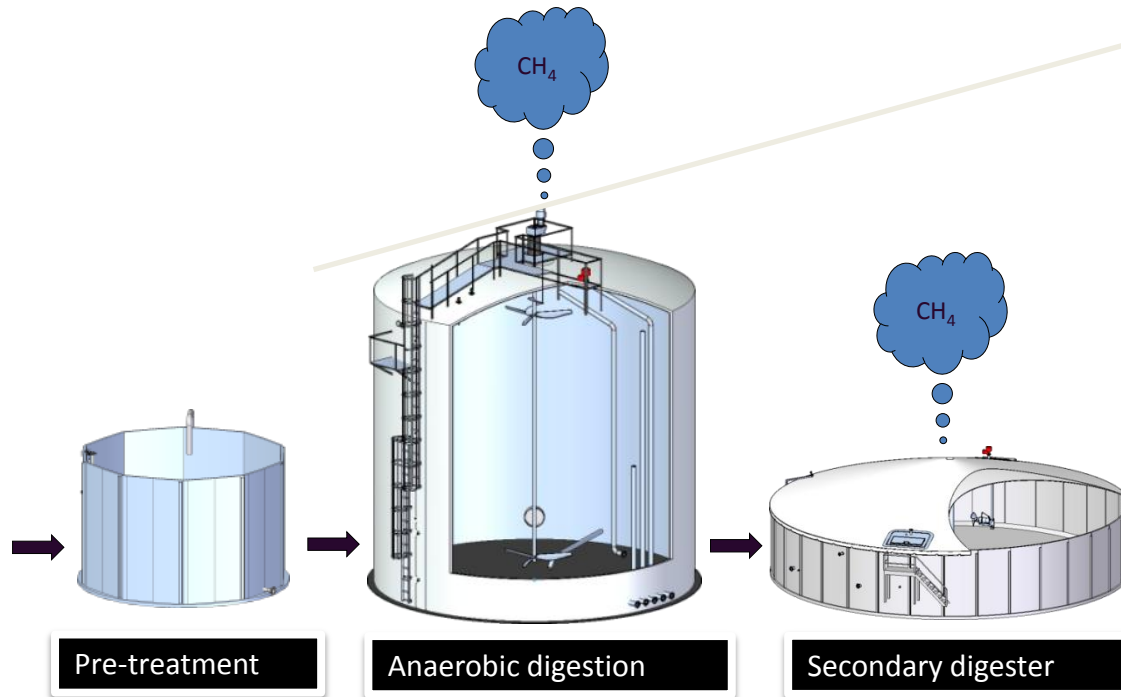
Manure



Agricultural waste



Energy Crops



## Anaerobic Digestion:

Biopolymers (proteins, fats, carbohydrates)

### Hydrolysis

Monomers (aminoacids, fatty acids, glycerol, monosaccharides)

### Acidogenesis

Short chain acids (VFA: C1-C5), Alcohols, CO<sub>2</sub> and H<sub>2</sub>

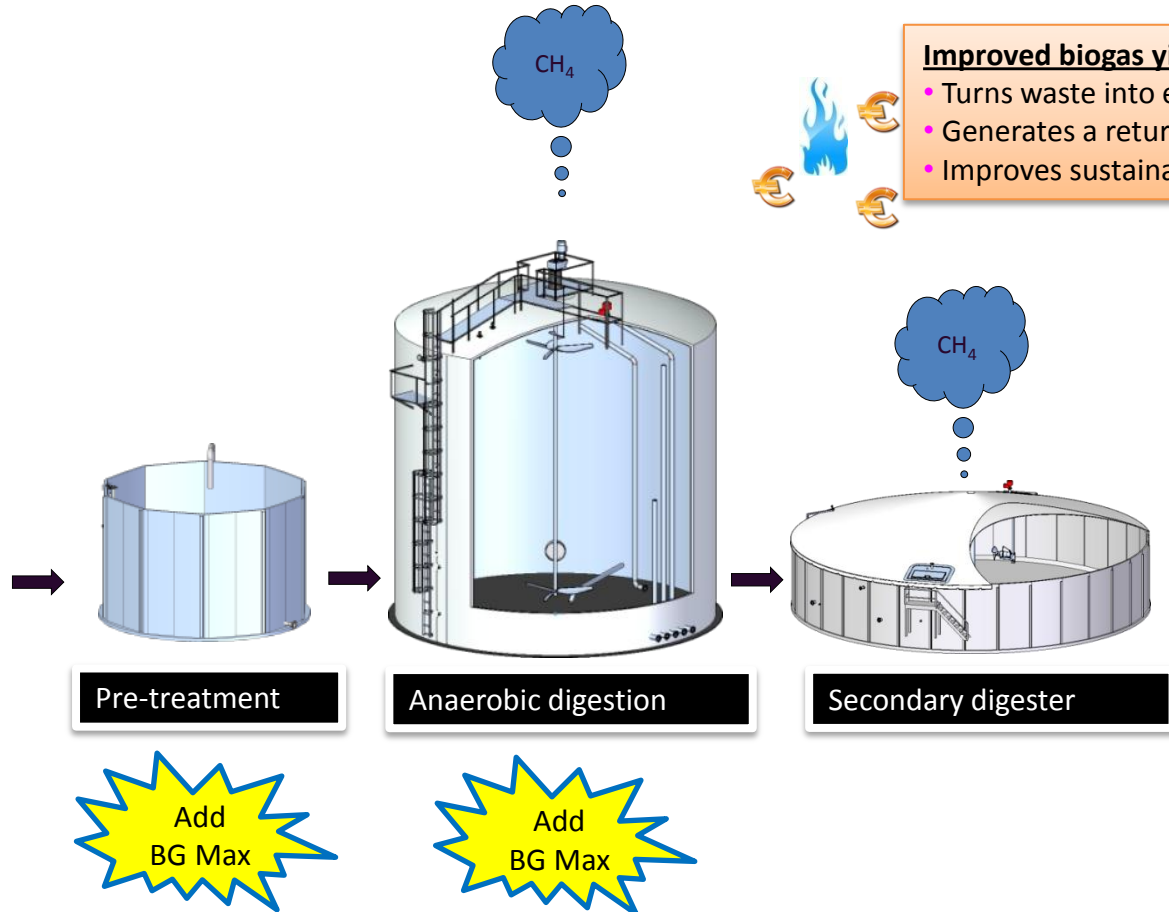
### Acetogenesis

Acetate, CO<sub>2</sub>, H<sub>2</sub>

### Methanogenesis

**CH<sub>4</sub>, CO<sub>2</sub>, H<sub>2</sub>O**

# BG MAX at work



## Improved biogas yield

- Turns waste into energy
- Generates a return on investment
- Improves sustainability

## Easier Feedstock management

- Increased digester throughput
- Faster digester turnover
- Better use of substrate
- Reduced digester viscosity

## Reduced costs

- Reduced formation of swimming layers
- Reduced wear of stirring systems and pumps
- Less digestate

# PRODUCT RANGE

Enzyme	pH range	Temperature requirements
<b>BG Max 5005<sup>1</sup></b>	5-7.5	30-60°C
<b>BG Max 5105</b>	5-8	40-75°C
<b>BG Max 5205</b>	5-6	50°C
<b>BG Max 5305</b>	4.5-6	40-55°C
<b>BG Max 5405</b>	6-8	40-50°C

**BG Max 5005** - is a complex of cellulase, hemicellulase and  $\beta$ -glucanase components. It has been specifically developed for improvement of biogas production in anaerobic digestion processes, particularly where high levels of cellulosic material are being digested. BG MAX 5005 also reduces digester viscosity and formation of swimming layers leading to better mixing and improved processing. Its pH and temperature profile makes BG MAX 5005 suitable for direct addition to a biogas reactor.

**BG Max 5105** - contains a patented Xylanase which offers a wide range of thermo-stability (40-75°C) and excellent performance in pH 5-8 applications.

It has a good resistance against wheat inhibitors which can be an important to consider when treating small grain cereal straws such as wheat, Rye, Triticale (found to contain inhibitory proteins to most xylanase enzymes. The inhibitors can enter the digesters from straw cattle-bedding (enters reactor with the manure), "energy crops" fed to anaerobic digesters, as well as spent grains from EtOH bio-refineries utilizing small grains . Contains also rich cellulase & Beta-glucanase components along with the natural Trichoderma reesei Xylanase.

**BG Max 5205** - is a balanced blend of xylanase, beta-glucanase, alpha-amylase and cellulase. It has been specifically developed for viscosity reduction in high solids processes with substrates such as rye, wheat, corn, triticale, cassava etc.

**BG Max 5305**- is a complex of cellulase and hemicellulase components. The product catalyses the breakdown of cellulosic material into glucose, cellobiose, and higher glucose polymers. Due to its fairly low pH-optimum it is mostly suitable for pre-hydrolysis prior to the main anaerobic digestion step.

**BG Max 5405**– is a mono-component cellulase. It has been successfully tested on several occasions as a stand-alone enzyme and in combination with other enzymes. The enzyme is suitable for direct addition to biogas reactors.

*What's in it  
for ME?*

# Enzymes – wiifm?

## BENEFITS

- Increased biogas production
- Improved biogas yield
- Higher digester loading
- Faster digester turnover time
- Improved digester mixing/reduce mixing energy spent
- Reduction of digester viscosity
- Less digestate
- Improve digestate dewatering properties
- Reduced formation of “swimming layers”
- Reduced wear of stirring systems and pumps

INCREASED  
REVENUE

REDUCED  
COST

INCREASED PROFITABILITY

- Hydrolysis of Cellulosics in Anaerobic Digestion has a Multitude of Benefits!