



BIOGAS CATALYST

A Fluid Science Microbial Product

Powder additive designed to stimulate, bolster and improve the efficiency of the anaerobic digestion process by using both a *unique mineral carrier* and *microbial bioaugmentation*.



What is it?

A dual action product containing bacteria that secrete digestive enzymes and a mineral carrier that supports bacterial colonisation.



Uses

To improve biomass breakdown thus increasing biogas production in AD, suitable across varying ranges of pH, temperature and biomass input.



Eco credentials

Non-pathogenic bacteria and inert carrier material to support green energy / biogas production.



How it works

Bacteria are supported by the mineral carrier to colonise the AD and produce extra cellular metabolites that both speed up production and release more stored energy from biomass increasing biogas yield.

BIOGAS CATALYST

A Fluid Science Microbial Product

INTRODUCTION

Fluid Science Ltd are a biotech company specialising in sourcing and harnessing microbial based additives to improve many industrial processes. Expert scientists have utilised their knowledge to develop *Biogas Catalyst*, a dual action, easy to use personalised powder additive that increases biogas yield by 10-30%.

Our product is specifically designed for your anaerobic digester (AD) and works by both **breaking down biomass faster** and **releasing more stored energy** from the feedstock, so more gas harvested, more quickly, from the same quantity of Biomass, with less costly waste to landfill.

Our dual action product is comprised of specially selected non-pathogenic bacteria, paired with a supportive mineral carrier that act in synergy to optimise biogas yield and more completely degrade the material. Working directly with our Biotech partners to launch *Biogas Catalyst*, it contains a unique blend of Bacteria selected from an extensive catalogue of bacterial species. This allows us to then tailor our regime specifically for your AD to improve efficiency and gain better results.

In addition the mineral carrier provides resource, acts as a catalyst for bacterial colonisation and assists in reducing limiting factors within ADs. Our experts will be on hand throughout the process to assist, support and analyse results and feedback to ensure optimal yields are achieved and maintained.



APPLICATIONS

- Sludge fed systems
- Agricultural waste fed systems
- Slurry fed systems
- Food and municipal fed systems
- Landfill leachate systems
- One phase configurations
- Two phase configurations
- Other complex configurations

BIOGAS CATALYST

A Fluid Science Microbial Product

CONSULTATION

Our approach is tailored to your system, we provide a product that is formulated specifically for optimising the performance of your AD plant.

Our experts will provide a consultative approach to fully understand your ADs internal environment, operation, biomass input, and process.

Once we have gathered the required information, we will tailor our approach to the dosing and implementation of the product into your AD and provide continued support throughout the process and ongoing following implementation.

During product development data was sourced from AD plants combined with a range of molecular techniques including genomic screening, sequencing, and enzyme output assays.

Expert scientists then implemented a systematic approach in selecting the correct combination of bacteria to optimise performance within AD's.

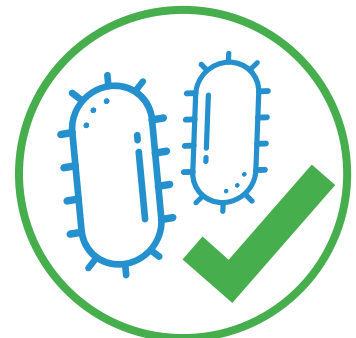
This unique blend of bacteria is included within the *Biogas Catalyst* product to provide optimal Biogas production and markedly reduce the output of waste to landfill.



Initial Consultation
with Fluid Science Rep



Identifying the
regime best suited to
your digester



Final product
implementation
catered for to give
optimal biogas
production

BIOGAS CATALYST

A Fluid Science Microbial Product

THE SCIENCE

Scientists have sourced, catalogued, and selected a range of robust non-pathogenic bacteria that secrete active hydrolytic enzymes to improve the digestion process. This live action enzyme approach utilises and releases extra substrates within the biomass that would previously remain locked in the waste sludge. In short, the unique blend of bacteria act as biological factories that you can employ to release more of the value adding elements from your biomass, giving you more output from the same amount of input.

A unique approach to product development categorised a range of characteristics, including metabolic differences, enzyme output /production volume, thermostability and the pH tolerance of each bacteria to create a universal tool kit that then allowed selection of the ideal bacteria to suit the needs of AD plant.

Once deployed the bacteria, supported by the mineral carrier, colonise your AD, secreting their substantial enzyme library. The Enzymes then act to release more energy from the biomass and at an increased rate. In short, this unique consortia of bacteria are specific to AD optimisation, who's enzymes will breakdown more biomass at a faster rate to increase biogas production.



Bacteria



Mineral Carrier

BIOGAS CATALYST

A Fluid Science Microbial Product

Bacteria	Mineral Carrier
<ul style="list-style-type: none"> - Multiple species - Metabolically diverse - Toolkit for the variation within ADs range of enzymes secreted to hydrolyse more of the biomass - pH and Thermostable - Non pathogenic - Naturally derived - Secrete extra Cellular Metabolites 	<ul style="list-style-type: none"> - Provide resources for bacteria - Increase bacterial growth - Improves limiting factors such as ammonia. - Ion exchange between bacterial species - Enables biofilm to protect bacteria / enhance spores - Reduction of output material to landfill
<p>The Synergy between the biological (bacteria) and biochemical (mineral carrier) enables a multifaceted support system to reduce biomass and increase methanogenesis (biogas production).</p>	

The combined properties of both the specifically selected bacteria for AD plant and the mineral carrier give you a supportive toolkit that when deployed into your system can work around the clock to breakdown biomass faster and to a more complete point thereby optimising biogas and reducing sludge volumes. In addition, the bacterial temperature output can limit the amount of external heating (diesel heating) thus saving energy, reducing costs, and ensuring a more environmentally friendly process.

BIOGAS CATALYST

A Fluid Science Microbial Product

AFTERCARE - Our Commitment to You

Post implementation of the *Biogas Catalyst*, experts will be on hand to quantify, process data and improve your ADs biogas yield. We can then tweak and re-engineer the implementation process as required to give maximum benefit. This close relationship between your operation and our experts has facilitated ~50% yield improvements within our current customers biogas plants.

Using the Product

Your blended *Biogas Catalyst* product will arrive as a premixed powder in 20kg containers, which can be easily added to the system upstream or directly into the AD. The Product is easily storable with no special requirements and has a 2 year minimum shelf life.

Dosage

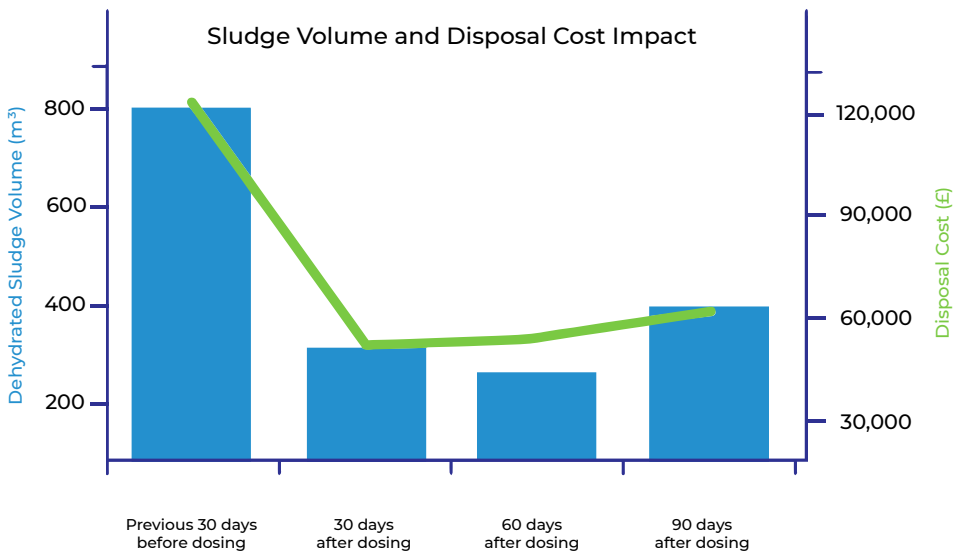
Our consultative approach will enable our experts to calculate the dosage, allowing a simple user-friendly experience, for optimal results. Dosage usually falls into a range of between 0.1 - 1% of the volume of dry weight entering the system. Upon receiving the *Biogas Catalyst*, we recommend a loading dose of 0.15% of the estimated total dry weight present in the digester. Followed by regular dosing of 0.1% of the volume of dry weight entering the system. The dosage may be modified downstream post data gathering as we seek to ensure optimal biogas yield.

BIOGAS CATALYST

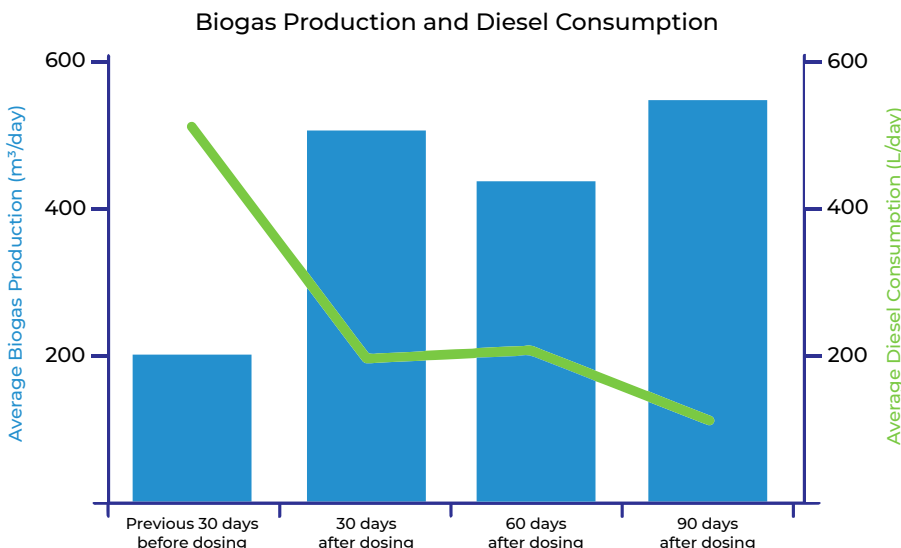
A Fluid Science Microbial Product

SUCCESS

We currently provide services to multiple sites worldwide, during a trial conducted in Italy biogas yield improvements of 50% and slurry reduction of a complimentary 50% were recorded using this formulation. Single digit increases have been recorded in optimised systems but up to 50% in non-optimised systems. *Biogas Catalyst* is proven to break down more of the complex molecules within biomass that would otherwise need to be removed periodically from the AD at extra cost.



Sludge Volume and disposal cost impact: The addition of Biogas Catalyst significantly lowered sludge volume from 1st month of use. This was due to bacterial induced enzymatic degradation of previously inaccessible material within the biomass. Data was taken across multiple sites and showcased an average of around a 50% reduction in final sludge volume.



Biogas production and diesel consumption: The addition of Biogas Catalyst significantly increased biogas production, in addition to lowering diesel usage (green line) from 1st month of use. This was due to the previous additional material release (Graph 1) now available for methanogenesis. Data was taken across multiple sites and showcased an average of around a 50% increase in biogas production. Advantageously diesel was also reduced by over 50% due to bacterial respiration facilitating an increased temperature within the AD.

BIOGAS CATALYST

A Fluid Science Microbial Product

CONCLUSION

Fluid Science Ltd provide a dual action bacterial / mineral carrier product that has been blended specifically for use in AD systems. This user-friendly powder additive comprises a consortia of bacteria that when deployed will act as biological factories within your AD to breakdown biomass faster and to a more complete level, releasing more stored energy from your biomass and in turn reducing sludge volume. This is achieved by utilising a bacterial catalogue and only selecting the bacteria that will perform best within your ADs internal environment. Throughout the process experts will be on hand to provide support and assistance where needed. This model is currently implemented in several other waste to energy facilities where biogas yield increases of up to 50% have been recorded.

For more information, please contact :

Our Product Development Scientist Andrew:

andrew.clark@fluidscienceltd.com

Our Senior Sales Manager Christopher:

chris.hogan@fluidscienceltd.com