



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 chemistry and *Bacillus* bioaugmentation.



What is it?

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



Uses

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



Eco credentials

Non-pathogenic bacteria to support green energy/ Biogas production.



How it works

Bacteria are supported by the mineral carrier to colonise the AD, secreting hydrolytic enzymes that both speed up and release more stored energy from biomass increasing Biogas yield.

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INTRODUCTION

Fluid Science Ltd are a biotech company specialising in developing and harnessing microbial based additives to improve many industrial processes. Our expert scientists have utilised their knowledge to develop Biogas Catalyst, a dual action, easy to use personalised powder additive that increases Biogas yield by up to 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 waste.



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. We have a catalogue of bacterial species that have been specifically bred and individually categorised for their value adding characteristics. Using our expert consultative approach, this allows us to tailor pick a microbial team specific and unique to your ADs environment.

In addition, our mineral carrier provides resources, acts as a catalyst for bacterial colonisation and assists in eliminating limiting factors within ADs.

Our experts will be on hand throughout the process to assist, support and analyse feedback to ensure optimal yields are achieved and maintained.

APPLICATIONS

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

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CONSULTATION

Our products are bespoke, formulated specifically to your plants AD and are assigned a unique (batch) blend number post production. Our experts will offer a consultative approach to fully understand your ADs internal environment, operation, biomass input, and process.

Once in possession of this knowledge, we will select only the best bacterial strains from our catalogue, ensuring their properties are best suited to your AD.

Following our consultation, we will pair your information to our data sourced from a range of molecular techniques including genomic screening, sequencing, and enzyme output assays.

We then implement a systematic approach to select the correct combination of bacteria to optimise performance within your AD.

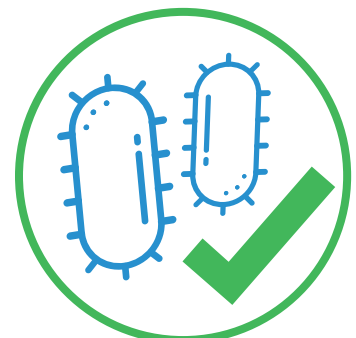
This unique blend of bacteria we create will be specific to your digester, ensuring only the most value adding bacteria are selected to generate optimal Biogas production.



Initial Consultation
with Fluid Science Rep



Identifying properties
best suited to your
digester



Final product catered
for optimal Biogas
production

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THE SCIENCE

Our 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, our 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.

Our bacterial catalogue categorises a range of characteristics, including metabolic differences, enzyme output /production volume, thermostability and pH tolerance of each bacteria to create a universal tool kit that we can select from to suit the needs of your AD. 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, we blend a team of bacteria specific to your AD, who's enzymes will breakdown more biomass at a faster rate to increase Biogas production.



Bacteria (Bacillus)



Mineral Carrier

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Bacteria (Bacillus)	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 - Natural - Raise temp = less heating required thus saving input fuel costs 	<ul style="list-style-type: none"> - Provide resources for bacteria - Increase bacterial growth - Remove limiting products such as ammonia. - Ion exchange between bacterial species - Enables biofilm to protect bacteria / enhance spores
<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 your AD 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.

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AFTERCARE - Our Commitment to You

Post implementation of the Biogas Catalyst, our experts will be on hand to quantify, process data and improve your ADs Biogas yield. As this is a bespoke package, we can tweak and re-engineer the product by substituting or adding bacterial species from our catalogue to provide a new combination of secreted enzymes to optimise and maintain yield improvements. This close relationship between your operation and our experts has facilitated ~30% yield improvements within our current customers Biogas plants.

Using the Product

Your bespoke blended 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 0.1% of the estimate 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.

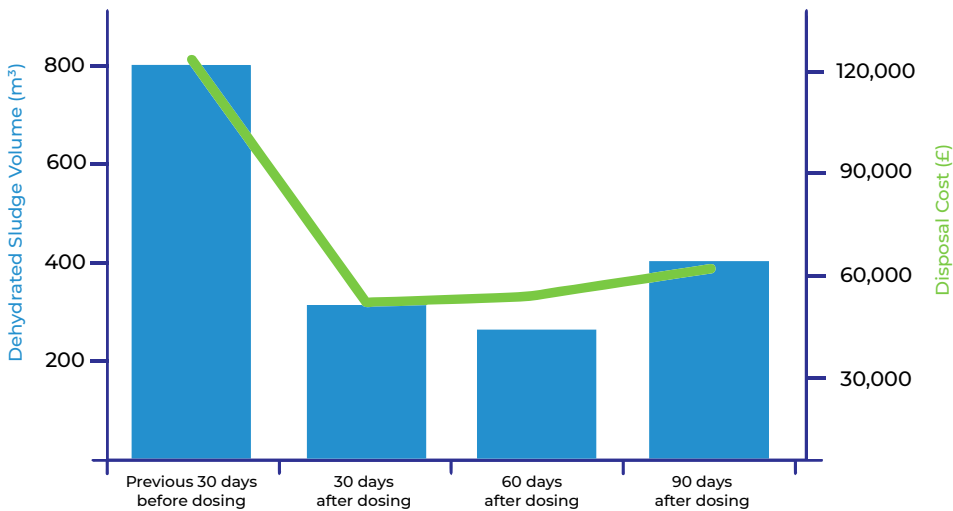
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SUCCESS

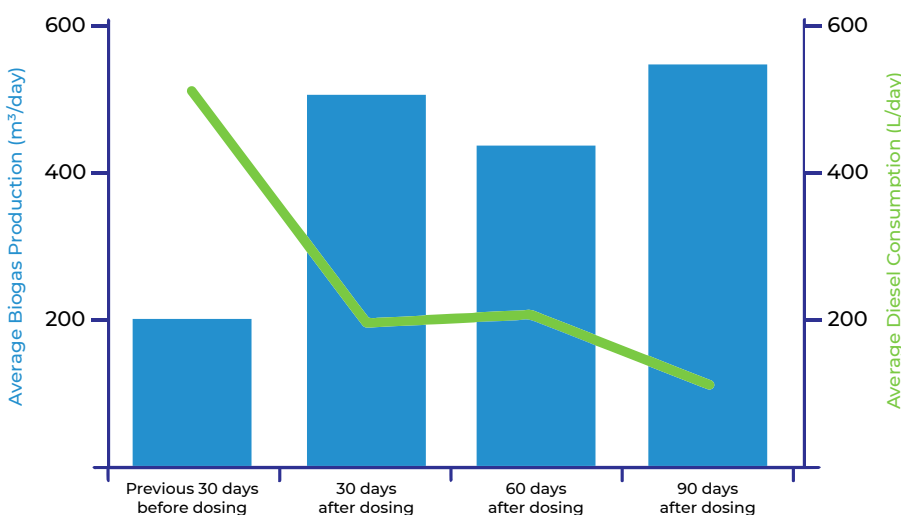
We currently provide services to multiple sites worldwide, where (feedstock depending) we have recorded Biogas yield improvements of ~30% and slurry reduction of a complimentary 30% given our products breakdown more complex molecules within biomass that would otherwise need to be removed periodically from the AD at extra cost.

Sludge Volume and Disposal Cost Impact



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 30% reduction in final sludge volume.

Biogas Production and Diesel Consumption



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 30% increase in Biogas production. Advantageously diesel was also reduced by over 30% due to bacterial respiration facilitating an increased temperature within the AD.

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CONCLUSION

Fluid Science Ltd provide a dual action bacterial / mineral carrier product that has been blended specifically to your AD. This user-friendly powder additive comprises a team 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. We achieve this by utilising our bacterial catalogue and only selecting the bacteria that will perform best within your ADs internal environment. Throughout the process we will be on hand to provide support and assistance where needed. This model is currently implemented in several other waste to energy facilities where we have supported Biogas yield increases by up to 50%.

For more information, please contact :

Our Product Development Scientist Andrew:

andrew.clark@fluidsceinceltd.com

Our Senior Sales Manager Chris:

chris.hogan@fluidscienceltd.com