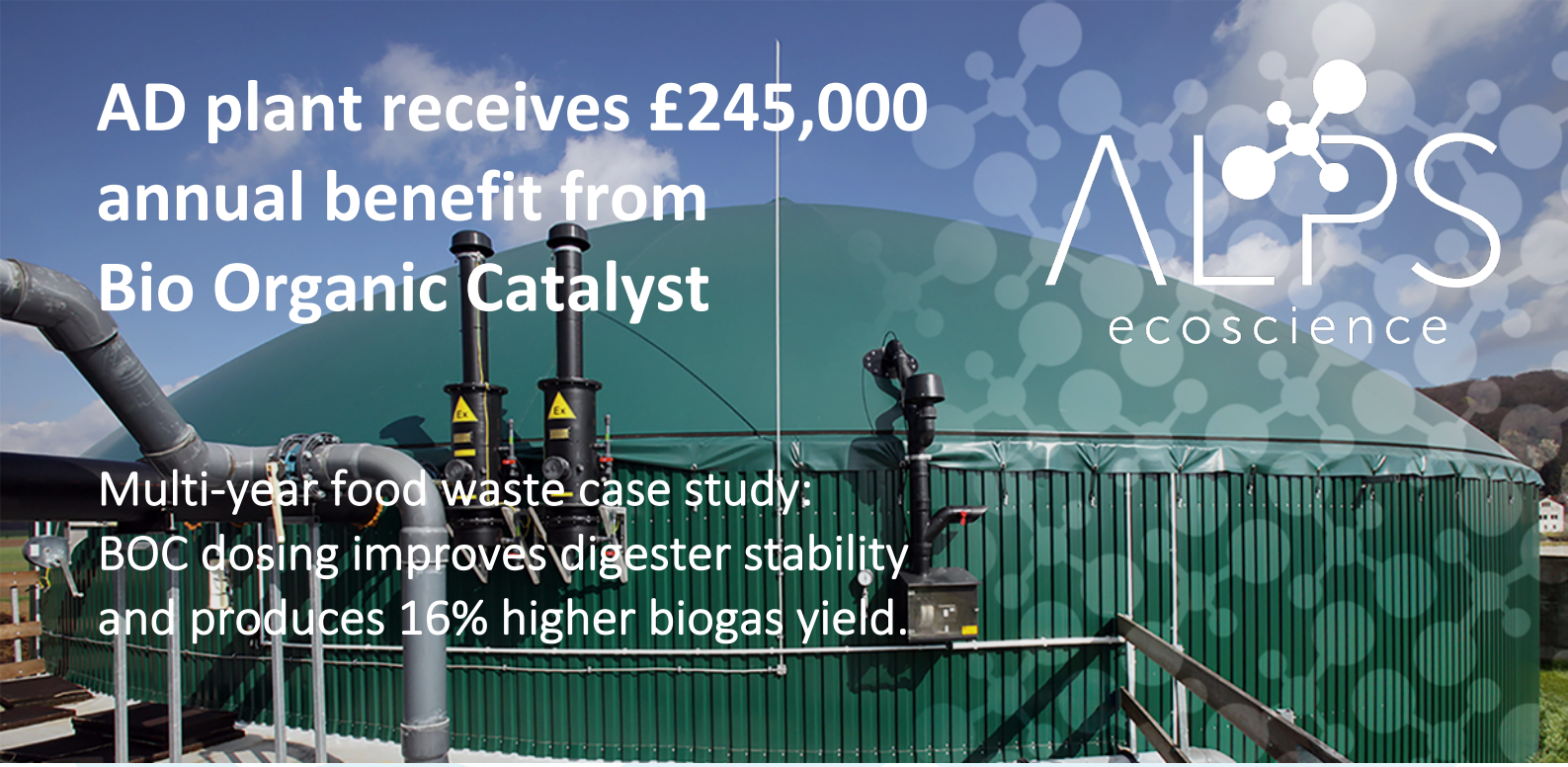
AD plant receives £245,000 annual benefit from Bio Organic Catalyst



Multi-year food waste case study: BOC dosing improves digester stability and produces 16% higher biogas yield.

A UK food waste anaerobic digestion facility running mesophilic CSTR digestion adopted bio-organic catalyst (BOC) dosing in February 2020. The site operates 3.2 MW CHP and had almost two years of baseline operational data before dosing started.

Benefits at this site

- Up to **16% peak methane yield uplift** versus baseline
- Improved pH stability, supporting more predictable operation
- Optimum BOC dose range identified at 1.1-1.2 L/tVS
- Estimated annual net benefit of approximately **£245,000**

Digester type	CSTR
Operating mode	Mesophilic
Annual throughput	Approx. 9,000 tVS/year
Primary feedstock	Food waste
Energy outputs	CHP
BOC adoption	February 2020
Dataset	2,933 daily records, 2018-26

Up to 16%	£25.85/tVS	~£245k/year	£1.5 million
CH_4 yield uplift	Ave. net gain	Annual net benefit	Cumulative gain

Results

After BOC was introduced, every year of operation produced more energy from each tonne of volatile solids than the baseline before BOC was used. Before BOC, the plant generated 2,051 kWh per tonne of volatile solids (tVS). The best-performing year after BOC produced 2,377 kWh/tVS, an increase of around 16%.

Statistical testing confirmed that the improvements seen after BOC was introduced were unlikely to be due to chance ($p < 0.05$), giving confidence that BOC contributed to the higher energy yields.

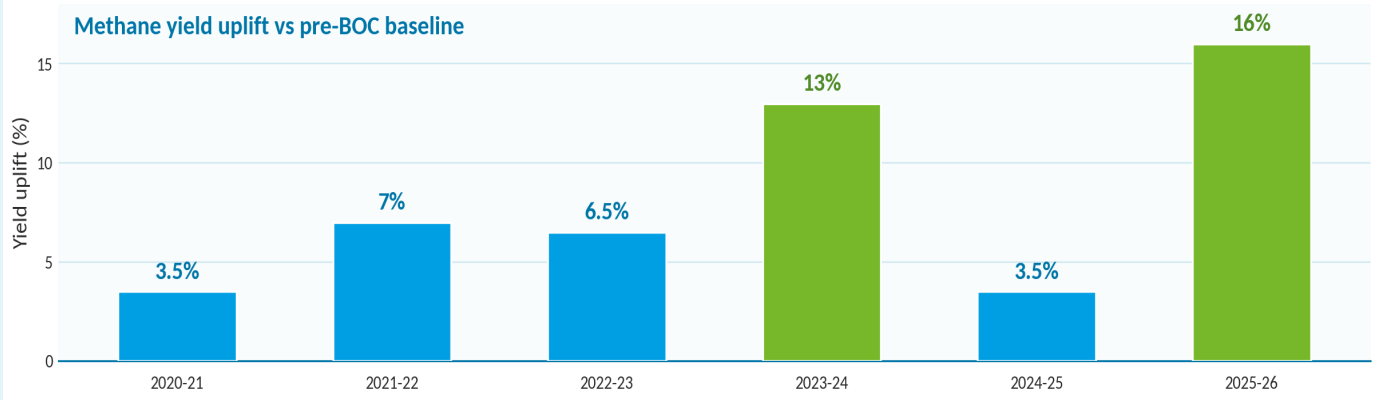


Figure 1: Observed methane yield uplift by operating year block after BOC adoption.

Performance and stability

To understand how BOC affects methane production, we used a statistical model that considers the way an anaerobic digester responds over time. Because the biology inside the digester does not react instantly, the model included the effect of BOC over the previous 10 days, as well as the influence of methane production over the previous two days, along with the organic loading rate (OLR) and hydraulic retention time (HRT).

The results showed that BOC alone explained around 24% of the day-to-day changes in methane production. For a single product in a commercial food waste anaerobic digestion plant, this is a significant contribution.

The digester also became more stable after BOC was introduced. Before dosing, the average pH was 7.49 and it fluctuated more from day to day. After dosing, the pH generally stayed between 7.8 and 8.2 with much less variation. A more stable pH reduces the risk of volatile fatty acids (VFAs) building up and helps maintain more consistent biogas production.

How does BOC work?

BOC is a biological product derived from a yeast fermentation process. Its active ingredient is a mixture of naturally produced proteins — small enough to move freely through the liquid environment inside the digester and interact directly with the feedstock.

It works in two complementary ways.

The first is surface chemistry. The proteins in BOC act as a natural surfactant, reducing the surface tension between the liquid in the digester and the solid organic material being broken down. Think of it like a washing-up liquid effect: without it, water and grease repel each other; with it, they mix. In the digester, this means the microbial community gets far better contact with the food waste, making more of it accessible for digestion.

The second is that BOC actively converts fats, oils, and greases — which are normally the hardest materials for microorganisms to break down — into water-soluble compounds that the microbial community can process much more readily. This isn't just improved access; it's a chemical transformation that effectively enlarges the pool of digestible material.

Together, these two effects mean the digester extracts more energy from the same volume of feedstock. The result is higher methane yields, a more stable biological environment, and a digester that is more resilient to the natural day-to-day variation in food waste composition.

Financial impact

Gross revenue uplift	£43.25/tVS
BOC cost	£17.40/tVS
Net financial gain	**£25.85/tVS**
Return on dosing cost	**~148%**
Estimated annual net benefit	**~£245,000/year**

Conclusion

BOC has delivered clear improvements in the performance of this anaerobic digestion plant without requiring any process changes or new equipment.

Since its introduction, the plant has consistently produced more methane and energy, achieving up to 16% higher energy yield while maintaining more stable digester conditions. Statistical analysis confirms these improvements are significant and not due to chance.

Over six years, BOC has generated an average of £245,000 in additional annual revenue, delivering a 2.5X return on investment, making it a simple and cost-effective way to improve both plant performance and profitability.

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