



Interim Analysis of Eco-Cat™ dosing on the Willen Biogas at Cattlegate, Enfield

Background

A trial to analyse the effect in the use of the BOC technology was established at the Willen Biogas facility in Enfield, North London.

The trial commenced on the 2nd January 2018, a baseline data set spanning 36 days prior to dosing has been used in the following data analysis. Baseline data from the 27th November 2017 to 1st January 2018 was used. Dosing has been set to 17 to 18l/day, initially Ecosystem Plus was dosed, this was changed to Ecocatalyst as it was noted a large amount of FOG in the Influent.

The trial was implemented to analyse the following:

- To increase the Methane Yield to cater for the lack of TOC influent.
- Increase the mean total dissolved Nitrogen exiting the digester.
- Reduce viscosity, and
- Reduce odour.

The trial has been running for 36 days, although there are results it is important to note that a 90 to 120-day trial is suggested to understand and realise the full effect of the technology.

1.1. Results Summary

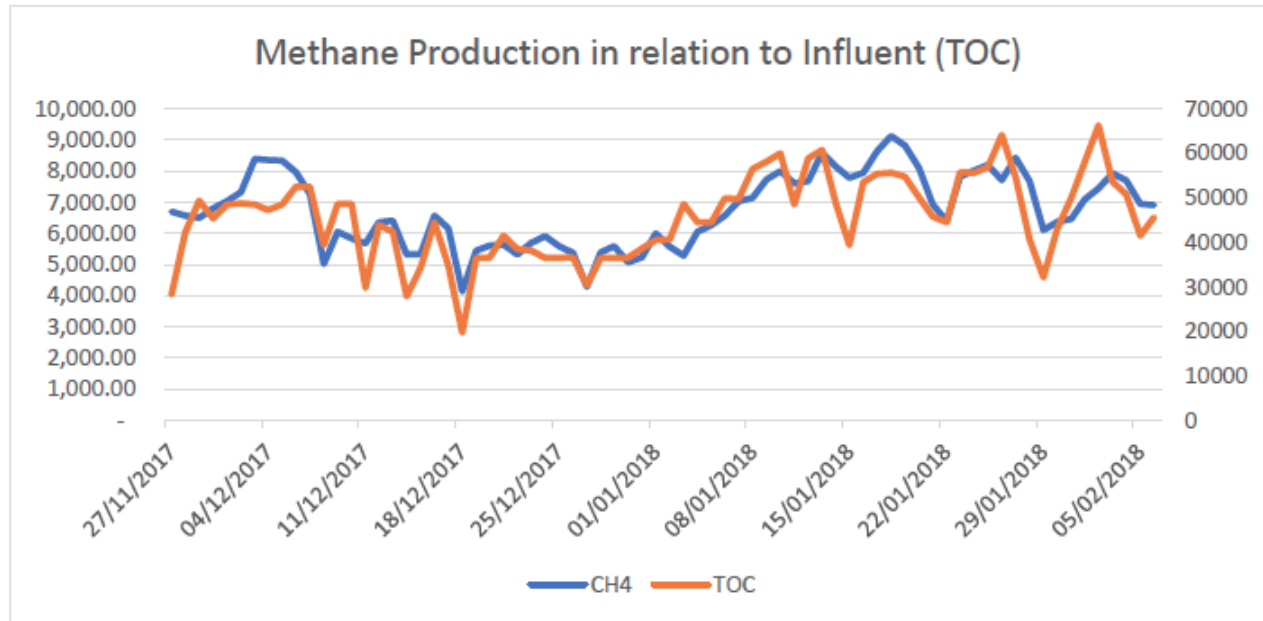
The following highlight results in the trial period:

	BASELINE	TREATED		
	27/11/17 to 01/01/18	02/01/17 to 06/02/18	Difference	% Change
BIOGAS PRODUCTION - M3	417,801	479,839	62,038	13%
METHANE PRODUCTION - M3	220,223	266,128	45,904	17%
ENERGY - MW	800	1,023	223	22%
INFLUENT - TOC	1,445	1,836	391	21%
REVENUE (£120/MW)	£ 96,048	£ 122,796	£ 26,748	22%
INFLUENT COST (£20/T WASTE)	£ 28,892	£ 36,720	£ 7,828	21%
TREATMENT COST (18L/T ODM)	-	£ 7,452		
NET REVENUE	£ 67,155	£ 78,623	£ 11,468	15%

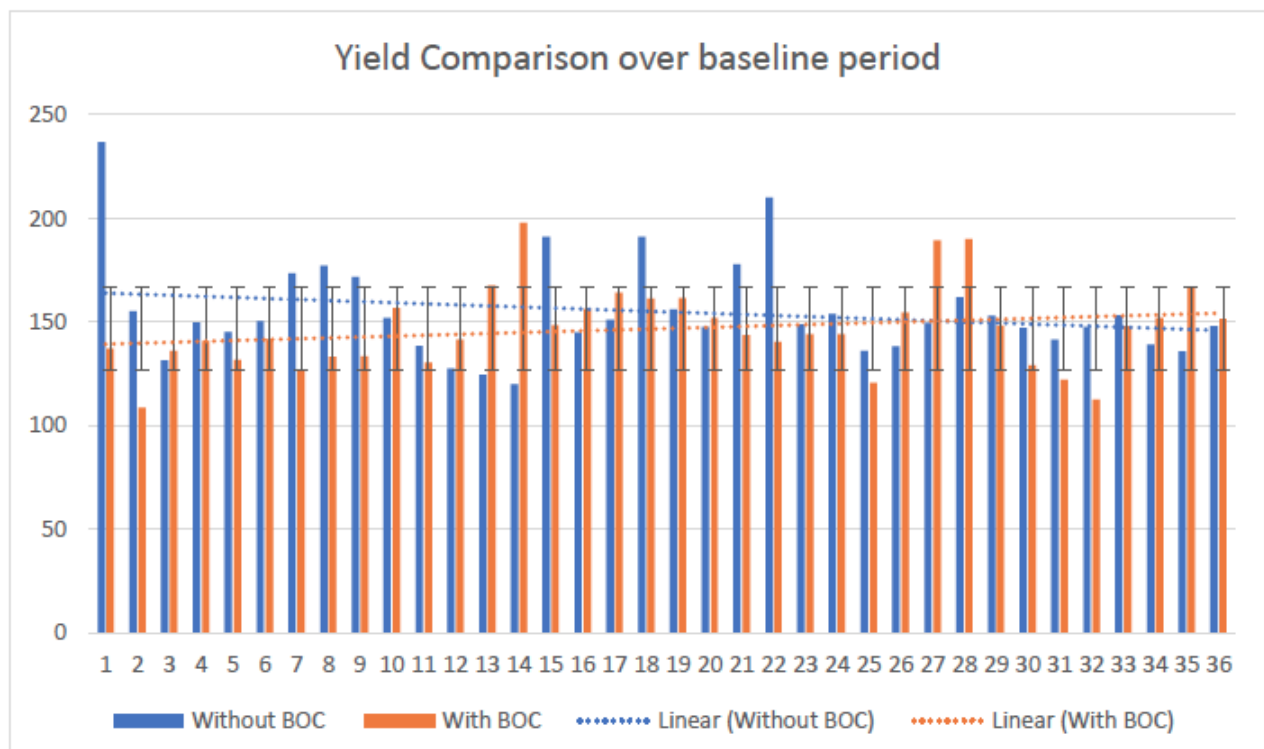
2. Biogas Production

2.1. Yield

There is a correlation between Influent and the resultant Methane output, as shown in the following graph, despite this the trend in the trial period is on an upward trajectory. It is expected, based on experience, this trend will continue over the next 60 to 90 days reaching an overall Methane yield of >25%.



A declining trend in Biogas yield has been observed at the facility which is shown in the following graph, this dataset is over a longer period, August 2017 to January 2018.



Methane Yield (Ch4 M3/TOC) in the trial period shows an upward trend, approximately 9%, this is compared to a downward trend in the baseline period, approximately 11%. See figure 2(a) for details. This downward trend is consistent on an extended period as shown in figure 2(b).

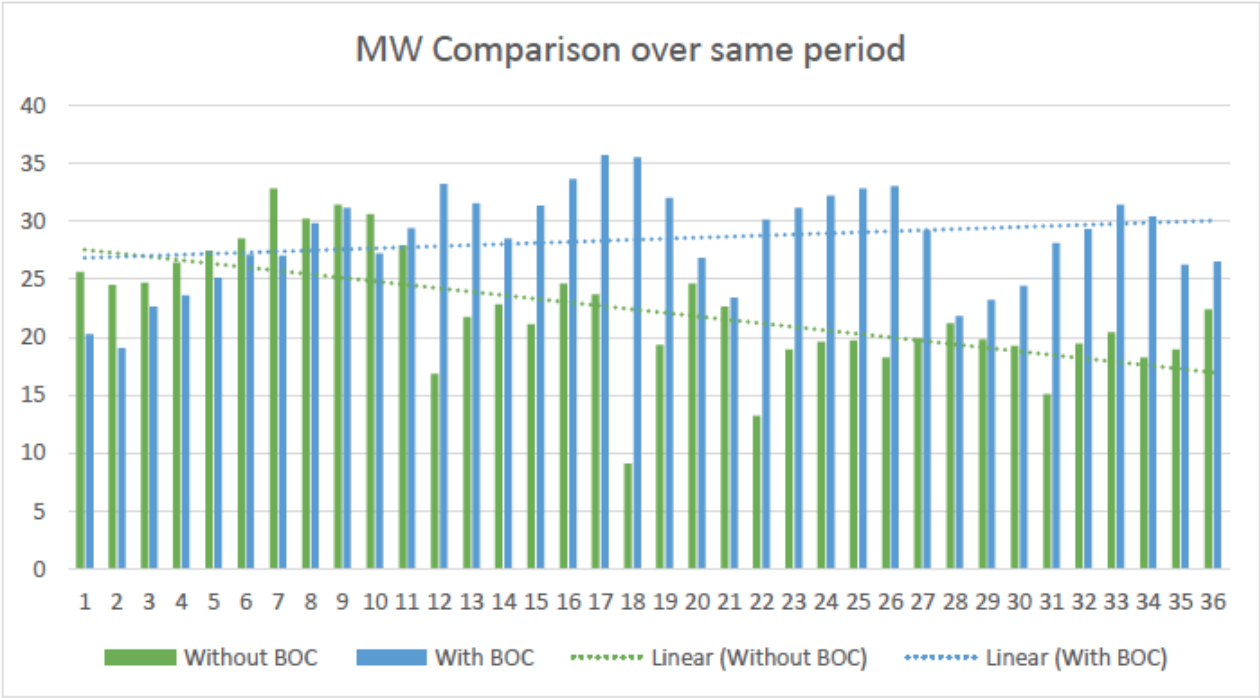
2.2. Financial Yield

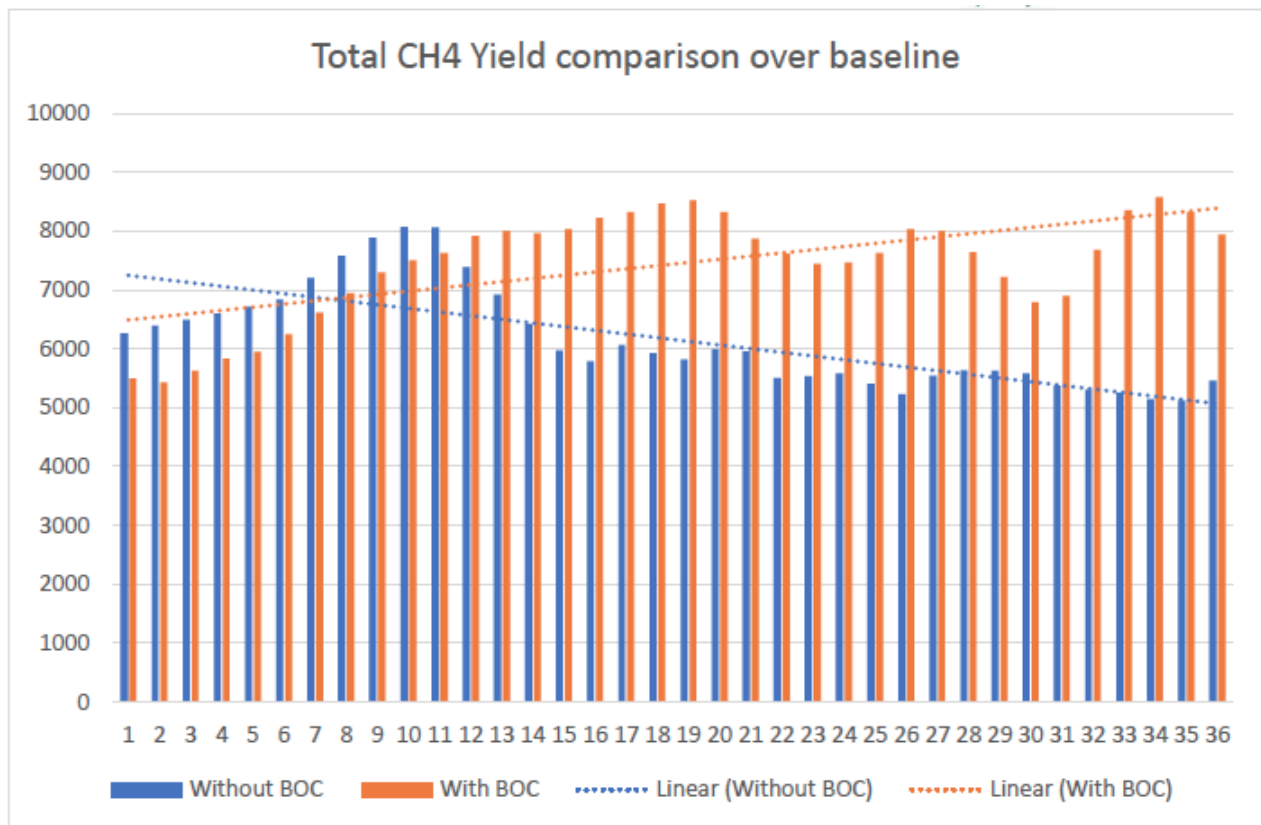
The increase in yield relates to 17m3 Ch4/t Influent (Dry), this results in a total increased Methane production of 31,212m3 in the Trial period. On average, converting to an overall increase of 113MW of power, resulting in an increased revenue of £14,232. See below table.

Methane Yield at start of Trial	M ³	137
Methane Yield at 6/2/18	M ³	154
Overall Yield Increase	M ³ /tC	17
Total ODM Influent in Trial period	t	1,836
Total Increase in Methane	M ³	31,212
Energy conversion factor	MW/m ³ Ch ⁴	0.0038
Resultant Energy MW		119
Gross Revenue attributed to Yield Increase	£	14,232.67
Cost of Trial (Consumables)	£	7,452.00
Net Increase in Gross Revenue	£	6,780.67

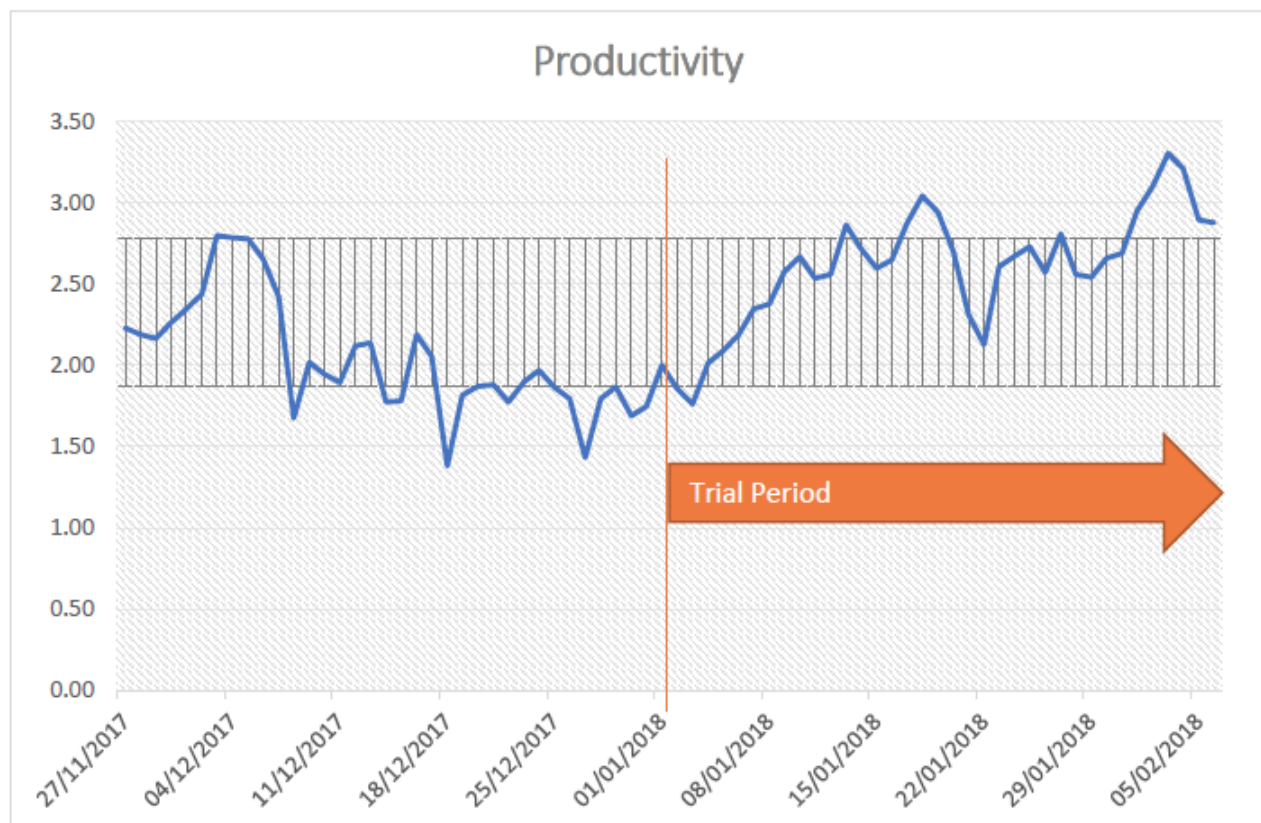
2.3. Productivity

The following graphs illustrates the productivity in the trial period.



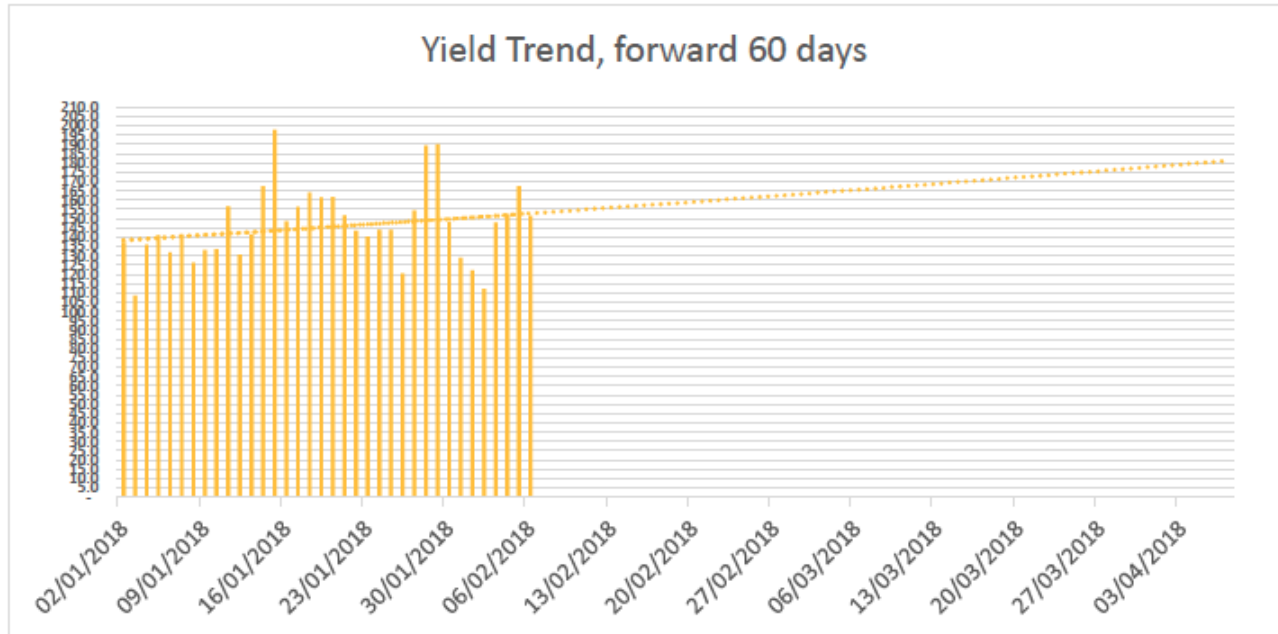


Productivity on the project is measured by total Methane produced against the total volume of the Primary Digester, the following graph shows a strong upward trend in productivity.



2.4. Productivity Trend

The trend as illustrated in the following graph, if maintained will see a 24% increase in Bio Methane yield.



2.5. Digester Efficiency

In Europe, Germany, operators have observed the balancing of the biological activity in the digester, a balancing of the biology in the digester sees a greater efficiency as seen in the below graph, allowing greater ease of management in predicting future yields of biogas despite changes to waste influent.

