

Type of waste:

Food and general waste (black bag)

Client/ Location:

The Centurion Best Western Hotel, located in Westfield, Bath (2017)

The project:

The Centurion Best Western is a large resort that incorporates a hotel, restaurant, golf course and spa. The company run events including weddings, parties, meetings, and other functions which generate waste, e.g. food waste, tissue, plastic, paper, etc. Before the purpose built XO was installed, 4 individual 1100 litre bins were collected twice a week, incurring a high annual waste disposal cost, which is only increasing year on year.



Objectives:

The aim for this client is to use the XO reactor to digest the waste created from the resort. This will reduce the waste mass and volume, their carbon footprint, and improve their environmental image in the process. The monitoring of this XO reactor includes measurements for gas emissions, waste input, digestate output, and temperature logs which have all been used to assess and improve the performance. Calculations based on this data reveal what achievements have been accomplished.

Implementation:

The XO reactor at this location was installed 06/01/2017 and is a purpose built machine with a capacity of approximately 0.3 tonnes of waste a day, giving a theoretical annual capacity of 109.5 tonnes. The power draw during normal operation is just 3kWh, for 24 hours a day, 365 days a year.

The 15 bin bags featured on the left are from the Centurion. They were reduced to one bag of digestate, shown in the right image.



Results:

The month of June 2017 saw the XO loaded with 1541.29kg of shredded waste, discharging 425.24kg under the normal residency period of 72 hours. This equates to a 72.41% decrease in mass; showing significant waste reduction. During the first four months, experiments with the residency time were trialled where the time the biomass inhabited the machine was reduced from 72 hours to 24 hours, this gave a slightly lower average reduction rate of 60.25%. The rapid waste reduction is achieved by exothermic reactions from Advetec's bespoke blend of micro-organisms. The average core temperature inside the machine was measured at 50.26 degrees centigrade. This promotes high waste reduction rates, and based on the current performance of the Centurion's machine, the theoretical monetary savings could exceed 54% when compared to the cost of landfill. In addition, the gas measurements from this machine reveal an 87% reduction in CO₂ levels compared to sending the same mass of MSW to landfill; this massively reduces the Centurion's carbon footprint. Since the XO's installation, the Centurion have declared there are no longer any flies, and there is a reduced odour in comparison to using waste bins. The problem of unaesthetic mounds of black bag waste has also been solved using this machine. Furthermore, the digestate analysis revealed a high nutrient levels and a calorific content of 18.6MJ/kg, meaning the digestate can be used as a fuel source for biomass burners, or alternatively sold for composting.

Summary:

The XO reactor at the Centurion is performing successfully; generating low gas emissions and decreasing the volume of waste significantly, while also forecasting large potential savings in comparison to landfill. All of the waste entered in the XO reactor has been prevented from filling landfill. On average 72% of the waste is digested by the bacterial blends, while the leftover digestate can be utilised or taken for incineration.



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BW CENTURION HOTEL
CHARLTON LANE
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DIGESTATE

WASTE ANALYSIS RESULTS

Sample Reference :

CENTURION DIGESTATE

Sample Matrix : WASTE

Laboratory References

Report Number	50819
Sample Number	79437

Date Received	03-MAR-2017
Date Reported	15-MAR-2017

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

ANALYTICAL RESULTS *on 'dry matter' basis.*

Determinand	Value	Units
Gross Calorific Value	18.6	MJ/kg

Released by Joe Cherrie

Date 15/03/17

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CENTURION DIGESTATE

DIGESTATE (Metric Units)

Sample Reference : CENTURION DIGESTATE

Sample Matrix : DIGESTATE

The sample submitted was of adequate size to complete all analysis requested.

The sample will be kept as the dry ground sample for at least 1 month.

Laboratory References

Report Number	50824
Sample Number	79445

Date Received	03-MAR-2017
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Date Reported	29-MAR-2017
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ANALYTICAL RESULTS

Determinand on a DM basis unless otherwise indicated	Units	Result	Amount per fresh tonne	Amount applied at an equivalent total Nitrogen application of 250 kg N/ha	Units
pH 1:6 [Fresh]		6.00			
Oven Dry Matter	%	99.9	999.00	12315	kg DM
Total Nitrogen	% w/w	2.03	20.28	250	kg N
Ammonium Nitrogen	mg/kg	84.1	0.08	1.04	kg NH4-N
Nitrate Nitrogen	mg/kg	45.0	0.04	0.55	kg NO3-N
Total Phosphorus (P)	% w/w	0.420	9.61	118.45	kg P2O5
Total Potassium (K)	% w/w	0.548	6.57	80.99	kg K2O
Total Magnesium (Mg)	% w/w	0.316	5.24	64.60	kg MgO
Total Sulphur (S)	% w/w	0.144	3.60	44.33	kg SO3
Total Copper (Cu)	mg/kg	318	0.32	3.92	kg Cu
Total Zinc (Zn)	mg/kg	128	0.13	1.58	kg Zn
Total Sodium (Na)	% w/w	0.464	6.25	77.03	kg Na2O
Total Calcium (Ca)	mg/kg	31145	31.11	383.56	kg Ca
Equivalent field application rate		—	1.00	12.33	tonnes/ha

The above equivalent field application rate for total nitrogen of 250 kg/ha has been provided purely for guidance purposes only. Organic manures should be used in accordance with the Defra Code of Good Agricultural Practice and where required within the specific regulatory guidance for the spreading of that material to land. To get the most benefit from your organic manures it is recommended that you follow the principles as set out in Defra's Fertiliser Manual (RB209) or as directed by a FACTS qualified adviser.

Released by

Date 29/03/17

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