

# Bio Collectors Biomethane Plant CO<sub>2</sub> Analysis Report

March 2020

# Bio Collectors Biomethane Plant

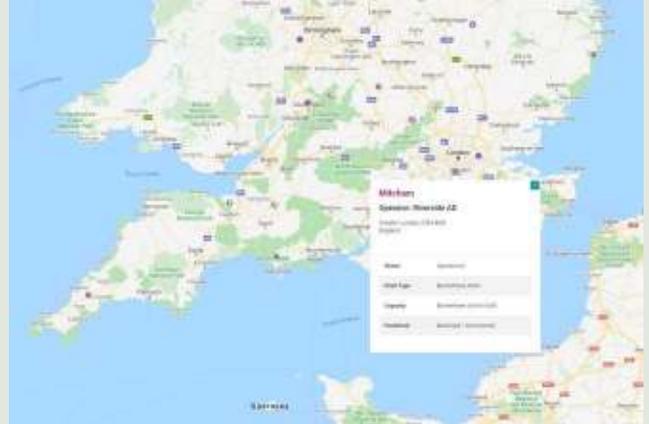
## CO<sub>2</sub> Analysis Report

### Executive Summary

Aardvark Certification Ltd (ACL) has been instructed by JLEN Environmental Assets Group Ltd to assess and report against the carbon savings achieved by the 650m<sup>3</sup>/hr Bio Collectors Biomethane Plant located at Mitcham in London. This assessment considers the CO<sub>2</sub> savings made as a result of this biogas plant as well as the wider environmental benefits the project has delivered.

#### Asset Introduction

The Bio Collectors Biomethane Plant is currently fed on approximately 65,000 tonnes per annum of food waste. The biogas plant has a designed export capacity of 650m<sup>3</sup>/hr biomethane with all biomethane produced exported directly to the national gas grid. Two CHP's (500kW & 1,200kW) provide heat and power to meet the energy requirements of the plant with surplus electricity exported to the grid. The plant was originally commissioned in March 2012 and has undergone several phases of expansion since that time. At current capacity, the plant produces 8,760 MWh of renewable electricity and a further 53,010 MWh of biomethane per annum.



#### CO<sub>2</sub> Savings from Biomethane

Biomethane and electricity derived from biogas avoids significant CO<sub>2</sub> emissions compared with fossil fuel derived gas and electricity. Standard conversion factors for fossil fuel derived electricity, natural gas and biomethane are shown below:

UK Generated Electricity: 0.2556 kg CO<sub>2</sub>e per kWh

Natural Gas: 0.18385 kg CO<sub>2</sub>e per kWh (gross CV)

Biomethane: 0.000375585 kg CO<sub>2</sub>e per kWh (gross CV)

The calculated CO<sub>2</sub> savings shown within this report are based on the actual savings achieved by the site.

#### Greenhouse Gas Emissions

The Bio Collectors Biomethane Plant uses 100% waste materials as feedstock to produce energy. The anaerobic digestion process enables the diversion of this waste going to landfill where the decomposition of the material would release greenhouse gases directly to atmosphere. By treating the waste via anaerobic digestion, the energy from these gasses can be captured and substitute fossil fuel derived energy.

#### CO<sub>2</sub> Emissions Avoided

Based on the above data, it is possible to calculate the CO<sub>2</sub> savings the plant has achieved since commissioning had the equivalent quantity of energy been derived from fossil fuel sources. Total CO<sub>2</sub> emissions which would have come from an equivalent quantity of electricity or natural gas from fossil fuel sources in the UK is shown below along with CO<sub>2</sub> savings made through energy production from the biomethane plant. This shows a total of 2,237tCO<sub>2</sub>e is being avoided per annum by the Bio Collectors Biomethane Plant through it's electricity export and a further 9,726tCO<sub>2</sub>e is being avoided per annum through biomethane production.

Total Energy Produced			UK Generated Electricity	Biogas Generated Electricity	
			Conversion factors	0.25560	0.00021
Electricity	8,760	MWh	CO <sub>2</sub> Equivalent (kg CO <sub>2</sub> e)	2,239,056	1,840
			CO <sub>2</sub> Difference (kg CO <sub>2</sub> e)	2,237,216	

Total Energy Produced			UK Natural Gas Emissions	Biomethane Emissions	
			Conversion factors	0.18385	0.00038
Biomethane	53,010	MWh	CO <sub>2</sub> Equivalent (kg CO <sub>2</sub> e)	9,745,889	19,910
			CO <sub>2</sub> Difference (kg CO <sub>2</sub> e)	9,725,979	

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### CO<sub>2</sub> Savings & Lifetime Forecast

With the preceding analysis, it is possible to calculate the CO<sub>2</sub> emissions which will be avoided in the future based on the expected operational phase of the plant. An anaerobic digestion plant is typically designed with a 20 year operational lifetime. In practice this may go on well beyond the planned 20 years. Based on the expected 20 year operational forecast, the Bio Collectors plant is expected to save a total of 239,264tCO<sub>2</sub>e. This forecast is based on the current GHG emissions associated with the processing of waste feedstocks and operation of the plant. In practice it is expected that improved technology and efficiencies over the remainder of the lifetime of the plant will enable it to reduce its own emissions thereby increasing the overall CO<sub>2</sub> savings it contributes. The plant is also increasing its fleet of gas fuelled waste collection vehicles which will further improve the CO<sub>2</sub> savings the plant is currently achieving.

### What do these savings mean?

The CO<sub>2</sub> savings achieved by the project can be difficult to comprehend and relate to real world understanding. We therefore equate the savings to every day scenarios such as vehicles, and homes to assist readers in interpreting the data.

The Bio Collectors Biomethane Plant has to date offset an estimated 71,779tCO<sub>2</sub>e since commissioning and is expected to offset at least a further 167,484tCO<sub>2</sub>e over its operational lifetime.

This equates to:

- Equivalent emissions produced by a mid-sized diesel car driving around Earth's equator 34,405 times over the lifetime of the plant
- Removing 109,839 mid-sized diesel cars from UK roads based on the lifetime CO<sub>2</sub> savings the plant will achieve whilst it has already offset equivalent emissions to 32,952 cars.
- Providing enough gas for heating and cooking in 5,113 average UK homes over the lifetime of the plant
- Providing enough renewable electricity to power 11,436 average UK homes over the lifetime of the plant.

### Other Environmental & Community Benefits

The wider Bio Collectors business includes a food waste collection business which collects food waste on behalf of local councils and on a commercial basis for local businesses. Bio Collectors is all too aware of the impact its vehicles have in air quality in the London area. Being a fuel producer, Bio Collectors have invested in a self-contained compressed natural gas (CNG) refuelling station for its growing fleet of CNG-fuelled waste collection vehicles. To date Bio Collectors have invested in nine such vehicles in a rolling replacement scheme which will eventually see all of its food waste collections being fuelled by the energy from the food waste being collected. The existing fleet of CNG-fuelled collection vehicles has driven 157,405 miles in the last 12 months. This represents 36% of the total vehicle miles Bio Collectors drives per annum. Displacing 36% of vehicle miles fuelled by diesel is equivalent to avoiding a further 242tCO<sub>2</sub>e per annum. This figure will continue to increase as the fleet of vehicles continues to be upgraded to CNG vehicles.

### Digestate

The Bio Collectors biomethane plant delivers another important environmental benefit to the local farms around the plant through provision of a natural biofertiliser they are able to use. This offsets the need for fossil fuel derived fertilisers. The liquid fraction of the digestate has been particularly useful for establishment of cover crop, oilseed rape and grass. Use of the digestate as a direct replacement for traditional fertilisers offsets an estimated 682 t CO<sub>2</sub>e per annum.

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### Methodology

This report has been prepared in good faith by Aardvark Certification Ltd based on data obtained from the owner/operator of the asset reviewed. Our calculations of GHG emissions associated with the production of biogas from the plant has been through the Ricardo Biomethane and Heat GHG Calculator Tool, v 1.1.1 updated on 09/06/2016. Our GHG emissions assumptions for this plant are based on an annualised average emissions value for the plant by feedstock type. Biogas yield data is an average of the UKAS accredited laboratory analysis undertaken of the plants specific feedstocks over a three year period.

Our calculations of CO<sub>2</sub> savings are based on IFI Approach to GHG Accounting for Renewable Energy Projects. Baseline Emission Factors used in this analysis are taken directly from the Department for Business, Energy & Industrial Strategy Greenhouse gas reporting: conversion factors 2019.

Energy usage statistics are taken from OfGEM - <https://www.ofgem.gov.uk/gas/retail-market/monitoring-data-and-statistics/typical-domestic-consumption-values>

Mileage travelled per vehicle in the UK was taken from the RAC Foundation.

Digestate NPK values sourced from Defra's Fertiliser Manual 2017 (RB209) 9<sup>th</sup> edition

### Liability

This document contains information and may contain conclusions and recommendations. Every effort has been made to ensure that the information is accurate and that the opinions expressed are sound. However, Aardvark EM Limited cannot be made liable for any errors or omissions or for any losses or consequential losses resulting from decisions based on the information.



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