

ETA Energie  
Tecnologie  
Ambiente Waste to  
Energy Plant  
CO<sub>2</sub> Analysis Report  
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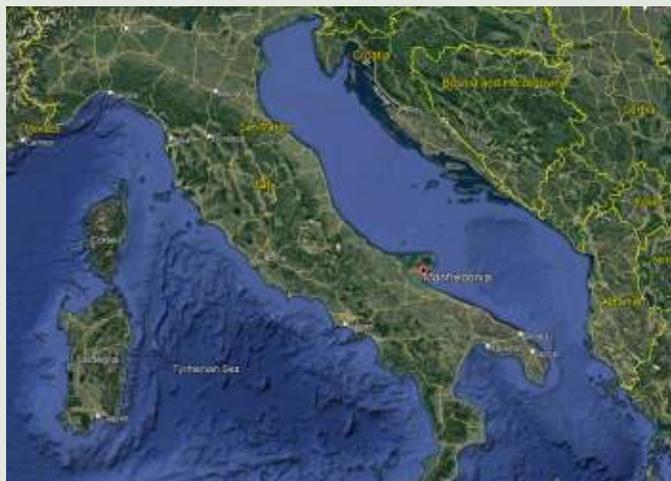
# ETA Waste to Energy Plant CO<sub>2</sub> Analysis Report

## 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 16.8MW Waste to Energy Plant located in the Manfredonia Municipality of the Foggia Province in Italy. This assessment considers the CO<sub>2</sub> emissions avoided as a result of this plant being in operation in this part of Italy.

### Asset Introduction

The ETA Waste to Energy Plant is capable of processing 147,000 tonnes per annum of refuse derived fuel. It makes use of a fluidised bed combustion chamber. The steam produced is expanded in a dedicated 16.8MW condensing steam turbine with the resultant electricity exported via High Voltage lines to the national grid. The plant was first fired in November 2012 and underwent performance testing before achieving full commissioning on 31 March 2016. Since commissioning, the plant has exported an average of 80,768 MWh (net) of renewable electricity per annum.



### CO<sub>2</sub> Savings from Renewable Electricity

Renewable electricity derived from energy to waste plants avoids significant CO<sub>2</sub> emissions compared with fossil fuel derived electricity. Standard conversion factors for fossil fuel derived electricity are shown below:

Italian Generated Electricity: 0.2134 kg CO<sub>2</sub>e per kWh

The calculated CO<sub>2</sub> savings shown within this report are based on the actual savings achieved by the site using the Italian conversion factor for grid derived electricity as reported in 2020. The grid intensity factor associated with electricity produced by the Waste to Energy plant has been calculated by Fichtner Consulting as 0.11171 kg CO<sub>2</sub>e per kWh

### Greenhouse Gas Emissions

The ETA Waste to Energy Plant uses 100% refuse derived fuels to produce energy. The waste to energy 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 waste to energy combustion technology, the energy from the fuel can be converted to electrical energy replacing fossil fuel derived electricity.

### 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 is shown below along with CO<sub>2</sub> savings made through energy exported from the combustion plant. This shows a total of 8,213 t CO<sub>2</sub>e is being avoided per annum by the Energy to Waste Plant through it's electricity export.

| Total Energy Produced |                |   | UK Generated Electricity | EfW Generated Electricity |
|-----------------------|----------------|---|--------------------------|---------------------------|
|                       |                | Conversion factors                                | 0.21340                  | 0.11171                   |
| Electricity           | 80,768,000 kWh | CO <sub>2</sub> Equivalent (kg CO <sub>2</sub> e) | 17,235,891               | 9,022,701                 |
|                       |                | CO <sub>2</sub> Difference (kg CO <sub>2</sub> e) |                          | 8,213,191                 |

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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 energy from waste plant is typically designed with a 30 year operational lifetime. In practice this may go on well beyond the planned 30 years. Based on the expected 30 year operational forecast, the ETA plant is expected to save a total of 246,396 tCO<sub>2</sub>e over its lifetime at the current carbon intensity of grid derived electricity. This forecast is based on the current GHG emissions associated with the processing of waste feedstocks and operation of the plant. Future emissions avoided are expected to amount to 201,223 tCO<sub>2</sub>e over the next 24.5 years of operations of the plant.

## 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 ETA Waste to Energy Plant has to date avoided an estimated 41,173 tCO<sub>2</sub>e since commissioning and is expected to offset a further 201,223 tCO<sub>2</sub>e over its operational lifetime at current conversion factors.

This equates to:

- Equivalent emissions produced by a mid-sized diesel car driving around Earth's equator 35,430 times over the lifetime of the plant
- Removing 113,113 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 20,737 cars.
- Providing enough renewable electricity to power 11,777 average UK homes over the lifetime of the plant.

## Other Environmental & Community Benefits

The ETA plant diverts waste from landfill which prevents the waste from decomposing in anaerobic conditions which would release methane to the atmosphere. Methane is a powerful greenhouse gas with a global warming potential approximately 30 times that of CO<sub>2</sub>. Preventing this gas from being emitted to our atmosphere is important in reducing anthropogenic emissions.

The Energy to Waste plant is operated in accordance with EU Directive 2008 – The Integrated Pollution Prevention and Control (IPPC) Directive. This ensures that the emissions produced through the combustion process are in keeping with Best Available Technology and permitted Authorised Emissions Limits. The plant benefits from a continuous monitoring system within its stacks ensuring that emissions from the plant can be controlled in real time and all emissions are within limits which will be tolerable to the local environment.

## 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 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 European Environment Agency - <https://www.eea.europa.eu/data-and-maps/indicators/overview-of-the-electricity-production-4/assessment>

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.

Grid intensity factor for the ETA Energy to Waste Plant calculated by Fichtner Consulting, *Foresight Grid Emissions Factor Evaluation*, Dated 07 May 2021

## Liability

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