AARDVARK
Certification Ltd

Wear Point Wind Farm

CO_2 Analysis Report

April 2019

Prepared for: John Laing Environmental Assets Group Ltd

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Executive Summary

Aardvark Certification Ltd (ACL) has been instructed by John Laing Environmental Assets Group Ltd to assess and report against the carbon savings achieved by the 8.2MW wind farm located in Pembrokeshire, South Wales. This assessment considers the CO_2 savings made as a result of the wind farm's energy production and export to the grid.

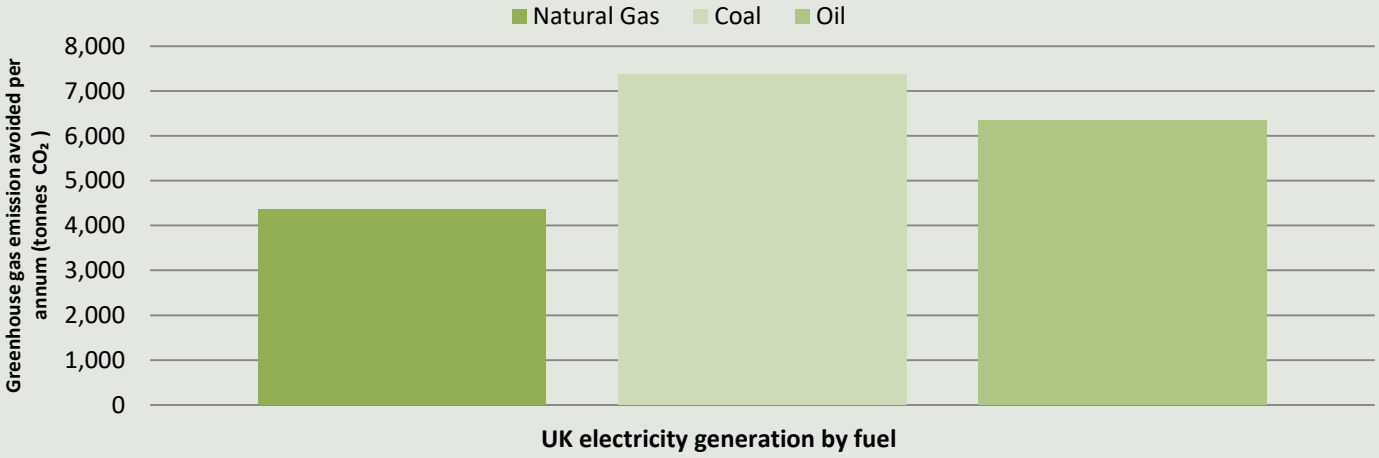
Asset Introduction

The Wear Point Wind Farm comprises of 4 NO MM82 Senvion turbines each with a three-bladed rotor, active pitch control and variable speed operation with a rated power of 2,050kW each. Each year an average of 23,662MWh of renewable electricity is produced. Since commissioning in 2014 the wind farm has produced an estimated 114,195MWh of electricity. During the course of the installations operational lifetime it is anticipated that up to 478,988MWh will be produced.

The renewable energy generated by the wind farm is fed directly into the grid via the transformer. The grid management system converts the current generated by the generator into an AC current according the requirements and standards given by the local utilities operator.

CO_2 Savings

The preceding summary of energy generation from the wind farm enables illustration of the quantities of CO_2 that have been avoided had the Wear Point Wind Farm's annual electricity production (23,662MWh) been produced by conventional fossil fuel sources.



GHG Emissions Avoided

Fuel Type	*Average Annual (tonnes CO_2e)*	*Remaining Lifetime (tonnes CO_2e)*
Natural Gas	4,353	88,115
Coal	7,362	149,023
Oil	6,349	128,517

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Energy Production
As there are no green house gas emissions associated with the operational phase of a wind farm, the renewable energy produced by the Wear Point Wind Farm avoids 100% of the equivalent fossil fuel derived energy.

Total energy produced each year		UK Generated Electricity	Wind Generated Electricity
23,662,000 kWh	***Conversion Factor***	0.28307	0.000
	CO_2 Equivalent (kg CO_2e)	6,698,00	0.000
	Annual CO_2 Difference (kg CO_2e)	6,698,002	

What do these savings mean?
The forecast CO_2 savings the Wear Point Wind Farm will achieve over its lifetime is equivalent to:
- removing the combined emissions of 3,112 medium sized diesel cars over 20 years from UK roads.
- Power 6,345 residential properties based upon the national average electricity consumption statistics.
- Provide enough power to drive a Nissan Leaf 69,594,118 miles a year – equivalent to driving 2795 times around the circumference of the earth
- Boil enough water for 4,141 million cups of tea

Site Location
The turbines location is carefully chosen to optimise the conversion of available energy from the wind to into electricity. The site's average wind speed is 6.5m/s, 2.2m/s greater then the UK average, allowing for an annual energy production of 23,662MWh.

Average Wind Speed m/S	Energy Production MWh/yr
6.5	23,662

CO_2 Forecast
Based on the quantity of electricity the turbine produces each year, an average of 6,698 tonnes CO_2e per annum will be avoided compared to the emissions associated with electricity produced for the UK Grid. It is expected that during the course of the turbines remaining 15.4 years of operational life 103,262 tonnes CO_2e will be saved.

Other Emissions to Air Avoided
In addition to avoiding CO_2 emissions, other greenhouse gas emissions are also avoided including CH4 and N_2O. Based on the amount of electricity produced by the Wear Point Wind Farm per annum, emissions of these gasses which have been avoided have been calculated and shown below.

CO_2e of CH_4 emissions avoided kg/yr	CO_2e of N_2O emissions avoided kg/yr
15,617	36,203

Conversion factors used in this analysis are the Department for Business, Energy & Industrial Strategy Greenhouse gas reporting: conversion factors 2018.

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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 CO2 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 2018.

Liability

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