



EnTRESS Case Study

Green Eco Technologies Ltd & Wolverhampton Racecourse

Green Eco Technologies (GET) develops, supplies and manages innovative, safe, efficient and environmentally beneficial on-site solutions for the conversion and re-purposing of putrescible organic waste into reusable resources (Source: www.greenecotec.com).

GET are a market-leading manufacturer and supplier of an innovative food waste disposal technology (WasteMaster). The WasteMaster uses anaerobic digestion to remove the water content of organic materials reducing the total feedstock volume by up to 80%.



Figure 1. Green Eco Technologies Ltd WasteMaster in situ at Wolverhampton Racecourse

Background to the support provided

Operating in a competitive industry, GET were looking for opportunities expand their client base, as well as develop their environmental technology to meet the demands of a range of bespoke organic feed stocks in addition to food waste, which the technology was originally designed for.

WRAP estimate that 10.2 million tonnes of food waste is produced annually in the UK. With 3.1 millions produced by business (inc food manufacture, retail and hospitality).

The WasteMaster technology requires 3-phase power and produces an inert organic material with a high calorific value as the output.

EnTRESS engaged Wolverhampton Racecourse (WRC) who are looking to improve their environmental sustainability and green policies. WRC were looking for an alternative disposal route for their horse manure and bedding and hoped the WasteMaster technology could provide an answer.

What was accomplished? The Knowledge Transfer Process

Initial EnTRESS work with GET involved understanding the key principles of their WasteMaster technology and how this was different and/or similar to other waste disposal technologies already on the market, as well as identifying how the technology may be used by other Black Country based business.



Figure 2. Used bedding ready for WasteMaster

EnTRESS established that the WasteMaster in principle was a low-temperature (~60°) anaerobic digester which reduces the total volume of organic content by up to 80% through water content removal, producing a coarse sawdust type organic material.

Due to the lower temperatures found within the WasteMaster vs other technologies, a major anticipated benefit is the retention of the intrinsic calorific value in the output product, which can then be used for added value products in other sectors such as waste to energy. GET asked EnTRESS for some independent calorific data to aid their ongoing business development work.

Wolverhampton Racecourse Opportunity

A key element of the work for GET Ltd was to identify potential end-users of the product. With this in mind, EnTRESS engaged WRC who were looking to become more sustainable, as well as within the wider Arena Racing Company. WRC are owned by Arena Racing Company, the largest race operator in the UK, with 16 racecourses and 2 greyhound tracks. WRC host over 80 racing fixtures a year.

They noted several challenges and opportunities which included, but were not limited to, food waste and horse manure disposal.

WRC horse manure disposal costs (2018) = £8,705 per annum

WRC tonnage of manure produced on site (2018) = 134 tonnes

**This excludes both general & food waste, as well as additional compactor costs*

3 bedding types across the equine industry paper, wood chippings or straw.

**All are used on-site at Wolverhampton Racecourse*



Figure 3. Dr Paul Hampton, EnTRESS (left), Andrew Emery, GET (middle), Tom Mills, WRC (right)

What's available from EnTRESS?

- Fully-funded, one-to-one mentoring and business support, for the development and / or adoption of environmental technologies, processes and improvements.
- Access to, and collaboration with, leading research provided through the University of Wolverhampton.
- Fully-funded, in-house resource efficiency audits for SMEs.
- Technical review workshops providing assessments on current products and associated R&D opportunities.
- Environmental impact challenges set by large commercial and public organisations, providing SMEs with business opportunities.
- Technology showcases promoting the uptake of environmental innovations developed by SMEs.

Solutions Identified

The main area of academic input for the project was to undertake calorific analysis of the WasteMaster's output material. Dr John Henry, a lecturer in Physical Chemistry at the University of Wolverhampton, used a bomb calorimeter to determine the energy within the material by measuring heat during combustion.

The addition of food waste to the horse manure made a significant impact, increasing the calorific value by ~65%.

During the trial period, it was identified that the WasteMaster needed to be modified to accommodate horse manure only feedstocks. This was due to the high volume to weight ratio. To mitigate against this, EnTRESS worked with GET to tailor the WasteMaster to accommodate this feedstock.

EnTRESS Recommendations

- There should be discussions around unit adaptation to cater for different size bins, increasing market opportunity.
- Contamination of waste from passers-by should be considered, as they see a bin and dispose of waste not suitable for the machine.
- Identification of an end-user of the output should be a business priority for GET and they should look specifically at waste-to-energy companies.

Sample	Comments	kJ/g	kcal/g
Horse manure only	3 x 1g samples in bomb calorimeter. The sample burned cleanly, with about 95% of the material combusting. The remaining material was small white spheres which are thought to be primarily phosphorous.	13.055 ± 0.528	3.1203 ± 0.1261
Horse manure & food waste	3 x 1.8 g samples in bomb calorimeter. Samples burned cleanly, the little that remained was black, thought to be unburned carbon. The samples were wetter, as there was an oily yellow/brown residue when pressing the samples.	21.695 ± 0.051	5.1852 ± 0.0121

Table 1. Calorific analysis end product of horse manure and horse manure & food waste samples

Fuel Type	Forest Research UK	World Nuclear Association	Engineers Toolbox
Natural Gas	38.1 MJ/kg	42 – 55 MJ/kg	52.2 – 54 MJ/kg
Coal	27 – 31 MJ/kg	17.4 – 24.9 MJ/kg	24 – 36 MJ/kg
Charcoal	-	-	34.7 MJ/kg
Wood	12.5 – 19 MJ/kg	16 MJ/kg	18.9 – 20.6 MJ/kg

Table 2. Biomass feedstock calorific comparison

Background Information

GET Ltd typically offer the WasteMaster technology on a servicing basis with the client paying a fix monthly cost per month for the duration of the contract period (typically 5 years). Included within this service plan is the equipment costs, associated training, output collection, data collection/reporting and servicing.

Their servicing model also means GET has the added benefit of collecting and selling on the potentially valuable output to end-user markets which directly aids their profit margin.

Black Country Environmental Challenge, 23rd May 2019

EnTRESS worked with GET and WRC as part of the Black Country Environmental Challenge event in May.

GET exhibited their innovative environmental technology along with many other companies. Attendees included large stakeholders, waste management companies and local businesses. This opportunity gave GET a great platform to promote their product to a wider audience and the trial on-site gave them the chance to demonstrate the technology to attendees.

The event was held at WRC.



Figure 4. Andrew Stott, EnTRESS Knowledge Transfer Manager (left), Tom Mills, Wolverhampton Racecourse General Manager (middle) and Dr Paul Hampton, EnTRESS Project Director (right)

What is EnTRESS?

EnTRESS is an environmental innovation project drawing on University of Wolverhampton expertise, part funded by the European Regional Development Fund (ERDF).

What we do?

Support for SMEs who want to modify their practices for increased sustainability.

Eligibility criteria

Open to Small to Medium Size Enterprises (SMEs).

Definition of an SME

'The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million' - Extract of Article 2 of the annex to Recommendation 2003/361/EC

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