Appendix ‘A’

Lancashire Renewables

Blackpool Council

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LCC EXTERNAL SCRUTINY MEETING
LANCASHIRE RENEWABLES LIMITED REPORT
APPENDIX A

LANCASHIRE WASTE

Part A

Central Waste Treatment Facility Introduction

Lancashire Renewables Limited (formally Global Renewables Lancashire Operations Limited) was established for the operation and management of the two Central Waste Treatment Facilities (Thornton and Farington) built for the Lancashire Waste Contract. The company's key objectives are to receive, treat and transport contract waste in accordance with the targets and service requirements set out in its Service Level Agreement *(the 'Contract')*. Each waste treatment facility is **designed** to process and handle various municipal wastes arranged and supplied by Lancashire County Council. Both facilities contain Mechanical and Biological Waste Treatment equipment *(referred to as an MBT process)*.

The primary household residual waste processing elements within the MBT process are:

- Household Waste Receivals,
- Mechanical Separations,
- Anaerobic Digestion Process *,
- Organic Growth Media (OGM) composting and refinery processes.

Each facility also has an Enclosed Green Waste composting (ECF) facility which is inclusive of composting and refinery processes which are currently unused and in a state of preservation.

Farington facility has additional assets to include the Materials Recovery Facility (MRF) for the processing of dry commingled waste and an Environmental Education Visitor Centre (EEC) which is currently occupied and used by the company and LCC waste management group employees. The Thornton site has an additional Waste Transfer Station building for the receipt and bulking up of various waste streams.

The business transformation during 2016 has resulted in a large number of processing areas being mothballed and the associated assets put into a state of preservation, with current residual waste processing operations reconfigured into more simplified, low risk operations.

** Note : Infrastructure designed to generate energy from waste (EfW).*

LANCASHIRE WASTE

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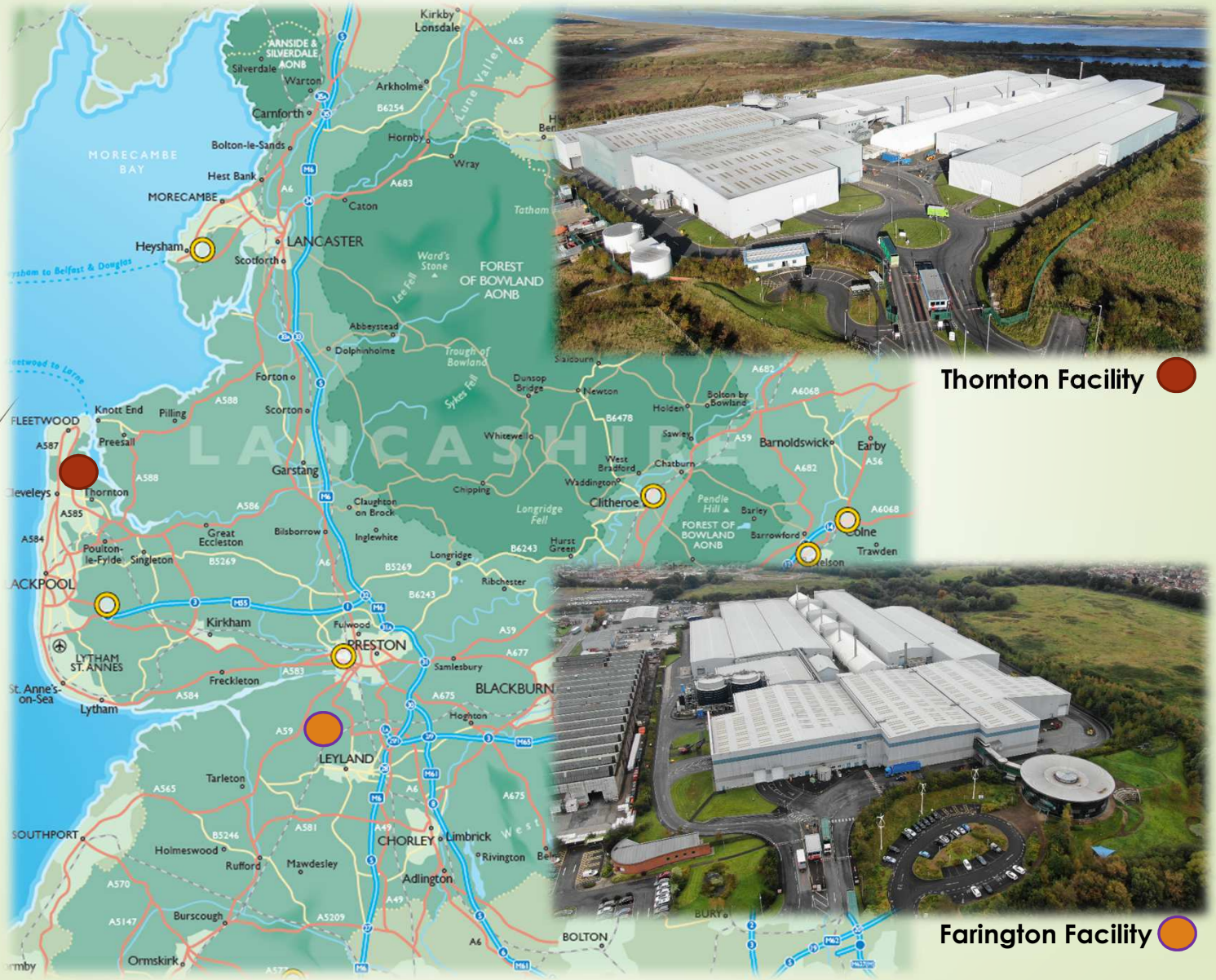
Part A

Facility Locations



LANCASHIRE WASTE

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Part A

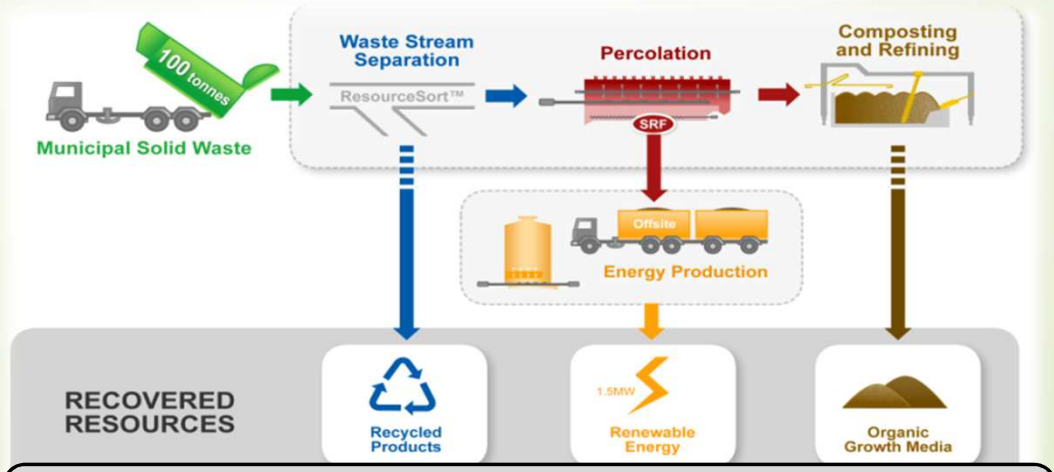
Central Waste Treatment Facility Introduction

Anaerobic Digestion Process *(Energy from waste infrastructure)*

The two waste treatment facilities are equipped with infrastructure to generate energy from waste, circa 2 megawatts electricity per hour (2 MWh) and accredited to receive Renewable Obligation Certificates (ROCs) for renewable energy generated at each facility.

The original design philosophy was to separate the organic fraction from the residual waste stream and treat via a multi stage anaerobic digestion process to generate biogas, which would then be cleaned and used to fuel the two onsite gas generators (circa 1 MWh each) and supply electricity to the facilities high voltage network to offset external supplies and grid demand.

Original design limitations and mechanical failures within the first stage of the process resulted in the caseation of the anaerobic digestion process in 2015 due to economic reasons. The infrastructure is currently unused and in a state of preservation.



Simple graphical overview of the residual waste processing operations prior to the company transformation (original design intent).

LANCASHIRE WASTE

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Part A

Central Waste Treatment Facility Introduction

Household Residual Waste Processing Operations

Further to the business transformation in 2016 and the associated changes to waste processing operations at both waste treatment facilities, the principal residual waste processing operations across the two waste treatment facilities serves to recover valuable recyclates and combustible material from the residual waste stream, to include the separation and biological drying of the organic fraction which produces a compost like output (CLO), thus diverting significant volumes of waste from landfill.

Processing operations differs between the two facilities, with Thornton facility utilizing reconfigured fixed waste processing equipment and infrastructure to treat c128,000 tonnes of residual waste annually, whilst Farington treats c57,000 tonnes annually via mobile processing equipment.

The combined annual tonnages in respect of recovered combustible waste of varying specifications is c139,000 tonnes *(fuel for external energy from waste facilities / supplementary fuel source post secondary treatment and refining)*.

Combined recyclate recovery (ferrous and non ferrous metals) equates to c3,100 tonnes annually.

The organic fraction (sub 80mm) biological drying process at Thornton facility treats c53,000 tonnes annually via the mass loss reactor and achieves approximately 45 % mass reduction through organic carbon loss and moisture loss which equates to c24,000 tonnes annually. The compost like output recovered for further offsite treatment is c14,000 tonnes annually.

Diversion from landfill at both facilities is currently in excess of 95%.

Note: The current processing operations is restricted to the tonnages represented due to the landfill contract and its minimum tonnage allocation restrictions.

LANCASHIRE WASTE

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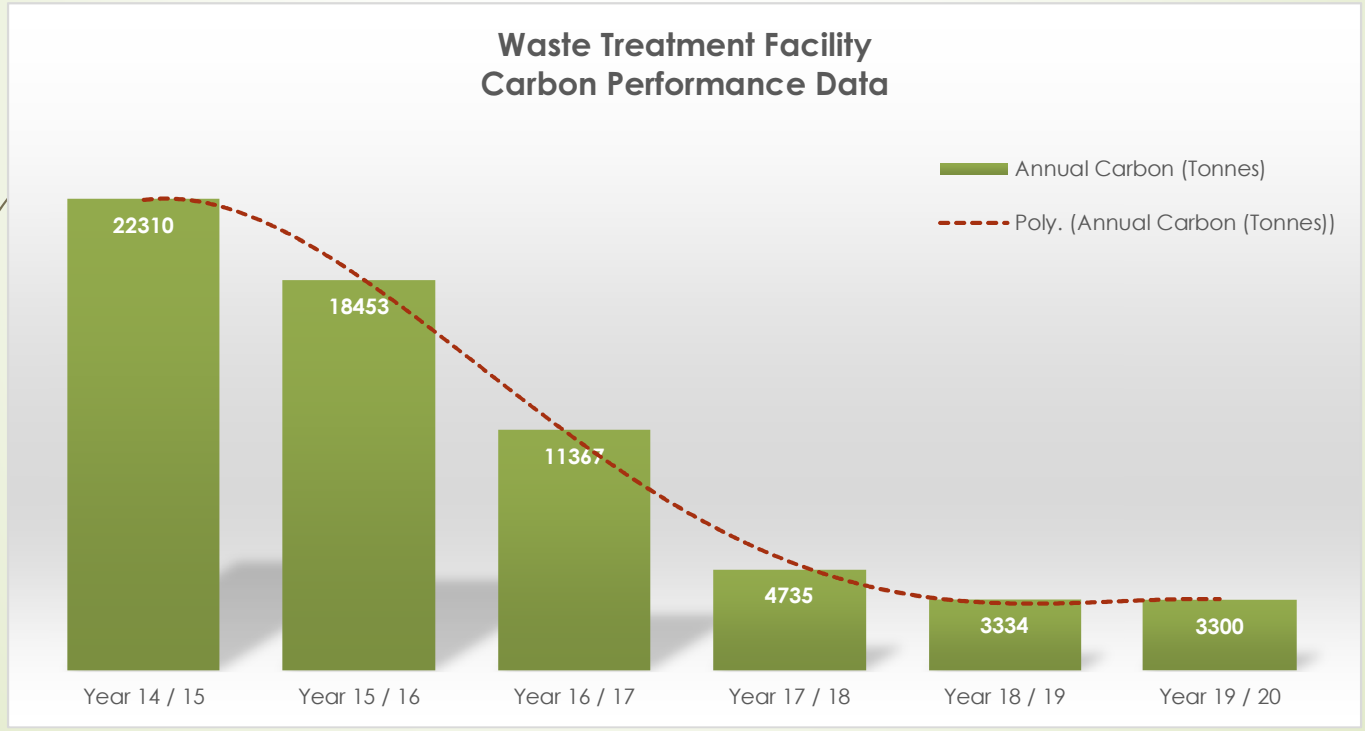
Part A

Central Waste Treatment Facility Introduction

The amount of carbon generated annually through electricity and gas supplies required to operate the two waste treatment facilities is detailed in the chart below, and acts to provide benchmarking data in respect of any future carbon reduction programmes and initiatives that may be considered and implemented. Significant carbon reductions have been observed following the phased caseation of processing activities, ramp down and stabilization of reconfigured and simplified waste processing operations over the past years.



Note: *Data presented for year 19 / 20 is a forward forecast based upon current operational statistics.*

LANCASHIRE WASTE

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Part B

Current Operational Activities *(Fuel source to the energy from waste industry)*

As outlined within part A, the combined recovery of combustible waste from the household residual waste processing operations at the two waste treatment facilities is circa 139,000 tonnes annually, which is based upon our current operational key performance indicators.

The combustible waste recovered is referred to as **Refuse Derived Fuel** (RDF).

There are currently four specifications of RDF that are recovered across the two waste treatment facilities, each having variable moisture levels and calorific values that serves to meet the requirements of the various disposal routes currently available to Lancashire County Council.

Waste derived fuel can be classified into three key elements which influence on the disposal route options available, and consequently whether additional pre treatment will be necessary via 3rd party waste processing operators prior to being sent as a fuel supply into energy from waste facilities or being used as a supplementary fuel source.

Economic Attributes
Material characteristics that will affect the economics of the fuel usage, typically moisture, colorific value and biomass content.

Technical Attributes
Material characteristics that will affect the performance of the end users combustion facility, typically chlorine and ash content to include material size / bulking.

Environmental Attributes
Material characteristics that will influence emissions to the environment, typically mercury, cadmium and other heavy metals.

Further technical guidance can be sourced from WRAP
http://www.wrap.org.uk/sites/files/wrap/WDF_Classification_6P%20pdf.pdf

LANCASHIRE WASTE

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Part B

Current Operational Activities *(Fuel source to the energy from waste industry)*

The disposal routes currently available to Lancashire County Council are direct to a number of energy from waste facilities and also to 3rd party processors, who further treat the refuse derived fuel to achieve a higher grade fuel that meets tighter quality specifications prior to being sent to energy from waste facilities and cement kilns to be used as a supplementary fuel source.

The higher grade fuel source is referred to as **Solid Recovered Fuel** (SRF) that meets the requirements of BS EN 15359: 2011.

The quality of the waste derived fuel can be defined by a number of variables, and energy from waste operators define their minimum quality requirements so that they can be accepted into their facilities and in the majority of cases will be subject to frequent waste composition analysis and testing.

The two waste treatment facilities currently recover a low specification refuse derived fuel through its basic mechanical separation and sorting processes albeit a higher specification of refuse derived fuel is recovered after the biological drying process at Thornton facility, where the organic fraction is separated, the fraction size and moisture level reduced and where a higher calorific value is achieved.

LANCASHIRE WASTE

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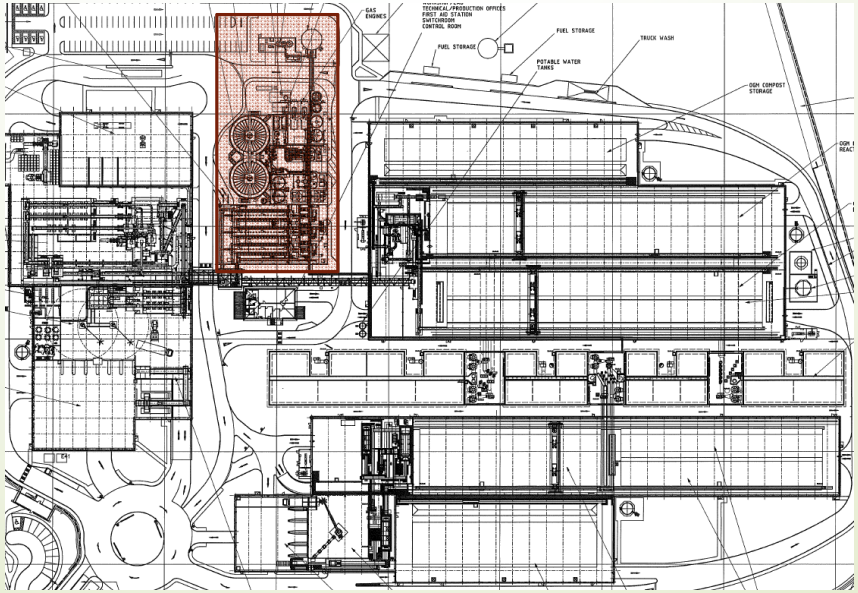
Part C

Future Carbon Reduction Opportunities & Initiatives

Further to the business transformation during 2016, the company has worked in partnership with Lancashire County Council's Waste Management Group in maximizing the utilization of the two waste treatment facilities within the restrictions of the landfill contract minimum tonnage allocation, as such to divert residual waste away from landfill and recognize the benefits of reduced disposal costs over the past three consecutive years.

The operational changes have seen a phased increase in electricity demand due to additional processing equipment and infrastructure being returned to service, however an innovative and creative approach to maintaining a basic and more simplified process has been adopted at each phase of operational expansion.

Below is the plan view of the Thornton Waste Treatment Facility and highlighted is the location of the anaerobic digestion process to which the following section of the report now refers.



LANCASHIRE WASTE

Part C

Future Carbon Reduction Opportunities & Initiatives

Waste Treatment Facility Anaerobic Digestion Process

Prior to the commencement of the business transformation process in 2016, the company commissioned a detailed feasibility study with specialist consultants to investigate options and associated costs to replace existing waste processing equipment at the first stage of the anaerobic digestion process which had proved un reliable and costly to operate, with alternative, more efficient and reliable technology that would serve to improve the economic viability of the energy from waste section of the two waste treatment facilities.

A few typical examples of the types of alternative technology presented as part of the feasibility study have been defined below;

- Pulpers and alternative screening / pre treatment equipment,
- Autoclave technology.

The proposals at the time were deemed cost prohibitive and with the uncertainty of future of the two waste treatment facilities, any further development work in respect of the feasibility studies was put on hold and no further studies have been undertaken in respect of the initial feasibility study and the processing assets and associated infrastructure remains in an unused and preserved state.

With the changes to the facility process and the associated demand on electricity and potential future separate food collection requirements, it is recommended by the company that a new feasibility and operational model be considered as part of any future work programmes.

LANCASHIRE WASTE

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Part C

Future Carbon Reduction Opportunities & Initiatives

Waste Treatment Facility Anaerobic Digestion Process

In collaboration and partnership with the Lancashire County Council Waste Management Group, 3rd party interest in the anaerobic digestion process has been realized and options to lease the energy from waste section of the facility (processing assets and infrastructure) have been presented and considered following the business transformation in 2016.

Initial consultation with the specialists indicated that the undertaking of a detailed feasibility study would be necessary to determine the viability of reconfiguring the process as such that it would serve to treat and generate electricity from the blending of non hazardous commercial / trade waste liquid feedstocks that would be suitable for an anaerobic digestion process.

Emerging government policy changes in respect of the Waste and Resource Strategy has deferred progress in respect of this particular project, however the company makes recommendation to reconsider the internal undertaking of a detailed feasibility study now that there are indications of separate food collections from government policy changes.

The current electricity demand at both waste treatment facilities has the potential to be supplied by one of the two onsite generators operating at full load, thus standby / duty configuration may be an option should the project be viable and considered for the future.

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Part C

Future Carbon Reduction Opportunities & Initiatives

In parallel to delivering the operational changes since 2016, the company has commenced investigative work in respect of identifying cost saving initiatives which are directly associated with the management and reduction of electricity at each of the two waste treatment facilities.

A number of the initiatives under investigation or in progress have been listed below for reference;

Improved Energy Data Capture, Monitoring & Reporting
Proposal received in respect of improving energy data capture, monitoring and reporting to enable improved response to variations in electricity demand.

Network Peak Demand Power Generation
Investigative work with Npower has been undertaken is respect of running the facility gas engines on natural gas to generate electricity during peak periods (referred to as Demand Side Response) and as part of a cost saving initiative. Further feasibility study work is required in respect of the costs associated with modifying the gas supply infrastructure due to being currently undersized.

Variable Speed Drive Technology
Opportunities exist to install variable speed drive technology to large induction motor applications throughout the two waste treatment facilities, as such to reduce absorbed power and match the demand of the process system for each particular application. Typical applications include, conveyors, fans and pumps.

Energy Efficient Lighting Installations
Work commenced during 2019 to undertake a lifecycle replacement of internal high bay / low bay lighting with more energy efficient LED lighting and the programme of work is expected to be concluded during 2020.

LANCASHIRE WASTE

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Part C

Future Carbon Reduction Opportunities & Initiatives

Battery Storage (Office Locations)
Battery storage options have been discussed with Npower and the company awaits further response which will be progressed as part of the next phase of works.

Solar Power Installations
Large scale solar power proposals have been received prior to the business transformation, which will be reviewed and updated as part of the next phase of works.

Process System Monitoring & Ramp Down
Further to the changes to operational activities, the company has adopted internal procedures for the close monitoring and the strategic shutdown of various process systems outside of peak operational periods. This approach has supported our commitment to controlling energy use and reducing carbon emissions and associated costs and proves the most valuable 'no cost' initiative.

Biological Drying Process Carbon Emissions Offset

One significant impact to offset carbon emissions has been the introduction of the organic fraction biological drying process at Thornton Facility, where circa 24,000 tonnes annually is being displaced via the mass loss reactor as outlined previously in the report.

The implications of this annual tonnage displacement is not only disposal cost reductions, but also waste haulage movement reductions. It is estimated that a reduction of circa 1000 vehicle movements has been realized impacting on significant fuel reductions and as such the associated carbon emissions reduction.

Whilst this actual carbon emissions offset has not been quantified to date, further analysis will be undertaken and recorded as part of the company's future carbon reduction initiatives programme and progress reporting activities.

LANCASHIRE WASTE

Part C

Future Carbon Reduction Opportunities & Initiatives

In support of Lancashire County Councils approach to a low carbon future within Lancashire, the company intends to prepare and present to the company Board a new policy and supporting programme of works for consideration at its meeting to be held in March 2020.

Particular strategic focus in respect of energy management shall be given to the following key areas:

- Preparation of mission, vision and core values statement,
- Preparation of a company energy policy,
- Preparation of operational procedures / energy manual in order to:
    - Clearly define organizational roles and responsibilities,
    - Improve the organizational understanding of energy management responsibilities,
    - Improve energy efficient technology procurement practices,
    - Improve energy data collection, recording, analysis and responsiveness to standard deviations and center line settings,
    - Investigate new energy efficient technological advancements,
    - Identify, cost, report and when approved, implement energy efficiency projects,
    - Incorporation of energy efficiency into routine maintenance schedules,
    - Train, inspire and empower staff to incorporate energy management activities in their operational activities.
    - Prepare and roll out energy awareness campaign through the use of media, posters and sticker campaigns.

Critical to the successful delivery of the new work flow will be company Board and senior management commitment and the company provides full support to Lancashire County Council in respect of establishing a low carbon future.