



Improvements in Waste Management and Recycling Waste Stream Analysis

Introduction

In November 2019 Premier Recycling Ltd were asked to undertake a compositional analysis of the general waste and recycling generated on the campus. This work was commissioned in preparation for the development of the University’s second Recycling and Waste Strategy; the results of the analysis will be used to help identify opportunities to improve the organisation’s recycling performance.

Background

The draft Sustainability Strategy includes commitments to reduce the amount of waste generated by the University, to recycle more and to deal responsibly with remaining waste.

The current contract for the management of the University’s general waste and mixed recycling expires next year. In anticipation of this the following aspiration and actions were also included in the draft Sustainability Strategy.

<u>Aspiration:</u>	<ul style="list-style-type: none"> ● Our waste contractor and service providers use the latest technologies, innovation and best practice to manage and dispose of the University’s waste.
<u>Action:</u>	<ul style="list-style-type: none"> ● We will ensure that innovation and best practice are included in the service specifications as our waste contracts are retendered. ● We will review our waste disposal practices and update in line with latest standards.

Work Streams

To achieve our aspirations there are a number of work streams that need to be undertaken:

1. Write a new waste and recycling strategy that reflects:
 - Government policy on sustainable waste management and the circular economy
 - Predicted technical innovations within the sector in the short to medium term.

2. Develop a technical specification for the new waste management contract that is based on best practice and up to date knowledge and that will allow the University to:

- Procure a flexible service so that we can capitalise on any changes in the market place
- Respond and mobilise our operational activities quickly to take advantage of new innovations and opportunities.

3. Undertake a comprehensive analysis of our general waste and mixed recycling to help:

- Understand how much of our waste is recyclable and determine our potential recycling performance
- Understand what recyclable wastes are regularly disposed of in the general waste
- Assess the viability of setting up additional recycling schemes.

Waste stream analysis

Premier Recycling Ltd are the University's current general and waste recycling contractor. Premier currently direct the general waste for energy recovery and collect recyclable materials in a mixed waste stream, which is sorted at a Materials Recovery Facility in North East Derbyshire.

The following materials are collected in the mixed recycling:

- Glass
- Metal (aluminium and steel) cans and tins
- Plastics (LDPE, HDPE and PET)
- Paper and Cardboard
- Textiles

Towards the end of 2019 Premier were commissioned to undertake a compositional analysis of the general waste and mixed recycling that is generated on campus.

Premier appointed MEL Waste Insights to analyse two bulk deliveries of waste materials (one each of general waste and mixed recycling) collected from the bins on main campus – waste from the compactors was not included in the analysis. Half a tonne of each waste stream was analysed from collections made on the 27th and 29th November.

The waste was sorted by hand into 20 material categories and weighed, the aim of which was to determine:

- How much recyclable material (i.e. those materials that are acceptable in the recycling bin) is in the general waste stream
- The level of contamination in the mixed recycling (i.e. non target materials)
- The quantities of other materials in the general waste.

This information can then be used to:

1. Determine the potential recycling rate of waste generated on campus and set realistic targets
2. Help determine the feasibility of developing additional recycling schemes
3. Tailor recycling communications to address specific issues that are affecting recycling rates.

Results and commentary

The analysis of the waste indicates that:

- 42.29% of the waste generated on campus was recyclable through the recycling collection provided by Premier
- 26.6% of the general waste was recyclable material
- The contamination rate in the mixed recycling was 9.58%.

The table below provides the detailed results of the compositional waste analysis. The rows highlighted in green are recyclable materials.

Waste materials		% of material in waste stream		
		General waste	Mixed recycling	Total in waste
Paper	All recyclable paper	2.47%	17.73%	10.10%
	Non-recyclable paper – shredded, tissue, greaseproof, shiny wrapping etc.	14.37%	4.07%	9.22%
Card	Tetrapak cartons	0.38%	0.30%	0.34%
	Coffee cups	4.05%	1.01%	2.53%
	Recyclable card & cardboard packaging	4.60%	31.54%	18.07%
	Other recyclable card inc. books	0.97%	0.66%	0.81%
Plastic film	Recyclable wrap, films & bags	11.94%	4.68%	8.31%
Dense plastic	Recyclable pet bottles	1.74%	2.85%	2.29%
	Recyclable plastic food tubs, pots & trays	2.70%	1.16%	1.93%
	Polystyrene	0.41%	0.04%	0.23%
	All other non-recyclable dense plastic and film	2.27%	0.60%	1.44%
Textiles	All textiles	4.35%	0.00%	2.17%
Misc. combustibles	Disposable nappies	0.00%	0.00%	0.00%
	All other combustibles	5.90%	0.17%	3.04%
Misc. non-combustibles	All non-combustibles	2.48%	0.00%	1.24%
Glass	All glass bottles & jars	1.21%	30.82%	16.01%
	Other non-packaging glass	0.00%	0.00%	0.00%
Metal	Tins, cans, foil & aerosols	0.98%	0.97%	0.98%
	Other ferrous	0.58%	0.01%	0.29%
	Other non-ferrous	0.00%	0.00%	0.00%

Garden waste	Garden waste	2.68%	0.94%	1.81%
Putrescibles	All loose food waste	24.23%	0.86%	12.55%
	All packaged food waste	7.85%	0.22%	4.03%
	Consumable liquids, fats & oils	2.17%	1.17%	1.67%
Fines	Sweepings < 10mm	0.81%	0.11%	0.46%
Unacceptable materials	Electrical and electronic equipment	0.82%	0.07%	0.45%
	Hazardous waste	0.06%	0.01%	0.04%

Recycling performance

The recycling rates on campus have remained around 30% for a number of years. This is the percentage of material employees and students stream in the mixed recycling bin on site. Superficially, this appears to suggest that the University is performing poorly. However, as previously noted, the compositional analysis indicated that 42% of the waste analysed was recyclable which reframes the University's performance and indicates that the organisation's recycling performance is actually quite good.

There was, nevertheless, a significant amount of recyclable materials still in the general waste stream. 26.6% of the general waste consisted of target materials for the mixed recycling. Using the average tonnage of general waste from the last four years (Aug 2015 to July 2019) this equates a little over 219 tonnes of recyclable waste being disposed of a general waste each year.

Recyclable materials found in the general waste stream	% by weight
Recyclable paper	2.47%
Recyclable card	5.57%
Recyclable wrap, films & bags	11.94%
Plastic bottles	1.74%
Plastic containers	2.70%
Glass bottles and jars	1.21%
Metal packaging	0.98%
Total	26.60%

Plastics, card and paper were largest percentage of recyclable materials disposed of in the general waste. The waste analysis does not indicate why this is the case, but is likely to be due to combination of the following reasons:

- Lack of engagement,
- Access to recycling bins,
- Confusion about what can be recycled.

Contamination in the mixed recycling represents a significant problem and results in the contractor rejecting recycling collections. A key cause of contamination is confusion about what can and cannot be included in the recycling bins. Just over 5% of the of the material in the recycling bins was non-recyclable paper and card – this consisted of tetra packs, coffee

cups, tissues, coated and greaseproof paper and card. The table below provides further information about the types of non-target material that were found in the mixed recycling.

Non target materials in the mixed recycling	% by weight
Non-recyclable paper	4.07%
Non-recyclable card	1.31%
Non-recyclable plastics	0.65%
Non-recyclable metal	0.01%
Garden waste	0.94%
Food waste	1.08%
Contained liquids	1.17%
Other	0.37%
Total	9.58%

To ensure that future recycling communications are effective, communications should specifically focus on the non-target paper and card found in the recycling and the target materials that are commonly disposed of in the general waste

Food waste

Food waste is already collected from a number of locations across the campus. Depending on the location, these collections are organised and managed by either the ARMC, ACS or The Students' Union. Collections of food waste are made from locations where food is served and prepared. Despite this, food waste accounted for a total of 12.55% of the waste analysed. Using the average tonnage of total waste from the last four years (Aug 2015 to July 2019), this could be equivalent to 144 tonnes per year.

The source of the food is likely to be the smaller food outlets, remains from catered events and the food and drink that students and staff consume whilst onsite (i.e. lunch and snacks). Given that there is a sizeable quantity of food waste in our waste and that managing food waste sustainably is a key priority for the UK Government, it would probably be prudent to begin exploring the viability of setting up food waste collections across the campus.

Food packaging and disposable food containers

As a result of the heightened awareness of the impacts of disposable coffee cups, Premier Recycling were specifically asked to determine the quantity of disposable coffee cups on the University's waste stream.

Coffee cups equated to 2.53% of the waste stream analysed which, using the average tonnage of total waste generated over the last four years, could be equivalent to 29 tonnes per year.

Other than coffee cups the waste analysis did not identify other types of disposable food / beverage containers or food packaging. These items (for example plastic glasses, plates,

sandwich wedges, food containers and film packaging) were sorted into the categories identified in the table below.

Material groups that include that food packaging and disposable food containers	% by weight
Non-recyclable paper	9.22%
Non-recyclable card	0.34%
All other non-recyclable dense plastic and film	1.44%
Combustibles (other than nappies)	3.04%
Polystyrene	0.23%
Packaged food waste	4.03%

These materials add up to 18.03%, and it is therefore reasonable to assume that food packaging and disposable food containers are likely to make up a considerable proportion of the University's non-recyclable waste.

In addition to food waste, the UK Government has identified the reduction of waste packaging as another key priority. Consequently, as an organisation the University needs to determine how it can contribute to this agenda.

Final comments

The findings of the compositional analysis of the waste and recycling generated on campus will feed in to the development of the University's Recycling and Waste Strategy, specifically it will be used to:

- Review and develop recycling targets and KPIs,
- Set out the University's objectives and plans to improve performance and stream more wastes at source,
- Develop a communications plan.