

## Case Study

## Residual Value

A pioneering MRF now recovers added value from its residuals.



The Milton Keynes MRF

**Commissioned in 1993, the Materials Recovery Facility (MRF) at Milton Keynes is one of the UK's first. After a fire in 2005, the plant was re-built and is today regarded as one of the country's top performing sites.**

The facility, which is wholly owned by Milton Keynes Council (MKC) and operated by Community Waste Ltd, processes approximately 100,000 tonnes of fully co-mingled paper, plastic and metal cans (but not glass) every year. Although the proportion of feedstock collected from businesses is growing, around 85% of inputs still come from households. These are mainly in Milton Keynes, although local authorities in Cambridgeshire, Oxfordshire, Northamptonshire, Central Bedfordshire and Aylesbury Vale are also served. In addition, source-segregated glass and cardboard enter the site for bulking up, but do not pass through the MRF sorting process.

“Almost 100% of News and PAMs are recovered in the MRF”  
Community Waste  
Director Alex Cutts

#### Milton Keynes MRF - key facts

- Owner: Milton Keynes Council
- Operator: Community Waste Ltd
- Opened: 1993 but re-built 2006
- Capacity: 150,000 tonnes per annum (3 shifts, 24 hr operation)
- Tonnage processed: Up to full capacity, 20 tonnes/hour through sorting lines
- Inputs to the sorting lines: Co-mingled municipal and commercial dry recyclables (mainly paper and cardboard, cans, plastic bottles and plastic film)
- Other inputs to the site: Source-segregated glass, OCC and rigid plastics
- Total site: 2.38 hectares including storage: 5,000 square metres undercover
- Recovery rate: 100% (94% materials, residuals to energy recovery)
- Employees: 111 (over three shifts)
- Outputs: Mainly paper and cardboard, plastics (HDPE, PET and mixed plastics), ferrous metals and aluminium from the sorting lines. Also OCC and glass, collected and bulked separately. Beverage cartons are supplied to Tetra Pak for recycling in Sweden. Aluminium foil is supplied to a local charity.



Shredded paper in residuals stream

“Since the improvements, it now takes more than two shifts to fill a residuals compactor”

Christopher Carvell,  
MKC’s Waste  
Operations Manager

**The challenge**

The Milton Keynes facility recovers materials using a positive sorting methodology. In other words, automated and manual picking processes identify and extract target materials such as paper, cardboard, PET and HDPE plastic bottles, and metal containers (i.e. steel and aluminium) from the lines while allowing unwanted items to continue. The materials which remain at the end of the process are disposed of as a residuals stream. To maintain a 100% landfill diversion rate, the MRF compacts, bales up and delivers these residuals – at a cost of around £70/tonne - to an energy from waste (EfW) plant. While positive sorting produces excellent quality outputs, until recently, MKC

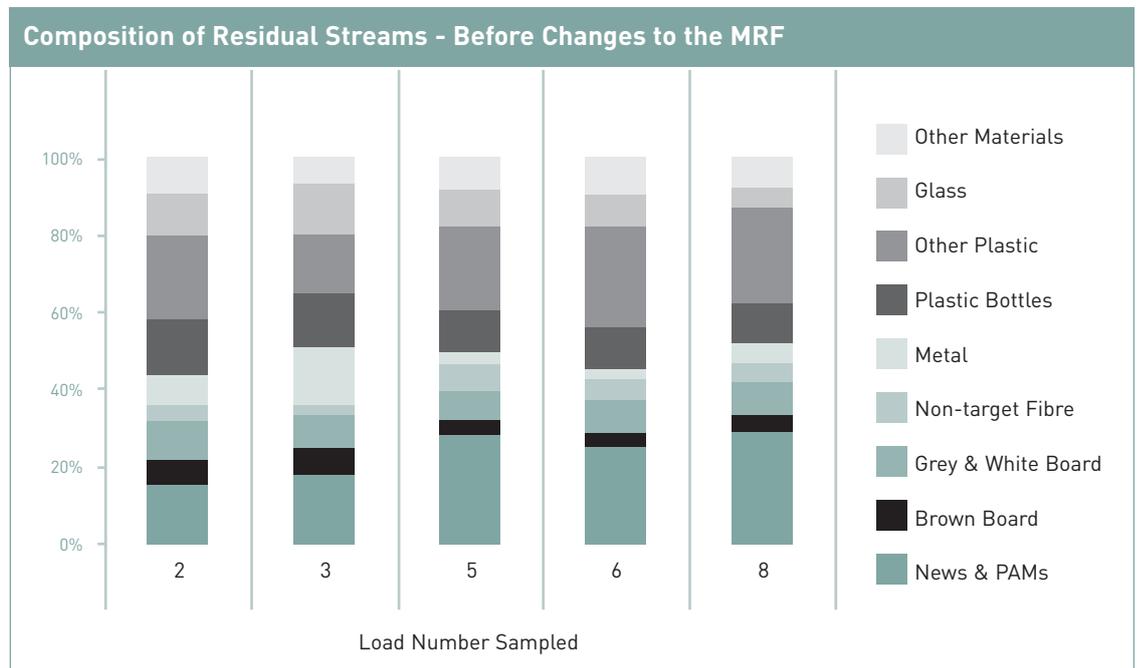
and Community Waste were not sure how much saleable material was ending up in the residuals line.

Following attendance at a workshop on effective MRF management, organised by WRAP, the MRF operators decided to assess the severity of the problem and take steps to tackle it.

**The solution**

In 2007, the consultancy Resource Futures was commissioned to analyse samples of the residual stream, at the time representing 10-12% of Milton Keynes MRF’s throughput. Before this, residuals were not checked for recyclable material prior to compaction and delivery to EfW. The sampling audit suggested that over 90% of the residual stream consisted of recyclable matter, as shown in the chart.

This result led Community Waste to carry out further in-house trials. Combining the results revealed that, averaged across the samples, the residues contained around 40% mixed plastics including bottle PET and HDPE as well as non-target packaging such as plastic film, yoghurt pots and margarine containers. Paper-based fibre – largely catalogues, single sheets and small shredded paper – comprised 30% of the residuals. About 12% were small pieces of cardboard and greyboard, while metal, especially steel cans, amounted to some 2%. Approximately 16% of the residues were actually non-target materials or fines. Depending on the time of



Source: Data supplied by Resource Futures

year, this unwanted material used to represent between 3% and 5% of the overall inputs to the Milton Keynes MRF.

“The data from the audits showed that reconfiguring and retro-fitting the lines at Milton Keynes could be financially justified to extract the fibre, metal and plastic being lost in the residuals,” says Community Waste director Alex Cutts. “So we started modifying the parts of the process where target materials were being missed.” Due to their weight, paper catalogues had been rolling away from other paper onto the containers line and were being lost into the residuals, so a manual sorting station was fitted to recover the catalogues. An air knife was also introduced to blow out other fibre, mainly cross-cut shredded paper, now fed back onto the paper line. In order for the air knife to target fibre only, other lightweight materials such as mixed plastics had first to be diverted from the residuals into a bunker. Any cardboard in the residues was also removed by the air knife. Meanwhile, Community Waste improved the recovery rate for steel cans by installing metering equipment to spread out the cans on the container line so that the overband magnets, which had been missing some cans which were clumped together with the plastic bottles, would now be recovered.

**The results**

The measures taken at the Milton Keynes MRF have delivered good results. Material entering the residual stream has been almost halved: from 10-12% of throughput down to about 6.5%. The true residuals remaining are



Pink recycling sacks in tipping bay

now mainly materials incorrectly placed in recycling bins such as glass, stone, wood, nappies, cat food pouches and other black bag waste which continue to be supplied to EfW. Even without detailed audits, the operators have noticed a difference. “Before the changes, the compactors used for the residuals were being emptied after every shift,” says Christopher Carvell, MKC’s Waste Operations Manager. “Since the improvements, it now takes more than two shifts to fill a residuals compactor.”

The economic downturn of 2008/09 has – indirectly – held back further reductions in the proportion of material diverted from the residuals. This is because the overall weight of fibre being processed at the MRF is lower due to a reduction in number of pages in a

“We started modifying the parts of the process where target materials were being missed”

Community Waste Director Alex Cutts.

**Background: Further reduction of the residuals stream**

Milton Keynes MRF has other investment plans to reduce the volume of material accidentally entering the residuals:

- **Increasing the bag splitter capacity.** The current bag splitter introduces input material into the MRF at a rate of 12tph. The flow is increased by a further 8tph using a mechanical grab which dumps more material onto the belt. However, this arrangement leads to an uneven material flow into the up-front screening kit which causes aggregation and results in less efficient sorting and materials being missed. A new bag splitter functioning at a 20tph rate will maintain the MRF’s throughput while ensuring a smoother flow of material.
- **Fitting hydraulic rams to the ballistic separators.** Two sets of ballistic separators, each using rolling decks to sort 10tph of material into three different size fractions, are used at the Milton Keynes MRF. The angles of the decks are adjusted depending on the weather to allow for the dampness of the largely paper-based material. At the moment, changing the angle takes up to 30 minutes. The new rams will enable remote adjustment on the run, reducing downtime and maximising recovery.

typical newspaper or magazine. “Almost 100% of News and PAMs are recovered in the MRF,” says Mr Cutts, “so if number of pages returns to pre-recession levels this will have the effect of lowering the residuals to about 4% of throughput.”

Prior to the changes about 40% of the residual stream consisted of mixed plastic containing non-target but potentially recyclable polymers such as carrier bags, packaging film, food trays and yoghurt pots. “We discovered that this non-target plastic – which we were diverting into a bunker – was arising in sufficient quantities for us to start marketing it,” says Mr Carvell, “so we put in a new manual picking cabin which removes over 90% of the mixed plastics in the residuals stream.” The success of this new hand-sort has encouraged Community Waste to invest in an extra optical separator for plastic. The MRF operators believe that the capital and running costs of the optical separators will be paid back within a few years. The mixed plastic recovered is being supplied to Plastics Recovery Facilities (PRFs) in the UK or is directed towards other applications such as the manufacture of construction materials.

#### Abbreviations

- HDPE: High Density Polyethylene
- MRF: Materials Recovery Facility
- MKC: Milton Keynes Council
- News and PAMs: Newsprint, Periodicals and Magazines
- NIR: Near Infrared
- OCC: Old Corrugated Cardboard
- PET: Polyethylene Terephthalate
- REL: Rear End Loader – waste compaction vehicle
- tph: tonnes per hour

#### Useful contacts:

**Bruce Terrell**, Director,  
Community Waste Ltd, 0207 373 3132

**Alex Cutts**, Director, Community Waste Ltd,  
01142 443272

**Christopher Carvell**, Waste Operations  
Manager, Milton Keynes Council, 01908 25420

All images © WRAP except MRF aerial view  
© Milton Keynes Council

While steps have been taken to ensure its accuracy, WRAP cannot accept responsibility or be held liable to any person for any loss or damage arising out of or in connection with this information being inaccurate, incomplete or misleading. This material is copyrighted. It may be reproduced free of charge subject to the material being accurate and not used in a misleading context. The source of the material must be identified and the copyright status acknowledged. This material must not be used to endorse or used to suggest WRAP's endorsement of a commercial product or service. For more details, please refer to our Terms & Conditions on our website – [www.wrap.org.uk](http://www.wrap.org.uk)

---

**Waste & Resources  
Action Programme**

The Old Academy  
21 Horse Fair  
Banbury, Oxon  
OX16 0AH

Tel: 01295 819 900  
Fax: 01295 819 911  
E-mail: [info@wrap.org.uk](mailto:info@wrap.org.uk)

Helpline freephone  
0808 100 2040

[www.wrap.org.uk/mrfs](http://www.wrap.org.uk/mrfs)