Recycling Rejects

Many businesses have made great strides over the past few years towards achieving zero waste, but often these are with materials that are easy to reuse or recycle – the real challenge comes when finding alternatives to materials deemed un-recyclable, whose only home is currently landfill or waste to energy, explains DS Smith's Mathew Prosser

Attaining zero waste is ambitious and is difficult even for easy-to-recycle materials, but the real success comes from finding a zero waste solution for those harder materials.

At DS Smith our zero waste philosophy runs central to the work we do. As a company 100 percent of resources that are collected are turned back into something useful once more.

Following and applying the principles of the waste hierarchy from the top down is integral to the DS Smith zero waste philosophy, identifying how to achieve the best environmental and economic solution. This way materials are used and reused as efficiently as possible and remain in the economy for as long as possible.

To DS Smith, zero waste means avoiding landfill at all costs. And it's not about simply relying on waste to energy as a solution for all waste streams. It should only be used as a last resort, when no other use or value can be extracted.

By treating waste as a resource, it's possible to demonstrate the true value of the materials being thrown away. It also highlights how a different approach is required – there's no one-size-fits-all solution. Different organisations and businesses have different requirements, material sources and processes. While there's overlap from some sectors, in the types of materials collected, the solution should be tailor-made for each business to ensure the best solution is found.

This will always start with finding ways to prevent the waste being generated in the first place, then looking at reuse and recycling. Collecting materials through a source-segregated system is best, generating the highest quality and value possible over the long term. It's about adopting an innovative approach to identify new opportunities to reduce, reuse, recycle and recover materials.

Reaching zero waste is not something that happens overnight. Strategic planning is essential, developing realistic and timely landfill and waste to energy diversion goals and understanding the waste hierarchy to produce waste reduction plans.

This has long been the DS Smith approach when working with customers, but it's equally important for resource management companies to practice what they preach. The setting up of a Reject Processing Centre at the DS Smith Kemsley Paper Mill is one such example, tackling some very difficult to recycle materials.

The DS Smith Kemsley Paper Mill is the second biggest recovered fibre based paper operation in Europe, with a production capacity of 800,000 tonnes per year. K-Light, the first recycled lightweight paper manufactured in the UK is produced at Kemsley Mill, alongside White Top Testliners, K-White, Brown Testliners, Dual purpose liner/fluting, K-Flex, and Standard fluting, including lightweight and Plasterboard liners.

Like any manufacturing process, while processing and producing the paper and cardboard, there is an amount of waste that arises, so a Reject Processing Centre (RPC) was established to find a better solution to the volumes. The wastes generated and subsequently used in the RPC are 12,000 tonnes per annum of ragger and 29,000 tonnes per annum of light rejects.

Baling wire has been a problem ever since it has been used to secure bales, even though it's the most efficient way to transport and store bales. Ragger rope is a by-product of the paper pulping process, containing baling wire as well as plastics (mainly retail film) and fibre. For many years businesses have thought ragger was unrecyclable and could only go to landfill.

Light rejects, the by-products of the various screening processes, comprise of metals, plastic and fibre that can be separated using equipment.

DS Smith partnered with local resource management and recycling company Countrystyle Recycling Ltd to trial different pieces of equipment and machinery to separate and recycle all these components. Countrystyle has worked with DS Smith since 2011 and understood its desire to achieve zero to landfill in relation to certain mill waste streams. The two companies, alongside Countrystyle's sister company FGS Agri, collaborated to carry out on-site trials to identify the best shredder and screener technology to separate the component parts of ragger and light rejects. Various technologies were tested; shredders capable of handling large ragger sizes as well as screening technology to ensure the fractions were of high enough quality for further recycling or re-processing.

The aim was to reuse as much of the extracted fibre back into the process. It was important to recover the valuable quality wet fibrous material (WFM) required for use in the on-site paper making process and the plant had to be capable of handling all the current arisings with capacity to handle future production increases.

The trials included determining whether a static or mobile processing solution was the best option; identifying a sufficiently robust shredder to deal with the resistance of the ragger cable and composition of the combined ragger rejects; and developing successful grading of the flip flow screen in order to achieve the quality output of WFM.

A single shaft heavy-duty shredder fitted with six rows of mobile blades and associated over-band magnet, conveyors and flip flow screening deck from MTB Recycling Fr was installed to separate out the wire, plastic and fibre from the ragger.

In addition to the investment in the equipment and machinery, an area on site was made suitable for processing by laying a concrete floor. In all an investment of approximately £1.5m has been spent on the RPC.

Following a successful installation and commissioning of the ragger line, Countrystyle/FGS Agri operate the ragger/light reject processing line, providing DS Smith with WFM for reuse, high concentrated plastics for recovery at the on-site E.ON waste to energy plant and revenue from the recycling of metal, including ragger wire.

The separated wire is sent for recycling, moving from a cost to the business to a revenue earner. In one month alone this has generated £20,000.

The plastics that have little value in this condition are sent to the E.ON waste to energy plant to be turned into fuel as a high concentrated plastic. The remaining plastics are mixed with sludge from the mill effluent process and used to produce steam that is used back in the papermaking process. The remaining fibres – the WFM – go back into the mill paper process to be re-used as good fibre.

Nothing To Landfill

OVER A six-month period the results show how this landfill diversion project is working:

- Ragger – 9,000 tonnes in six months
- Light Rejects – 10,000 tonnes in six months (both materials inputs)
- HCP – 8900 tonnes in six months
- Metal – 1250 tonnes in six months
- WFM – 2250 tonnes in six months (all materials outputs)

In addition, 75 percent of all WFM output consists of usable fibre, capable of being reused within the paper making process at the mill. Overall the project is delivering over £500,000 of benefit with nothing going to landfill.

The design and build arrangement with MTB included comprehensive training of all operational staff, enhanced by a repair and maintenance agreement. The maintenance of the shredder blade integrity is key to the success of the ragger processing line. It has only been after periods of intensive operation of the shredder that a true understanding of the harshness of the feedstock has been achieved and the importance of regular blade changes and rotation understood to achieve maximum throughput against a tight feedstock input timeline.

The plan is to maintain high levels of processing and targets have been agreed to attain a higher throughput. But the success of finding a use for materials previously deemed un-recyclable means additional trials are planned using other waste materials from the mill. With new innovations, materials, such as machine felts, could be processed through the RPC to divert further material away from landfill.

There is the potential to extend the solution to other mills within the DS Smith group across Europe as well as increase volumes via third party agreements. Technological developments and trialling different processes have proved that new uses can be found for a variety of materials, keeping them within the production cycle for as long as possible.

Finding a zero waste solution for all materials isn't easy, and it is often a real challenge. But as this project at Kemsley Mill shows, there are plenty of opportunities and benefits to businesses in working hard to find new innovative zero waste solutions. ■

The Author

Mathew Prosser is European commercial director for DS Smith's recycling division and has worked for the company since 2007. Prior to joining DS Smith, Mathew worked at P&O Transport, The Mirror Group, Cadbury's, and Biffa PLC, where he gained 22-years' experience in the resource management industry. Mathew is also a trustee of environmental charity Keep Britain Tidy.