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PLASTICS RECYCLING UPDATE

GOOD THINGS IN SMALL PACKAGES?

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Cosmetic tubes, bottle caps, and other "little guys" in the mixed rigid plastics stream are generally passed over by recycling facilities. Our authors analyze recovery barriers for these materials and offer ideas on moving forward.

Rigid plastics help create the economic foundation of the municipal recycling value chain. While coveted polyethylene terephthalate (PET) bottles and natural high-density polyethylene (HDPE) milk jugs still make up the majority of those rigid materials, the evolving waste stream now contains a much more complex mix of rigid materials.

Because of the increased use of plastics in consumer goods, single-stream materials recovery facilities (MRFs) are being pushed hard to divert these materials. MRFs may not be sufficiently equipped to handle this fast-changing stream, and robust end markets for some types of plastics do not yet exist. But, still, the door is open like never before to recycle a host of mixed rigid plastics in many community programs.

The mixed rigid bale has become the repository for many plastics that don't have their own single resin bale. And for the industry to move forward in recovering plastics that may be missed or undervalued in current operations, one component of that bale is worth extended focus: smaller rigid plastic packaging, a stream that is literally falling through the cracks at MRFs.

Universe of small rigids

Small rigid containers include aspirin and vitamin bottles, cosmetic containers, and personal care products such as deodorant, toiletries and lip gloss dispensers – not to mention the ubiquitous travel size of everything. The universe of small rigid plastics also includes small toys and office products like pens and small containers.

These products are typically made from HDPE, polystyrene, polypropylene and other resins. MRFs are reluctant to take these rigids because of their size, the diversity of resins in product packaging and the lack of markets for the recovered materials. It is also unclear if the volumes are significant or pure enough (in terms of resin composition) to make it economically viable to recover them.

Despite those facts, however, a number of drivers are pushing for more recycling of plastics of all kinds. The 2011 GfK Roper Green Gauge report, for instance, analyzed consumer attitudes and behavior over a 20-year period. Relying on a 1990 baseline, it documented a growth of 58 percent in the willingness of Americans to sort garbage from recyclables and a growth of 29 percent in their willingness to purchase products made from or packaged in recyclable material.

Manufacturers and end users of plastic packaging also feel pressure from their customers. For instance, Walmart is focusing on plastic packaging by using its sustainable product index to recognize the use of post-consumer recycled content and packaging designed for recyclability. This widespread attention on plastic packaging has invited deeper investigation of the barriers to its recycling. Johnson & Johnson's Care to Recycle program is such an example. With an emphasis on recycling the products found in the bathroom – many of which fall into the small rigid category

– Johnson & Johnson has supported its program with a study that demonstrates the importance of bin locations in the home outside the kitchen.

There are other important factors driving the recycling and recovery of more plastic products. A recent article in the journal Science estimated that in 2010 the amount of land-based plastic that entered the marine environment was between 4.8 million and 12.7 million metric tons. Researchers suggest this number could double over the next decade if waste management practices are not improved globally.

Regulators are taking notice. Several state legislatures in recent years have seen the introduction of extended producer responsibility bills for product packaging, and R.I. lawmakers this year have been presented EPR legislation that is tied to marine debris reduction (at press time, it is in a finance committee).

These pressures add up to increasing demands from brands, retailers, NGOs and consumers looking for materials management answers for plastic packaging, including small rigid plastics.

Envisioning a solution

This leads to an increasingly prevalent industry question: How do we add new materials to existing sorting systems without eroding business models? At MRFs, the solution has been to sort everything into a mixed rigid bale. But now may be the time for processors to consider ways to repurpose the current recovery system to optimize the value of the current material mix.

In the wake of China's Green Fence crackdown on dirty bales and other market quality initiatives, MRFs are being forced to adapt, and in so doing they must try to balance multiple goals: adding economic value, limiting contamination to other commodities and ensuring recovered materials can be reused in new products. If MRFs are to successfully bring small rigids into their models in a larger way, they need to know there's enough value in the mix of material to justify sortation, and they need to develop a means to make that sort happen. What might a solution look like?

The main issues with small rigids at the MRF are, not surprisingly, the size of the products and the resin composition. Single-stream processing systems are set up to separate materials first by size and shape and then by material type. That works well when separating paper from soda and detergent bottles, but smaller plastics present difficulties.

The majority of single-stream systems have equipment for breaking glass and removing it, and this step generally comes soon after rigid containers have been separated from the paper stream. The screening step of this process will send most objects that are less than 2 inches in diameter to the glass cleaning system, where it will end up with glass or with residue items (such as labels and other miscellaneous materials). Thus, in the current MRF system, small rigids are unlikely to be recovered, but it is not far-fetched to think that they could be.

Glass reprocessors could offer one answer. These operations already receive significant amounts of plastic in the form of bottle caps, and they could begin to focus on recovery of plastic materials, especially if those plastics became a larger percentage of what MRFs send them. Glass reprocessors already use magnets and eddy currents to separate out metals, and some operations employ screens to separate plastics from paper so that the paper can be marketed as a fuel pellet.

An additional step could be added to optically sort the plastics so that they could be baled and marketed. This would require a significant capital investment, and it's one that so far glass reprocessors have not been driven to make.

MRFs could potentially add an optical sorter for the same purpose as part of the glass cleanup system. However, sufficient volumes and markets would need to be available to justify the capital investment.

In either case, the material would likely be marketed as part of a mixed plastics bale until there was enough of a single type of material to make a product grade. In order to ensure that at least the majority of the plastics in the bale are recycled, further investments in plastics reprocessing facilities may be needed, and work would be needed in market development. Polypropylene has well-established end markets in the U.S., but that's not true for all resins showing up in mixed bales.

The issues of sortation and market development can be addressed in sequence. Once we determine how to reliably separate small rigid materials at a MRF, we can assess whether doing so affects the integrity and value of the Nos. 3-7 plastics bale. Then further investigation can be made with glass reprocessors to determine if these plastics can be economically separated from the glass stream. Finally, understanding the value of the mix of plastics that would be created and solidifying the end markets for those materials will be required to ensure economic sustainability.

Another solution has been partially developed outside the MRF sphere. Brands have taken action through individual efforts to develop take-back programs for cosmetic packaging and for personal care products like deodorant. Since 2009, for instance, the Origins bath and body brand has offered a Reuse Reduce Recycle program that leverages collection through retailers. The program accepts empty cosmetic tubes, bottles and jars – regardless of brand.

Similarly, Estee Lauder brand Aveda started its Full Circle program in more than 100 of its retail stores in 2013. Aveda is focusing on packaging and products not commonly accepted in recycling centers – bottle caps, makeup brushes, tubes, compacts, pumps, and certain bottles and jars. And Unilever began a pilot program in 2012 to test the feasibility of recycling polypropylene deodorant packaging.

Collective action, shared need

There are a lot of small rigids in the marketplace, but assessing the economics and feasibility of recovery requires the effort of those with shared interest in the solution – this group includes end users of packaging and all players in the recovery value chain.

Collaboration is becoming a common strategy for some simple reasons. Expert knowledge from across the value chain is required, and scale is needed to demonstrate the viability of required change, especially when no one company or product has a big enough position to create change on its own. In addition, transformation of the recycling system is challenging, takes time and requires multiple stakeholders pushing innovation. By working together and sharing resources, stakeholders increase the chance of success and reduce investment and risk for all.

On the small rigids front, the industry would also be wise to look to other materials that have been successfully integrated into recovery over the years. Such experiences show us understanding the end market value of the material and developing technology solutions will be needed before fully opening the door to consumer participation.

With the right initiative, perhaps small rigid plastics can become another example of a hard-to-recycle material transitioning into a reliable (and profitable) recycling feedstock. PRU

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