



Collection of Rigid Plastics and Packaging for Recycling

Introduction

The primary method to collect rigid plastics and packaging for recycling is known as “Curbside Single Stream Collection”. This is where all recyclable materials - plastics, paper, glass, and metals- are placed in a single collection cart by homeowners. Trucks collect the contents of the carts and transport materials for recycling to a Municipal Recovery Facility (MRF). In the United States, there are hundreds of single stream MRF’s that each serve a municipal or regional area. The APR’s discussion of collection focuses on single stream collection and the APR Design™ considerations that are involved in handling material at an automated single stream MRF.

Materials are sorted at a MRF both manually and with automated equipment to recover individual streams of materials desired for recycling. The individual plastics recovered most often at a MRF are Polyethylene Terephthalate (PET) packaging, High Density Polyethylene (HDPE) plastics, and increasingly, Polypropylene (PP) plastics. MRFs compress sorted materials into bales of each material that are sold to companies, called reclaimers, who create postconsumer plastics from the bales. The bales are the “raw material” used in the recycling process.

The cost of trucks, fuel and labor can be a substantial portion of recycling costs. Single stream collection continues to grow, because it provides the most economical approach available today for collecting materials for recycling.

Other methods that have long been used to collect rigid plastics and packaging for recycling include:

- Local drop-off centers.
- Deposit redemption for PET beverage containers.
- Source separation where individuals sort materials into different bins.

There are also alternate approaches to collecting plastics for recycling that are in early stages of use and the industry is watching to see if these grow, or only find limited applications. These alternate approaches include:

- Three separate bins used for recyclables, for food waste, and other waste.
- Wet and dry utilizes two collection containers. One cart for dry materials, including recyclables, and another for wet materials such as food and yard waste. Separating wet from dry will have the least impact on dry paper products that can be recovered for recycling.
- Mixed Municipal Waste Recovery (MMWR) utilizes a collection system where all recycling and waste materials, wet and dry, go into a single cart and sorted at a MRF.



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These alternate approaches rely on the highly automated sorting process equipment used for single stream recovery. The APR Design™ considerations for single stream recovery will also be applicable to any of the alternate approaches as well.

The potential benefits of these new approaches are even lower collection costs, as well as higher recovery rates of materials for recycling, transforming waste to energy, anaerobic gas generation, and composting. As a result there may be lower amounts of materials going to landfills. Skeptics are concerned about the impact of contamination in waste streams on the value and volume of materials recovered for recycling in these newer approaches. The industry will be watching these new approaches closely.

Overview of Single Stream processing at a MRF

The details of processing at a specific MRF are influenced by the installed equipment as well as the end markets a MRF has for sorted materials. This discussion takes the view that PET, HDPE and PP are recovered as the primary rigid plastics for recycling.

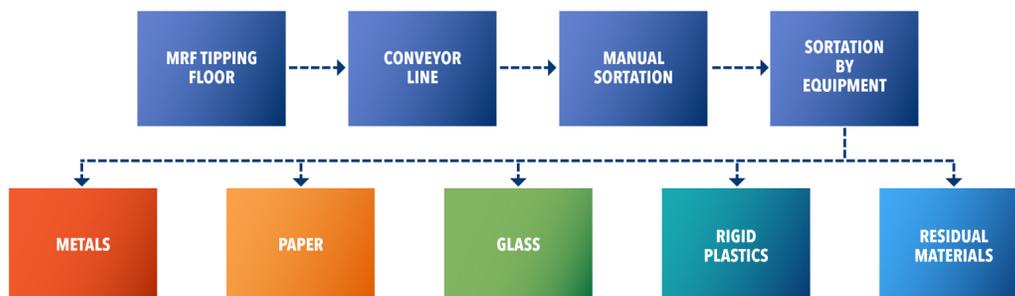
The two flow diagrams below break down recovery of rigid plastics at a MRF into two segments:

Segment 1: Create a stream of mixed rigid plastics separated from metals, paper and glass.

Segment 2: Sort the plastics to create separate streams of PET and HDPE. MRF's are also beginning to sort PP articles so the discussion below includes PP sorted at a MRF.

Segment 1: Create stream of mixed rigid plastics

The process starts when trucks deliver curb side collection to the “tipping floor” of the MRF. Materials are moved from the tipping floor to a conveyor where manual sortation and automated equipment create sorted streams.





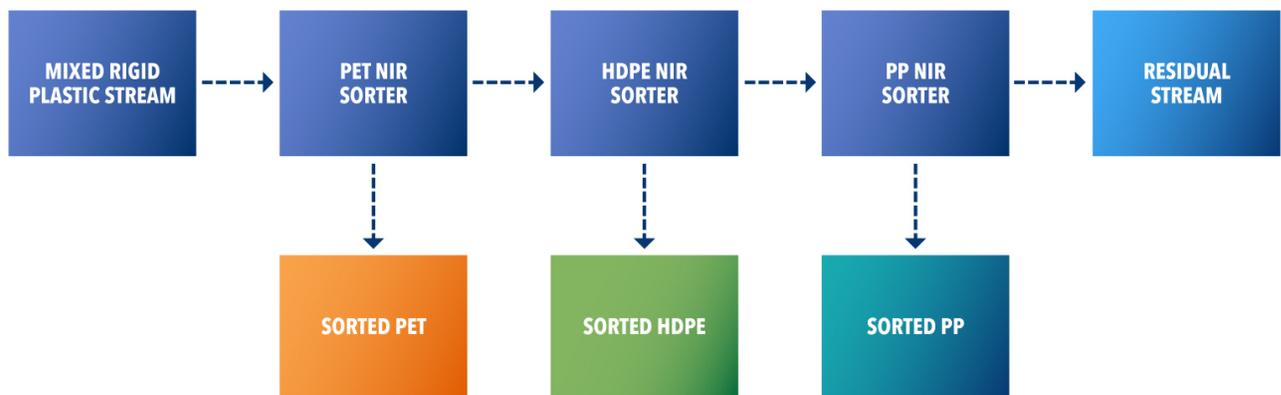
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During this first segment, there may be some rigid plastic materials that are not recovered for recycling:

- **Large Items:** There may be items that are too big to be accommodated on the conveyor line. For guidance, items bigger than a two gallon pail in size are likely to be hand sorted off the conveyor line at a MRF. Increasingly, MRFs will bale these so-called “bulky rigids” made from HDPE or PP and can find markets for them.
- **Small Items:** Items about the size of a 150 ml bottle or less are small enough to be at risk for not being conveyed through the process and lost at process steps required to remove glass as well as small size debris and contamination less than about 2 inches in dimension.
- **Metal attachments limit collection:** Part of the sorting process uses magnets to separate steel and eddy current units to separate aluminum. Plastic parts with metals may get ejected with the metals, or may get sorted out by hand.

Segment 2: Create streams of PET, HDPE and PP

In a modern MRF, units called Near Infrared (NIR) optical sorters are used to sort the rigid plastics stream. The NIR unit can positively identify an individual plastic resin used in an article by its infrared signature, and then eject that article from the mixed stream into a sorted stream. There is typically one sorter set to identify and collect each of PET, HDPE and PP.



The sorted rigid plastics can be compressed into bales that weigh 500 to 700 kg each. Bales will include the targeted plastic, along with any attachments, closures or labels found on the plastic. These bales are sold to reclaimers.



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Notes about NIR sortation:

- The NIR auto-sorters are very effective, but not perfect! They will miss some desired materials that end up in the residual stream. Some unwanted material may end up in the sorted product.
- NIR sorters cannot detect plastic articles colored black. These items will be passed to the residual stream.
- Articles with large labels, heavy opaque ink, coatings or multi-layer products may not be read accurately by the NIR unit.

What happens to the residual plastics stream?

Each MRF decides what to do with the residual based on their local conditions and market opportunities.

Options include:

- The residuals may be hand sorted at the MRF to recover any desired materials.
- Residuals may be baled and:
 - Sent to a PRF, or Plastics Recovery Facility, that specializes in getting the most market value from the residual stream. A PRF can extract PP for those MRF's that do not sort out PP articles. PRF's can also extract valuable HDPE or PET that was missed at the MRF. A PRF may also develop markets for other 3 – 7 plastics included in the bale.
 - Sold for export.
 - Land filled.
- Residuals may be used in waste to energy facilities.