TOP 10 PACKAGING CHALLENGES FOR RECYCLING IN A MATERIAL RECOVERY FACILITY

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Disclaimer

THE PURPOSE OF THIS WHITE PAPER IS TO PROVIDE INFORMATION THAT IS PUBLICLY AVAILABLE SO THAT READERS CAN MAKE INFORMED INDEPENDENT DECISIONS ON ANY ACTIONS THEY MAY CHOOSE TO UNDERTAKE. THE CONCLUSIONS AND VIEWS EXPRESSED IN THIS REPORT DO NOT NECESSARILY REFLECT THE VIEWS OF EVERY PAC NEXT MEMBER COMPANY OR AFFILIATE.

INTRODUCTION

The PAC NEXT Leadership Council agreed to initiate a project that informs stakeholders, especially packaging producers, about end-of-life challenges for the recycling of packaging materials at a material recovery facility (MRF). The information provided in this white paper aims to (1) answer questions regarding why a package may or may not be considered recyclable, (2) share knowledge on how MRFs operate while helping our membership avoid unintended consequences, and (3) better understand what issues can be resolved through improved communication and education.

The information provided in this white paper, “Packaging Challenges for Recycling in a Material Recovery Facility,” is publicly available and is intended to educate readers so that they can make informed independent decisions on any actions they may choose to undertake. The purpose is to share information and initiate conversation between stakeholders in the packaging value chain so that they can make informed decisions regarding packaging designs and understand what happens to those packages in a MRF. Since every MRF is different, the challenges that a MRF experiences vary as a result. Hence, the information presented in this document is subject to changes as (1) investment in MRF technology and infrastructure changes, and (2) as new and different materials are added to the curbside collection systems.

While this paper only looks at recyclability issues for packaging, we recognize that recyclability is only one of many different priorities that companies have to address when designing packages. Many more details have to be balanced to produce a package that will meet all the technical criteria and be successful in the market, for example, packaging performance, product compatibility, consumer acceptance, manufacturability and cost. The hope is that this paper will give packaging designers more information about end-of-life challenges so these can be considered as well.

PAC NEXT is a material neutral organization that is committed to finding solutions for the recovery of all materials. We acknowledge that there are a variety of organizations currently working to address the recycling challenges noted in this body of work. PAC NEXT also supports an integrated approach to waste management where recycling is just one of several recovery solutions. PAC NEXT recognizes that energy-from-waste (EfW) is not recognized as waste diversion in some regions at this time due to legal restrictions or local regulations.

The PAC NEXT project team consists of multiple stakeholders in the packaging and recovery value chain. The team selected the following packaging types to analyze and understand what happens to them in a MRF:

- Multi-layer laminates
- Compostable plastic
- Black plastic containers
- Full shrink-wrap label
- Hot beverage polycoated cups
- Metallized tubes
- Single-serve hot beverage pods
- Colored opaque PET
- Non-PET clamshells
- Cardboard tray with plastic film

We thank all members for their support and generous contribution of knowledge and expertise.

RECYCLING CHALLENGES IN A MRF

MULTI-LAYERED LAMINATES

Examples: Zipper and stand-up pouches/bags, foiled wrappers

Current State:

What happens to this material today?

- This type of packaging is comprised of multiple plastic resins (and foil) and is currently not accepted at curbside by municipalities. However, consumers are putting these materials into their curbside recycling bin.
- Due to its flat shape and light weight this packaging material tends to behave like paper and flows through a MRF with the paper stream, and therefore, can contaminate the paper stream.
- It requires manual sorting to remove the laminated plastics as today's optical sorting technologies are not proven in removing all contaminants from the fiber stream. When removed at the MRF, these packages typically end up in residuals that go for landfill or energy-from-waste.
- There is no large scale end market for this packaging type at this time.

What is being done about it?

- There is potential for specialty end markets such as engineered fuel, lumber core, fuel substitution in cement kilns, and other industrial uses.[1] Today, it is more practical using post-industrial materials compared to highly contaminated post-MRF residuals.
- There is an ongoing debate regarding the pros and cons of energy-from-waste (and whether it counts as diversion) across the provinces and municipalities
- Several municipal pilots have been run across North America. Most recently in Citrus Heights, California where an Energy Bag Pilot Program[2] collects non-recyclable plastic packaging at curbside to be separated at a MRF and sent to a nearby EfW facility
- TerraCycle's Drink Pouch Brigade® collects a small percentage of this material and recycles them into various products in the US[3] and Canada[4]
- Ongoing technology developments:
  - Enval technology in the UK has the ability to recover aluminum from laminated packaging[5]
  - New plastics sorting technology is being investigated to determine whether it may help to create a value stream

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1 http://www.plastics.ca/_files/file.php?filename=file_Final_Flexible_Film_Report.pdf
2 https://www.youtube.com/watch?v=843FiG1MPg0
3 http://www.terracycle.com/en-US/brigades/drink-pouch-brigade-r.html
4 http://www.terracycle.ca/en-CA/brigades/drink-pouch-brigade.html
5 http://www.enval.com/

Future outlook

This packaging category is here to stay with significant forecasted growth over the next several years with US demand for pouches growing approximately 7% annually to reach almost 24 billion units in 2018.[6] As a result, MRFs are observing an increasing presence of this material being collected at curbside. Until there is a viable end market available, these materials are likely to continue to end up in MRF residuals.

For more information:

Canadian Plastics Industry Association, Continuous Improvement Fund and Stewardship Ontario. (2013, February). Analysis of Flexible Film Plastics Recycling Diversion Systems.
http://www.plastics.ca/_files/file.php?filename=file_Final_Flexible_Film_Report.pdf

Canadian Plastics Industry Association. (2013, January). News Release: Valuable Alternative Source of Energy Going To Waste.
http://www.plastics.ca/_files/file.php?fileid=newsSvhkIDlPbA&filename=file_NR_VALUABLE_ALTERNATIVE_SOURCE_OF_ENERGY_GOING_TO_WASTE.pdf

The Dow Chemical Company. (2014, May). Citrus Heights to Kick-Off "Energy Bag" Plastics-to-Energy Pilot Program with Community Announcement Event.
http://www.dow.com/packaging/news-events/2014/20140515a.htm#.VBnZP0g030Q

WRAP, Stephen Slater and Trevor Crichton, Oakdene Hollins Ltd. (2011, September). Project Report: Recycling of laminated packaging.
http://www.wrap.org.uk/sites/files/wrap/Recycling%20of%20laminated%20packaging.pdf

Plastics News. (2014, June). UK leaders fund study on ways to increase laminated packaging recycling.
http://www.plasticsnews.com/article/20140624/NEWS/140629970/uk-leaders-fund-study-on-ways-to-increase-laminated-packaging-recyling

[6] "The US Market for Stand-Up Pouches to 2018", PCI Films Consulting Ltd. as cited in http://www.plasticstoday.com/articles/us-stand-pouches-continuing-growth-path

COMPOSTABLE PLASTIC
Examples: Takeout and single-serve containers, trays, cups, cutlery


Current State:
What happens to this material today?

- This packaging is primarily polylactic acid (PLA) and is generally not accepted at curbside for composting in food and yard waste composting programs.* Due to its similar physical appearance to clear PET and PS, it does end up in the recycling box.
- Where a facility uses optical sorting equipment, the PLA would end up with the mixed plastic as the PLA is easily distinguishable from PS or PET. Where a facility uses manual sorting, it is possible that, due to its similar look to PET, it will inadvertently be sorted into the PET stream. Unlike PET, both PS and PLA tend to crack and break apart in the MRF. This characteristic can assist in distinguishing PS and PLA from PET. However, as most plants do a negative sort of mixed plastics, which includes PS, the PLA would end up in that mix.
- All colored PLA would most likely end up in mixed plastics as typically PET thermoforms are only clear.
- Currently not enough of this material is being generated to significantly contaminate bales (less than 0.1% of any PET bale), though it can be sorted with optical sorters if volumes increase. PLA carries a very different signature from PET or PS and therefore it is easy to identify with optical sorters.
- Re-processors can separate out the PLA from PET bales using optical sorters. They cannot use the sink-float separation technology typically, as both PET and PLA sink in water (they would have to use different liquids with very tight specific gravities in order to separate PET from PLA in a sink float system).
- Some end markets exist to recycle this material but are limited. Typically, PLA either ends up in fuel, energy-from-waste or to landfill.

What is being done about it?

- PLA resin is no longer sold into the beverage bottle market in North America so there is little chance of significant PET contamination.
- Efforts are underway by resin producers to develop and grow collection and recycling strategies for PLA, which like many other resins has the ability to be recycled if kept separate or sorted out of conventional plastic streams.

*Note: A significant number of the rigid compostable single-use foodservice products now on the market have been tested by industrial composters and will break down, once shredded, in the shorter (45- to 60-day) process times used by these facilities. However, some products in this category do not meet this standard and because of this uncertainty, many composters are unable to currently accept compostable foodservice ware. However, as the composting infrastructure grows, the number of industrial facilities that accept compostable plastics is also expected to grow.

Future Outlook

PLA needs to be sorted separately from other resins with focused attention on recycling rather than composting. Given that there is not sufficient PLA coming into the waste stream today the cost of separate collection at a MRF cannot be justified in the short term. As PLA applications grow[7] there is an expectation that this will change.

For more information:

European Bioplastics. (2014, February). Fact Sheet: Bioplastics – Furthering efficient waste management.
http://en.european-bioplastics.org/wp-content/uploads/2011/04/fs/EoL_eng.pdf

Environmental Leader. (2013, August). "How Sports Teams Divert Waste Using Bioplastic."
http://www.environmentalleader.com/2013/08/26/how-sports-teams-divert-waste-using-bioplastic/

[7] http://www.natureworksllc.com/The-Ingeo-Journey/End-of-Life-Options/Case-Studies

BLACK PLASTIC CONTAINERS

Examples: Takeout and ready-to-serve containers, nursery pots and trays

Current State:

What happens to this material today?

- This packaging is variably accepted at curbside.
- Black plastic is not identifiable by optical sorters because it is undistinguishable from the belt and therefore needs to be manually sorted. Otherwise, it may end up as residue for landfill or energy-from-waste.
- End markets exist primarily for single resin types, although this packaging is often comprised of multiple resins in one package. This packaging can be added to mixed plastic bales.

What is being done about it?

- Manual sorting is labor intensive and expensive and some materials simply do not get picked from the conveyor systems. Where possible, alternative colored materials (other than black) should be used to facilitate optical sorters capturing more materials for mixed plastic bales.
- It should be noted that many black plastic containers (particularly nursery containers) are made from recycled plastic which have a tendency to be grey / black in color and are made of more than one resin further complicating effective recycling. However, for food tray applications made of PET or PP, recycled content is not typically used and alternative colors would be a viable option.
- Optical sorting technologies are being explored that would require the use of an additive that can be detected by Near Infrared (NIR) technology[8]

Future outlook

There are ongoing developments to improve sorting technologies to recover this material. Packaging design should consider other color options if black can be avoided (while still maintaining the high recycled content typical in much of this packaging, particularly in nursery applications).

For more information:

WRAP. (2011, September). Development of NIR Detectable Black Plastic Packaging.
http://www.wrap.org.uk/sites/files/wrap/Recyclability%20of%20black%20plastic%20packaging.pdf

WRAP. (2013, July). End Markets for Recycled Detectable Black PET Plastics.
http://www.wrap.org.uk/sites/files/wrap/End%20Markets%20for%20black%20rPET%20report.pdf

WRAP. (2014, July). Recyclability of Black Plastic Packaging.
http://www.wrap.org.uk/content/recyclability-black-plastic-packaging-0

[8] http://www.europeanplasticsnews.com/subscriber/headlines2.html?cat=1&id=2540

FULL SHRINK WRAP LABEL

Examples: Full-wrap labels or sleeves on rigid bottles and some closures

Current State:

What happens to this material today?

- This packaging is generally accepted at curbside.
- A full-sleeved HDPE bottle may or may not end up in the HDPE bunker. As the sleeves are typically non-HDPE, the optical sorters may eject the HDPE bottle based on the resin of the sleeve, e.g., PETG. However, most equipment manufacturers report the optical sorters will detect the HDPE with a PETG label because the PETG is very thin. If sorting issues occur, it may be possible to modify the settings on the optical sorter.
- In the event an HDPE bottle with PETG labels are missorted, it would be up to the QC sorter to redirect it back to the sort line where it could be manually sorted into the HDPE bunker. In a smaller facility where the containers are manually sorted, sorters would learn to associate a specific brand with a specific resin and sort the container into the appropriate bunker. In this case, the full-sleeved HDPE bottle would end up in the HDPE bunker.
- A full-sleeved PET bottle may end up on the PET eject line where optical sorting is used, if the sleeve is PETE or PETG. If the sleeve is another resin, it may be missed and would require manual sorting to ensure the bottle was captured for recycling. In a smaller facility where the containers are manually sorted, sorters would learn to associate a specific brand with a specific resin and sort the container into the appropriate bunker. In this case, the full-sleeved PET bottle would end up in the PET bunker.
- For a full-sleeved metal package, a full plastic sleeve does not impact the action of an eddy current separator or ferrous magnet. As such, an aluminum can or steel can would be sorted into the appropriate bunker regardless of the coverage provided by the plastic sleeve.
- For a full-sleeved glass package, a full plastic sleeve does not impact recycling regardless of the coverage provided by the plastic sleeve.
- When baled, re-processors with the right equipment typically mechanically remove the label and use the material in their process.

What is being done about it?

- Design for Recyclability guidelines have been developed by the APR and endorsed by PAC NEXT. PAC NEXT hosted a webinar, *Optimizing Labels on PET Packaging* on October 22nd, 2014, to communicate APR's critical guidance (http://plasticsrecycling.org/images/pdf/PET-Resins/PET-Bottles/sleeve_label_on_pet_critical_guidance.pdf) and shrink sleeve label requirements. These requirements include label floats in water, ink does not stain rPET, and where possible label should be so designed that automatic optical sorting equipment can properly identify the resin used to make the bottle (e.g., ¾ bottle coverage instead of a label covering the entire bottle.)

- A number of new initiatives are underway to improve the recyclability of bottles with shrink sleeve labels, including:
  - Several North American reprocessors have invested in delabeling equipment to mechanically remove the label from the container.[9]
  - A number of trials are taking place at reprocessing facilities to document the effects of adding perforations to the labels to aid in removal during crushing, baling, and mechanical de-label processing. Labels can then be separated from recyclable content during the initial wash step. Eastman Chemical, working with reprocessors has conducted multiple delabeling and perforation trials and found a minimum of 97% of all perforated labels are removed with delabeling equipment.[10]
  - Eastman Chemical and Sun Chemical are trialing a unique "de-seaming" coating that can be added during production of the shrink sleeve film that allows the label to easily separate from the containers. Removal of shrink sleeve labels takes place at the same point that other labels (e.g., wraparound, pressure sensitive, etc.) are removed with no additional equipment required by the recyclers.[11]
  - Some film manufacturers are developing new floatable films that will separate during the sink/float tank process.

Future outlook

There are many examples of full-shrink wrap labels being used to improve in-store shelf presence and consumer appeal. This is a fast evolving area with a number of important advancements being made by industry and reprocessors to improve recycling of bottles with full body shrink sleeves. Design for Recyclability (DfR) in cooperation with technology advances are key to improving sorting accuracy and recycling yield.

For more information:

Éco Entreprises Québec. (2011, April 27). Fact Sheet: Impact of Packaging on Curbside Recycling Collection and Recycling System – PET Bottle with PVC sleeve-label. http://www.ecoentreprises.qc.ca/documents/pdf/applications/fiche1_tech_impact_emballage_engl.pdf

The Association of Postconsumer Plastics Recyclers. (2014). Sleeve Label Information. http://plasticsrecycling.org/pet-resins/pet-bottles

The Association of Postconsumer Plastics Recyclers. (2012, November). Principles for Sleeve Labels on PET Bottles. http://www.plasticsrecycling.org/images/pdf/PET-Resins/PET-Bottles/principles_for_sleeve_labels_on_pet_bottles.pdf

[9] http://www.plasticsnews.com/article/20140716/NEWS/140719946/carbonlite-installing-recycling-equipment-at-new-texas-plant

[10] Alexander, Holli, *Eastman Chemical.* (October 22, 2014). PAC NEXT Webinar Presentation: *Optimizing Labels on PET Packaging*.

[11] http://www.foodproductiondaily.com/Packaging/Shrink-label-group-puts-recycling-challenges-under-wraps

HOT BEVERAGE POLYCOATED CUPS
Examples: Coffee/tea takeaway cups

Current State:
What happens to this material today?

- This packaging is accepted at curbside by some but not all municipalities.
- Where it is accepted, there is a need to separate the lid from cup and contents must be empty.
- Optical sorters for polycoated containers can see the polycoat on aseptic containers or milk cartons but cannot identify polycoated cups because the polycoat is in the inside of the cup. Hence, the paper cups will end up on the container sort line (assuming they were collected in a single stream system) where an optical sorter can be set up to eject ALL fibers. Once the fibers have all been ejected onto a quality control line, the paper cups can be manually sorted into the bunker with the milk cartons and aseptics, which are typically reprocessed into high value fiber. If not manually sorted here, they will end up in the mixed paper stream.
- Where the facility does not have an optical sorter for polycoated containers, the cups would be manually sorted from the line with the polycoated containers or end up in the mixed paper stream.
- In single stream plants, if the cups are flattened during collection (compaction) or from being handled in the MRF (piled up on the tip floor), the cups can end up flowing over a mixed paper or finishing screen thereby ending up in the mixed paper stream at a MRF. This material is lower grade and ends up in various reprocessed paper grades.
- PS lids typically end up in residue.

What is being done about it?

Continued education for consumers to empty cups and remove lids according to their local recycling program's guidelines helps increase awareness. Identifiers on cups would help to facilitate easier separation. There have been several pilot projects using manual sorting to recover this material, and then commingle with recovered aseptic or polycoat containers. Hydro-pulpers then de-poly and pulp these materials in which the end product would be various grades of tissue.

Future outlook
The success of these pilot programs provides a benchmark for other municipalities and helps create interest in waste management for beverage cups.

For more information:

Multi-Material BC. (2014). MMBC Materials List.
http://recyclinginbc.ca/program/mmbc-materials-list/

Earth911®. (2014). How to Recycle Paper Cups.
http://www.earth911.com/recycling-guide/how-to-recycle-paper-cups/

Stewardship Ontario. (2014). Tim Hortons and recycling team tests curbside collection of beverage cups. http://www.stewardshipontario.ca/case-study/tim-hortons-and-recycling-team-tests-curbside-collection-of-beverage-cups/

City of Toronto, prepared by Entec Consulting Ltd. (2009, May). Report on Processing of Hot Drink Cups. http://www1.toronto.ca/city_of_toronto/solid_waste_management_services/divisional_profile/bylaws/files/pdf/entec_report_mrf_assessment.pdf

METALLIZED TUBES

Examples: Toothpaste tubes, personal care products, prescription creams

Current State:

What happens to this material today?

- This material is generally not accepted at curbside. However, consumers tend to put these materials in the recycling box.
- It is manually sorted or ends up in residue.
- Multiple materials are used in this packaging (multiple plastics and sometimes metal) and residual product contents cause contamination in other materials.

What is being done about it?

- There is currently no end market but there is work being done to retrieve aluminum from this type of packaging. Enval in the U.K. uses patented technology based on a process known as Microwave Induced Pyrolysis, developed at the University of Cambridge, to separate metal/foil from plastic.
- Waste-to-energy is another recovery solution to avoid these materials going to landfill

Future outlook

Educate consumers that this packaging is not appropriate for curbside collection at this time.

For more information:

WRAP, Stephen Slater and Trevor Crichton, Oakdene Hollins Ltd. (2011, September). Project Report: Recycling of laminated packaging.
http://www.wrap.org.uk/sites/files/wrap/Recycling%20of%20laminated%20packaging.pdf

SINGLE-SERVE HOT BEVERAGE PODS
Examples: PS K-Cups, metalized cups

Current State:
What happens to this material today?

- This packaging is generally not accepted at curbside due to the multiple components of pod, filter, seal/lid and grounds. However, consumers tend to put these materials into the recycling box.
- Due to their small size the pods, if broken, tend to drop through the mechanical screens with heavy materials and contaminate other streams, particularly glass (i.e., the pods still contain coffee grounds).
- Note that this packaging is acceptable in British Columbia's new recycling program for PS content – coffee pods would be ejected with the optical sorter set up to eject PS. Otherwise, the pods are manually sorted from the line or left to go with the mixed plastics as the negative sort.

What is being done about it?

- There is an end market for the PS materials. The key is to be able to separate all the components of the package - PS pod, filter, seal/lid and grounds.
- Consumer education needed where packaging is not compatible with MRF capabilities. Promote Return-to-retail where appropriate.

Future outlook

There are new innovative designs from brand owners focused on (1) design for pod disassembly to separate a recyclable plastic pod from the filter and coffee grounds, and (2) compostable pods. There are collaborative projects that are currently performing K-Cup trials through several MRFs. This is a highly evolving market where four out of every 10 dollars spent on ground coffee in the US is now spent on single-serve pods, such as K-Cups, according to Nielsen.[12]

For more information:

Atkins, Eric. (2014, August 24). "Toronto firm set to shake up K-Cup coffee wars with first compostable pods." *The Globe and Mail.*
http://www.theglobeandmail.com/report-on-business/toronto-firm-muscles-in-on-single-serve-coffee-wars/article20186873/

Kalish, Jennifer. (2013, June 13). "Coffee makers wrestle with recyclability of single-serve pods." *Waste and Recycling News.*
http://www.plasticsnews.com/article/20130603/NEWS/130609998/coffee-makers-wrestle-with-recyclability-of-single-serve-pods

[12] http://www.foodnavigator-usa.com/Markets/Single-serve-pods-account-for-41.2-of-dollar-sales-of-ground-coffee-in-the-US

COLORED OPAQUE PET

Examples: Household and personal care bottles, energy drink bottles

Current State:

What happens to this material today?

- An optical sorter will positively sort all PET regardless if it is clear or opaque.
- Opaque, colored PET in significant quantities is a problem for the re-processor as it limits the yield from the bale of clear PET. Clear PET can be made into any new color, whereas colored PET, unless color separated into specific colors, is generally limited to grey/black recycled PET applications.
- If manual sorting is used, the colored, opaque PET bottles are added in with the clear PET bottles or mixed plastics.

What is being done about it?

- The Association of Postconsumer Plastics Recyclers (APR) developed guidance documentation, *APR Design™ Guide for Plastics Recyclability– PET Bottles,* which states:

> The use of translucent and opaque colors is problematic for many recycled PET end uses because of contamination. In particular, TiO_2 is very detrimental to PET recycling for bottle-to-bottle and engineered resin uses. Although newer sorting technology is capable of identifying white PET from other PET colors, much current sortation capability does not always identify and isolate white opaque PET. Non-TiO_2 opaque and translucent PET bottles are also problematic and should be examined for their impact on the recycling process.[13]

Future outlook

It is preferable to change to clear PET if possible. There is need to better understand end use and consumer preference.

For more information:

The Association of Postconsumer Plastics Recyclers. (2014, May). *APR Design™ Guide for Plastics Recyclability– PET Bottles.*
http://www.plasticsrecycling.org/images/pdf/PET-Resins/PET-Bottles/PET_Bottle_Design_Guidance_May2014_update.pdf

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[13] http://www.plasticsrecycling.org/images/pdf/PET-Resins/PET-Bottles/PET_Bottle_Design_Guidance_May2014_update.pdf

NON-PET CLAMSHELLS

Examples: Bakery goods, electronics packaging

Current State:

What happens to this material today?

- These materials are referred to as look-a-like plastics to PET since most consumers cannot tell the difference.
- Where optical sorting is used, the optical sorter can be set up to identify all non-PET clamshells and eject the non-PET clamshells into the mixed plastics stream.
- Where plants use manual sorting, extensive sorter education is required, including brand recognition to distinguish PET from non-PET containers (e.g., PVC has a blue glow and also turns white when folded over).
- Non-PET materials that end up in the PET bale are a contaminant. Also, labels, adhesive and inks that do not cleanly remove can further contaminate the PET material.
- Where markets exist for mixed plastics bales, non-PET clamshells can be included in the bale. Generally, the bales are sold to export markets.

What is being done about it?

- MRFs and re-processors can distinguish between resin types, particularly where optical sorting is employed.
- Guidelines for recyclability recommend using labels, inks and adhesives that can be cleanly removed from the thermoforms.
- Several Canadian retailers collaborated in 2010 and volunteered to use only PET thermoforms in bakery and produce applications for their private label brands.[14]

Future outlook

Because the demand for recycled resins outpaces supply, reprocessors are looking for additional sources of PET and non-PET feedstock, beyond bottles. Thermoform packaging such as clamshells, blisters and trays offer a potential new source of feedstock. While non-PET packaging collected in municipal programs generally is marketed in mixed bales for export, there is growing interest in the need for domestic markets and more work needs to be done.

For more information:

The Association of Postconsumer Plastics Recyclers. (2014). *APR Design™ Guide for Plastics Recyclability– PET Thermoformed Packages.* http://www.plasticsrecycling.org/images/pdf/PET-Resins/PET-Thermoforms/PET_Thermoform_Design_Guidance.pdf

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14 http://www.packworld.com/sustainability/recycling/collaboration-enables-sustainable-win

CARDBOARD TRAY WITH PLASTIC FILM

Examples: Beverage bottle and can cases, 12-count and higher

Current State:

What happens to this material today?

- Mixed materials entering the recycling stream must be manually separated at the MRF. If not captured during the sorting process, this material ends up in residue and to landfill.
- Plastic should be separated from cardboard tray before collection since end markets exist for both materials.

What is being done about it?

- Continued investment in Promotion & Education (P&E) to educate consumers to remove cardboard tray from plastic wrap, stressing the importance of separation of mixed recyclable packaging materials.

Future outlook

There is an opportunity to better educate packaging designers and decision-makers on designs to remove the need for mixed materials. For example, staggered-row configurations for shrink-wrap bundling exist that remove the need for a cardboard tray.

For more information:

Region of Peel. (2014, April). "RecycleRight: Separate cardboard beverage cases from plastic wrapping." http://www.peelregion.ca/bluebox/#beverage

Packaging World. (2011, February). "Multipacks say 'So long' to corrugated materials." http://www.packworld.com/machinery/multipackers-amp-shrink-wrappers/multipacks-say-so-long-corrugated-materials

NEXT STEPS

PAC NEXT acknowledges that this white paper is a living document. It will be reviewed annually by the project team and updated as appropriate to reflect new legislation, recovery technologies, new design approaches and material choices. The project team will:

- Welcome feedback
- Consider all new potential solutions
- Update content as needed

Although the term *challenge* is used in the title of this report, it is important to note that packaging perceived as a *challenge* today varies according to numerous factors, including local MRF capabilities, demographics, policy regulations and public perception. PAC NEXT believes that bridging the communication gap between packaging producers and end-of-life management will continue to present new opportunities for the increased recovery of packaging materials.

If you have any questions or comments regarding this document, please contact PAC NEXT Program Manager, Rachel Morier, rmorier@pac.ca.

PROJECT MEMBERS

MRF Operators	**Daniel Lantz**	***Green By Nature /Cascades Recovery***	PROJECT SPONSOR
	Geoff Rathbone	*Progressive Waste Solutions*	
	Paulina Leung	*Emterra Environmental*	
	Emmie Leung	*Emterra Environmental*	
	Tricia Berta	*Canada Fibers*	
Brand Owners	**Keith Fanta**	***Procter &Gamble***	PROJECT SPONSOR
	Pascal Lachance	*Danone*	
	Karen Blumel	*Walmart*	
	Ena Popic	*Loblaw*	
	Arin Selby	*Sobeys*	
	Angela Stone	*Mother Parkers*	
	Claudio Gemmiti	*Club Coffee*	
Re-Processors	Martin Vogt	*EFS Plastics*	
	Ryan L'Abbé	*Blue Mountain Plastics*	
NGOs	William Mueller	*Waste Diversion Ontario*	
	Lori Andrews	*Waste Diversion Ontario*	
	Sherry Arcaro	*Canadian Stewardship Services Alliance*	
	Pat Chauvet	*Stewardship Ontario*	
	Shane Hedderson	*CleanFARMS*	
	Philippe Cantin	*Retail Council of Canada*	
	Ashley Carlson Hall	*American Chemistry Council*	
	Fred Edgecombe	*Canadian Plastics Industry Association*	
Municipalities	Trevor Barton	*Region of Peel*	
	Kevin Mehlenbacher	*Region of Peel*	
	Mariano Singzon	*Region of Peel*	
	Dick Lilly	*City of Seattle, WA/Northwest Product Stewardship Council*	
	Lisa Sepanski	*King County, WA/Northwest Product Stewardship Council*	
	Das Soligo	*County of Wellington*	
	David Yousif	*City of Hamilton*	
	Laurie Westaway	*County of Peterborough*	
	John Baldry	*City of Toronto*	
Converters/Resin Producers	Patrick Kerrigan	*Alpha Poly Packaging Solutions*	
	Tim Goodman	*NatureWorks LLC*	
	Paul Van Leeuwen	*CKF Inc.*	
	Rosalyn Bandy	*Avery Dennison*	
	Patricia Enneking	*Klockner Pentaplast*	
Ancillary Services	Carol Zweep	*NSF-GFTC*	
	Bruno Ponsard	*ITEGA*	
	Lyle Clarke	*Lyle Clarke & Associates*	

Glossary

EfW	Energy-from-waste
HDPE	High-density polyethylene (Resin code #2)
LDPE	Low-density polyethylene (Resin code #4)
MRF	Material Recovery Facility
PET	Polyethylene terephthalate (Resin code #1)
PLA	Polylactic acid (Categorized under resin code #7 “Other”)
PP	Polypropylene (Resin code #5)
PS	Polystyrene (Resin code #6)
PVC	Polyvinyl chloride (Resin code #3)
WTE	Waste-to-energy