Highlights from
The Decision Tree Packaging Evaluation Tool

December 2013

INTRODUCTION

The PAC NEXT Sustainable Innovation committee presents the Decision Tree Packaging Evaluation Tool. This tool was developed to help packaging designers and manufacturers identify and avoid any unintended consequences of introducing new packaging materials or existing packaging materials with a new application, within the current recycling infrastructure.

The Decision Tree Packaging Evaluation Tool, or simply 'Decision Trees,' is designed to guide users through the decision-making process. It is first broken down by material class: paperboard, glass, steel, aluminum and plastic, where plastic is then further divided by material sub-class (PET, HDPE, PVC, LDPE, PP, PS, Other). The tool then directs the user through the package format, components, and the final decision. The final decision may be either YES, NO or CONDITIONAL for current recycling stream in Canada.

We acknowledge that infrastructure and processing technologies are subject to change, requiring the Decision Trees to be updated as waste management policies and collection systems evolve. For this reason, PAC NEXT 2.0 is developing an interactive version of the Decision Trees through the online PAC Knowledge Center. PAC NEXT will also work to further develop the decision trees to include other material categories and end-of-life options.

We thank everyone who participated in this project including committee members as well as subject matter experts who provided their valuable input and knowledge to ensure that the information presented is as accurate as possible.

Please feel free to contact us if you would like to receive more information or learn how to join the Sustainable Innovation committee.

With thanks,

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Disclaimer

This document was supported by a PAC NEXT Technical Committee consisting of member volunteers with packaging, materials management and policy experience from across the public and private sectors. The conclusions and views expressed in this document do not necessarily reflect the views of every PAC NEXT Member Company or Affiliate.

HIGHLIGHTS

Please refer to the Box.com web link below for the complete version of the Decision Trees by material category. Accessing this link will also allow you to submit comments or questions.

pac.box.com/decisiontrees

Material	Format	Key Considerations	Watch-outs
PET Polyethylene terephthalate	**Bottles/Jars/ Clamshell/ Trays/Tubs & Lids**	- PET is one of the most widely accepted plastic resins in recycling programs in Canada	- Avoid body material of other transparent colours, translucent or opaque - Avoid blending PET with other resins and multi-layer materials that do not delaminate - Avoid flourescers or biodegradable additives - Ensure pressure sensitive labels separate during hot caustic wash and are water soluble; label ink should not bleed
HDPE High-density polyethylene	**Bags & Films**	- This material is recyclable and collected with LDPE bags and films - Some curbside recycling programs in Canada accept plastic bags and films but at a high cost to manage and with low market value due to contamination	
	Bottles (small neck)/Jars/ Pails/Tubs & Lids	- HDPE is a widely accepted plastic resin in recycling programs in Canada	- Avoid black for body material - Avoid barrier layers that do not delaminate and additives - Avoid PVC, PS, metal and silicone parts for closure and liner - Ensure pressure sensitive labels separate during hot caustic wash and are water soluble; label ink should not bleed

Material	Format	Key Considerations	Watch-outs
PVC (Polyvinyl chloride)	**Bottles/Jars/ Tubs & Lids/ Sealed Packaging/ Films**	- This material is not recommended due to low volume and it is a contaminant for the PET recycling stream	
LDPE Low-density polyethylene	**Bags & Films**	- This material is recyclable and collected with HDPE bags and films - Some curbside recycling programs in Canada accept plastic bags and films but at a high cost to manage and with low market value due to contamination	
	Bottles (small neck)/Jars/ Pails/Tubs & Lids	- LDPE is a widely accepted plastic resin in recycling programs in Canada	- Avoid black for body material - Avoid barrier layers that do not delaminate and additives - Avoid PVC, PS, metal and silicone parts for closure and liner - Ensure pressure sensitive labels separate during hot caustic wash and are water soluble; label ink should not bleed
PP Polypropylene	**Bags & Films**	- This material is not currently collected by most curbside programs due to low volume	
	Bottles /Jars/ Clamshells/ Trays/Tubs & Lids	- PP is a widely accepted plastic resin in recycling programs in Canada	- Avoid black for body material - Avoid barrier layers that do not delaminate and additives Avoid PVC, PS, metal and silicone parts for closure and liner - Ensure pressure sensitive labels separate during hot caustic wash and are water soluble; label ink should not bleed - HDPE or LDPE attachments must be less than 5% total bottle weight

Material	Format	Key Considerations	Watch-outs
PS Polystyrene	**Rigid - Clamshells/ Trays/Cups/ Sealed Packaging**	- This material is not currently collected by most curbside programs due to low volume	
	Foam - Cushion Packaging/ Clamshells/ Trays	- This material is not currently collected by most curbside programs due to light weight, predisposition to get dirty and difficulty to clean and dry	
Other Plastics	**Bottles/Jars/ Tubs & Lids/ Films/ Clamshells/ Trays/Cups/ Tubes**	- This material is not currently collected by most curbside programs due to low volume, no end market and/or possibility for contamination in the recycle stream	
Glass	**Bottles & Jars**	- Glass is widely accepted in recycling programs (curbside or depot) in Canada	- Avoid etching and wax decorations - Avoid metal attachments
Steel	**Cans (Food, Aerosol, Paint), Pails, Drums, Caps & Lids**	- Steel can be easily sorted and is widely accepted in curbside or depot (e.g. paint cans, aerosols) recycling programs in Canada	
Aluminum	**Screw Top Closures/ Composite Packaging w/ Aluminum (Blister Packs, Pouches, Metalized Film or Paper, etc.)**	- This material is not currently collected by most curbside programs due to material separation issues	- Avoid plastic bottles with aluminum top as it gets sorted with plastic
	Beverage Cans/Bottles/ Rigid Containers/ Squeeze Tubes/Aerosol Cans/Trays & Foil	- Aluminum beverage cans are widely accepted in recycling programs (curbside or depot) in Canada	

How To Use This Tool

The following two examples are provided to illustrate how packaging designers and producers can use the Decision Trees to evaluate and understand how the current recycling system might handle their packaging and its components.

Example 1:

Shrink Sleeve Label

Your company's marketing department is pushing for the use of a full body sleeve label because of its ability to capture consumers' attention. They assert that the PVC label provides stronger shelf presence and promotes product differentiation. In addition, no adhesives are required for this type of label. The body material would be comprised of PET with a PP bottle cap.

1. Determine package components:

Body Material	PET (clear)
Barrier Layer & Additives	None
Closure & Liner	PP (green)
Sleeves, Safety Seals & Labels	PVC label
Label Ink & Adhesives	No adhesives required
Attachments	None

2. Assessment based on Decision Tree:

Body Material PET (clear)

- ✓ "Clear transparent, light blue & green transparent – YES"

Closure & Liner PP (green)

- ✓ "PP, LDPE, HDPE – YES"

Sleeves, Safety Seals & Labels PVC label

- ✗ "PVC, PS, PLA, delaminating material, metallized material – NO"
- ! "Full body sleeve may interfere with optical sorting systems – CONDITIONAL"

3. Conclusion:

The Decision Tree indicates that the PVC label does not allow for the optimal recycling of PET. The full body sleeve may also cause issues. Thus, to increase the material recovery of this packaging, changes to the label format is recommended.

Example 2:

Squeeze Bottle with Cap

For ease of consumer use, your company has decided to use a flip top PP cap with a silicone valve insert on barrier PET bottles (PET/nylon multilayer structure) for a new condiment product line. Closures that use a silicone valve have been on the market for a few years. The consumer is able to dispense a portion from the contents of the bottle, with no messy splattering. The product will also use a paper label with a water soluble adhesive.

1. Determine package components:

Body Material	PET (red)
Barrier Layer & Additives	Nylon multilayer
Closure & Liner	PP (yellow) with silicon valve
Sleeves, Safety Seals & Labels	Paper label
Label Ink & Adhesives	Water soluble adhesive
Attachments	None

2. Assessment based on Decision Tree:

Body Material PET (red)

✗ "Other transparent colors, translucent, opaque – NO"

Barrier Layer & Additives Nylon multilayer

✗ "Barrier Layers i.e. EVOH, nylon-based (nylon-6, MXD6) - Multi-layer materials that do not delaminate – NO"

Closure & Liner PP with silicon valve

✓ "PP, LDPE, HDPE – YES"

✗ "EVA liner with aluminum closure, silicone seals – NO"

Sleeves, Safety Seals & Labels Paper label

✓ "PP, OPP, PE, PS foam, paper – YES"

Label Ink & Adhesives Water soluble adhesive

✓ "Label adhesives water soluble/dispersible @ 140-180F – YES"

3. Conclusion:

The PET Decision Tree indicates that other transparent or opaque colors are not ideal and therefore, the red bottle should be changed to a clear bottle. It is also recommended to remove the nylon multilayer barrier as well as the silicone component in the cap to optimize recycling of this packaging, if possible.

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