Recycle Activity

- develop an understanding of the recycling process, from collection and processing of recyclables to remanufacturing and purchase of new items made with recycled content
- identify the recycling processes for aluminum cans, corrugated cardboard, newspaper, glass containers and plastic bottles
- understand the importance of closing the loop of recycling by purchasing items made with recycled materials

Life of a Recyclable (4-7)

**Intro:** What happens to recyclables once they are collected through our blue box or other recycling programs? Most of us have seen the chasing arrows symbol that represents recycling. These arrows represent recycling's three steps:

1. collecting recyclable materials
2. processing those materials into new products, and
3. buying those new products

That second step, processing materials such as old newspapers and tin cans into new products, is a part of the recycling process we seldom learn about. Going behind the scenes helps us understand the importance of all the steps in the recycling process.

**Materials:**

- Life of recyclable sheets (provided in following pages) cut into cards, laminate if desired
- Reference sheets at beginning of Recycling Chapter for correct order

**Activity:** Review any confusing terms contained in cards. (refer to List of Terms below). Divide the class into five groups and give each group a set of cards. Ask them to read the cards and put them in the correct order. Suggest they organize the cards in a circle to mirror the fact that the recycling process is circular, that old materials are becoming new items. When groups are finished, hand out reference sheets showing correct order. Ask each group to present their findings.

**Conclusion/Discussion:** Have students brainstorm what items can be made from the recyclables. (Information can be found at bottom of reference sheets under “Did you know?” or at www.recyclinginbc.ca) Talk about what students use or own that may have recycled content.

Discuss the importance of buying items made with recycled content so that recycling programs remain strong (if no one buys items with recycled content then manufacturers stop using the recycled materials and recycling programs cannot sell the materials they collect).
Discuss why reducing and reusing is preferable to recycling (recycling does use energy and resources and can cause waste while reducing and reusing do not).

**Extension Activities:** Have students research how juice boxes are recycled. Challenge students to create a new product or use for one of the recyclable materials. Have students identify items they presently throw in the garbage (for example, plastic wrap or straws) and design a recycling process for those items.

**List of Terms**

**Sorting** • separating items according to their class, kind, or size.

**Baling** • packaging like items together into larger bundles to prepare them for transport.

**Shredding** • breaking down material into smaller parts.

**Decoating** • removing the outer finish of an item using heat.

**Cast** • shaping an item by pouring liquid metal into a mold, for example.

**Ingot** • a mass of metal, such as a bar or block, that is cast in a standard shape for convenient storage or shipment.

**Pulping** • mixing shredded paper and hot water together to create a base for new paper production.

**Screening** • sifting or filtering out material into finer particles to remove impurities or unsuitable materials.

**Peroxide** • a powerful bleaching agent.

**Contaminants** • foreign or unwelcome materials which can hinder the recycling process.

**Cullett** • scraps of broken or waste glass.

**Pelletized** • cut or formed into smaller particles or pellets.

**Extruded** • forced through smaller spaces creating longer, more manageable strands of material.
The Life of an Aluminum Can Collection

Beverage Cans are collected and taken to a sorting facility.

Cans are shredded at processing facility.

Cans are baled for shipping.
<table>
<thead>
<tr>
<th>Decoating</th>
<th>Melting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paints and coatings are removed when heated.</td>
<td>Furnaces melt scraps to molten state.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cast into Ingots</th>
<th>Sheet Aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingots are massive aluminum casts weighing up to 27,000 kgs.</td>
<td>Sheets made from ingots at rolling plant.</td>
</tr>
<tr>
<td>Can Making Plant</td>
<td>The Life of a Cardboard Box</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td><img src="image" alt="Can Making Plant" /></td>
<td><img src="image" alt="Cardboard Box" /></td>
</tr>
<tr>
<td>New cans are made from 50% recycled aluminum.</td>
<td>Cardboard Box</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Collection</th>
<th>Sorting and Baling</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Collection" /></td>
<td><img src="image" alt="Sorting and Baling" /></td>
</tr>
<tr>
<td>Cardboard is taken to a sorting facility.</td>
<td>Cardboard is separated from other paper products and baled.</td>
</tr>
<tr>
<td><strong>Hydro Pulping</strong></td>
<td><strong>Cleaning</strong></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Cardboard is mixed with water and pulped until the right consistency is achieved.</td>
<td>Contaminants such as plastic, string, metal fasteners and dirt are removed in a coarse cleaning process.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Disperger</strong></th>
<th><strong>Cleaning and Screening</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp runs through insulated pipes that melt any wax or adhesives.</td>
<td>Pulp runs through the final cleaning process.</td>
</tr>
</tbody>
</table>
Rolling Pressing

Pulp is pressed through formers to make sheets.

Final Rolling

Water is squeezed from the sheets.

Paper is wound on a reel and sized for shipment.

Rolling

Sheets are passed over a series of hot rollers.

Drying
<table>
<thead>
<tr>
<th>The Life of Newspaper</th>
<th>Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspaper</td>
<td>Newspaper is collected and taken to a sorting facility.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sorting Facility</th>
<th>Pulping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspaper is sorted and either baled or shipped loose to a processor.</td>
<td>Newspaper is mixed with water to produce a slurry. This is the first stage of the de-inking process.</td>
</tr>
<tr>
<td>Removal of Contaminants</td>
<td>Flotation Cell</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>The pulp is moved through heavy cleaners</td>
<td>Air is pumped in, ink attaches to the bubbles.</td>
</tr>
<tr>
<td>and screens.</td>
<td>The bubbles float to the top and are skimmed off.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Screening</td>
<td>Peroxide Bleach Tower</td>
</tr>
<tr>
<td>Screens remove more contaminants like glue,</td>
<td>Hydrogen peroxide ($\text{H}_2\text{O}_2$) is used</td>
</tr>
<tr>
<td>staples, and other metals.</td>
<td>to whiten the pulp.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pressing

Bales weigh about 300 kgs. Railcars and trucks take bales to mills.

Cutting

Glass Containers

Pulp is formed into sheets. Water is squeezed out.

Sheets are cut to make them into new paper products.
Glass is sorted, cleaned of contaminants and broken. Broken glass is crushed into tiny pieces called cullet.

Cullet is mixed with silica, sand, soda ash and limestone.
<table>
<thead>
<tr>
<th>Melted</th>
<th>Molded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixture is melted to molten state in furnace.</td>
<td>Molten glass is poured into molds.</td>
</tr>
<tr>
<td>Cooled</td>
<td>Packed and Shipped</td>
</tr>
<tr>
<td>Containers are cooled slowly to increase strength.</td>
<td>New containers are ready to be refilled and returned to grocer’s shelf.</td>
</tr>
</tbody>
</table>
Plastic bottles are collected and taken to a sorting facility. Sorted plastics are baled or shipped loose to a processor.

Bales are shredded into small flakes.

Flakes are pushed through three stages of washing.

Flakes are heated to loosen the glues and adhesives.
<table>
<thead>
<tr>
<th>Cleaned</th>
<th>Filtered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic flakes rise (density) and heavier contaminants sink and are removed.</td>
<td>The flakes are passed over a screen to remove any last particles of contamination.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spun and Dried</th>
<th>Melted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean flakes are spun to remove excess water and sent through a dryer.</td>
<td>Flakes are melted.</td>
</tr>
</tbody>
</table>
Extruded Pelletized

<table>
<thead>
<tr>
<th>Extruded</th>
<th>Pelletized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molten plastic is forced through an extruder creating long strands of plastic.</td>
<td>The extruded plastic strands are cooled, then cut into pellets by a quick knife. Pellets are sold to plastic manufacturers.</td>
</tr>
</tbody>
</table>
Recycling Process

THE LIFE OF AN ALUMINUM CAN

COLLECTION
Cans are collected and taken to a sorting facility

STORAGE FACILITY
Cans are baled for shipping

SHREDDING
Cans are shredded at processing facility

DECORATING
Paints and coatings are removed when heated

MELTING
Furnaces melt scraps to molten state

CAST INTO INGOTS
Ingots are massive aluminum casts weighing up to 27,000 kgs.

SHEET ALUMINUM
Sheets made from ingots at rolling plant

CAN MAKING PLANT
New cans are made from 50% recycled aluminum

BEVERAGE CAN

Did you know?

- It takes about 60 days for a pop can to be recycled, refilled and returned to the store.
- Recycling an aluminum can takes 95% less energy than making a new can from bauxite ore.
- A TV can run for three hours on the energy saved by recycling just one aluminum can.

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For current information about BC recycling programs, materials and end markets visit:

www.recyclinginbc.ca (Multi-Material BC residential recycling program)
www.rcbc.ca (Recycling Council of British Columbia EPR programs)

Note: refundable beverage containers are banned from disposal as garbage at Hartland landfill.
Recycling Process

Did you Know?

- Corrugated cardboard is recycled into new cardboard boxes and boxboard for cereal boxes, cookie boxes and a variety of other boxes.

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www.rcbc.ca (Recycling Council of British Columbia EPR programs)

Note: cardboard is banned from disposal as garbage at Hartland landfill.
Recycling Process

**Did you Know?**

- Until 150 years ago, paper was often made from cloth rags.
- Recycling paper uses 60 percent less energy than manufacturing paper from virgin timber.

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*Note: newspaper is banned from disposal as garbage at Hartland landfill.*
Recycling Process

Did you Know?

• Coloured glass is recycled into:
  o road aggregate
  o reflective material in paint
  o concrete products.
  o Clear glass is recycled into new glass bottles.
• Recycling one glass bottle saves enough energy to light a light bulb for four hours.

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Note: glass is banned from disposal as garbage at Hartland landfill.
Recycling Process

THE LIFE OF PLASTIC BOTTLES

Did you Know?

- Plastic containers are recycled into everything from insulation to polar fleece, detergent bottles to office equipment and toys to drainage pipe.

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