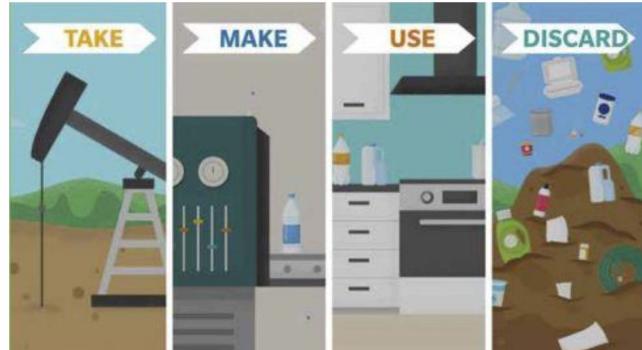


Let's Circle Back!

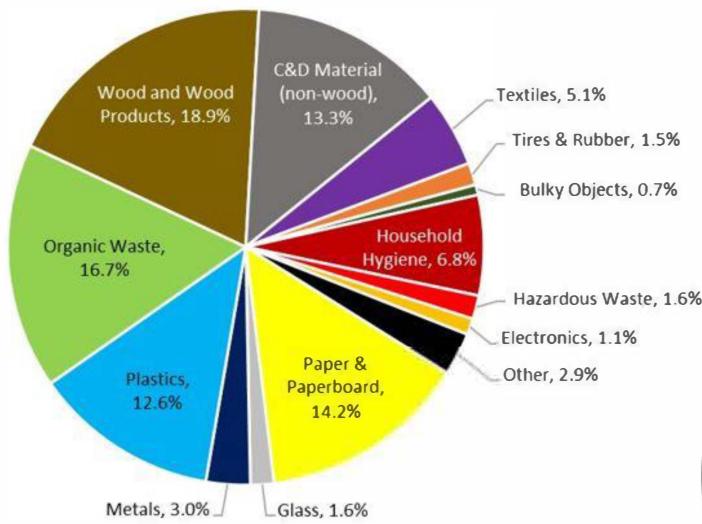
Beyond the 3R's: Zero Waste & the Circular Economy

Background

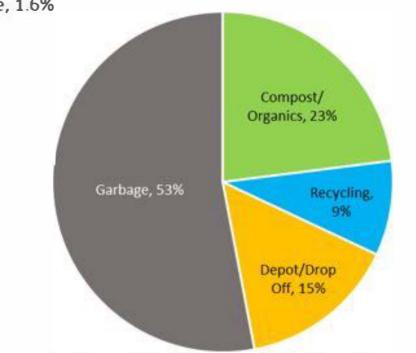
An economy is how people allocate resources to meet needs and wants through production of goods, providing services, and exchanging money. Our economy of goods is a linear system where materials are often extracted from the earth, turned into convenient products with short shelf lives, briefly used and then tossed in the garbage. This includes many machine-made materials and non-biodegradable items. A lot of these materials do not decompose, even when landfilled. More landfilled space means more waste and methane, and less natural habitat. Some materials don't make it to landfills and instead end up as litter, polluting the watershed.



Hartland landfill is the only solid waste disposal facility in the Capital Region. The [2022 Solid Waste Steam Composition Study](#) indicated that 47% of the landfilled materials could have been diverted through compost, recycle, and reuse programs. Our regional goal is to reduce the per capita garbage disposal and extend the life of Hartland Landfill to 2100.



2022 Composition of the Overall Garbage Stream at Hartland Landfill



Diversion Potential of the Overall Garbage Stream

A circular economy is a system where materials are continually used, and nothing goes to waste. We can imagine this drawn as a closed loop where every unwanted thing is turned into something else for a new use instead of being thrown in the garbage. This is seen in nature where the waste of one living thing becomes the food of another in an endless loop. Nature is continuously regenerated by its own circular system and there is zero pollution or waste.



Activity

Divide your class into groups of 2-4 students. Print 1 worksheet, 1 set of nature cards, and 1 set of machine-made cards for each student group. Alternatively, ask students to label scrap pieces of paper. Ask students to arrange the cards in the correct order of their circular or linear system and answer the worksheet questions. Students may use the internet to research examples of companies, products, and packaging. When complete, ask each group to present their ideas to the class.

Answer Key

Natural Circular System: *plant (resource) – insect (primary consumer) – bird (secondary consumer) – snake (tertiary consumer) – eagle (apex predator) – mushroom (decomposer) – loop back to plant*

Machine-made linear System: *natural resource extraction – manufacturing – packaging & transportation – store – use – disposal*

1. Explain why there is zero pollution or waste in the natural circular system.

The waste of one living thing nourishes another living thing. Resources such as energy and nutrients are continually reused and cycled through a balanced, sustainable system that resembles a closed loop. There are no unusable byproducts without a purpose in the system.

2. Choose an everyday packaging material or product that is machine made and often becomes litter or garbage.

If students struggle to choose, suggest options such as packing foam, candy wrapper, t-shirt, tires, water bottle, liquid soap, toothbrush, cell phone, pencil, jeans, shoes, makeup, etc.

3. Identify where there is waste and pollution in each step of the system. For this exercise, assume the item has become litter or garbage.
 - *natural resource extraction: greenhouse gas emissions, hazardous waste & leachate, acid water, radioactive waste & pollution, mine waste rock, spoil & tailings, noise & light pollution, spills, habitat destruction, etc.*
 - *manufacturing: waste byproducts, leftover scrap materials, over-production resulting in excess inventory, greenhouse gas emissions, chemicals, hazardous waste & leachate, waste packaging, noise & light pollution, etc.*
 - *packaging & transportation: waste packaging, microplastics, greenhouse gas emissions, deforestation, noise & light pollution, marine debris, oil and chemical leachate, vehicle end-of-life waste, etc.*
 - *store: damaged & expired products, food waste, packaging waste, single use displays and decorations, flyers, cleaning chemicals, noise & light pollution, greenhouse gas emissions, improper disposal, etc.*
 - *use: microplastics, chemicals in wastewater, greenhouse gas emissions, waste packaging, overconsumption drives overproduction, etc.*
 - *disposal: greenhouse gas emissions, leachate, animal entanglement, water and soil contamination, lost resources from improper disposal of e-waste, metal, cloth, glass, food, paper, plastic, etc.*
4. What steps in the system would have to be changed to reduce or eliminate waste and pollution for your chosen product?

Answer as specifically as possible. Ideas include clean forms of energy for manufacturing and transportation, produce and supply locally, incorporate recycled content into new products, clean up (example: use ocean plastics from clean ups to create recycled materials), reduce or eliminate packaging, new designs with less waste, innovate naturally degradable packaging from organics, use sustainable resources for products, rental and subscription services that return items at end of use, produce durable products, design products with refilling, reusability, repairability, and recycling in mind, find beneficial use for byproducts and scrap materials from manufacturing processes, eliminate over-production, provide accessible collection to return items, etc.

5. Not everyone is an innovator or owns a product company. However, consumer purchasing choices influence the economy. What can you do to support a more circular economy?

Buy products from businesses with circular systems, choose sustainable products, write to companies and policy makers to advocate for circular models, get educated about the circular economy and share the information with others, talk to your family, school, and work about how to reduce, reuse, and recycle to reduce waste, repair and maintain your belongings, donate or sell unwanted belongings, conserve energy and water, choose sustainable transportation, shop locally, volunteer at community clean ups, etc.

Video Resources

[Explaining the Circular Economy and How Society Can Re-think Progress; Animated Video Essay](#) (3.48 min)

[Imagine a Chair; An Animated Explanation of Circular Economy](#) (2.37 min)

[Breaking the Cycle of Plastic Waste; Canadian Geographic](#) (1.52 min)

[TED talk: How to Design the Circular Economy](#) (15.01 min)

[Explaining Circular Economy: Best Real-Life Examples; The Circular Economy Show Episode 11](#) (36.22 min)

Case Studies & Examples of Circular Economy in Action

[Ecovative](#) makes fully compostable packaging products from mushroom roots (mycelium).

[Notpla](#) produces edible, decomposable, zero-waste packaging from renewable resources like seaweed.

[Superuse Studios](#) constructs eco-buildings out of reused and biobased building materials.

[The Lauren Look](#) is a subscription rental service for the luxury brand Ralph Lauren.

[H&M](#) provides a 10% discount to customers who return clothes and scrap textiles for recycling.

The shoe designer [Timberland](#) and tire designer [Omni United](#) have collaborated to create Timberland Tires, designed purposely to be recycled into shoes at end-of-life on the road.

[Teemill](#) produces custom t-shirts only on demand so there is zero speculative overproduction waste with sustainable packaging.

Group Worksheet

1. Explain why there is zero pollution or waste in the natural circular system.

2. Choose an everyday packaging material or product that is machine made and often becomes litter or garbage.

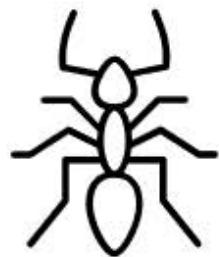
3. Identify where there is waste and pollution in each step of the system for your chosen product with the assumption that it has become litter or garbage.

4. What steps in the system would have to be changed to reduce or eliminate waste and pollution for your chosen product? Clue: imagine how humans might imitate nature's zero-waste, zero-pollution system when innovating products. Think of ways people create, transport, sell, use, and dispose of your chosen product.

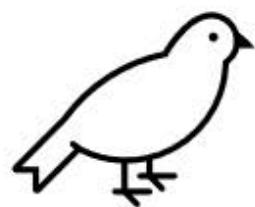
5. Not everyone is an innovator or owns a product company. However, consumer purchasing choices influence the economy. What can you do to support a more circular economy?



plant



insect



bird



snake



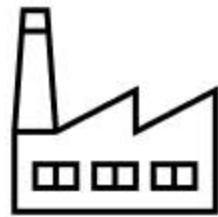
eagle



mushroom



natural resource
extraction



manufacturing



packaging &
transportation



store



use



disposal