



Striving for Zero Waste

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Protecting Maine's Air, Land and Water

Natural Resources

- **Plastics** are produced from nonrenewable fossil fuels by cracking natural gas into propylene or crude oil into ethylene; a small percentage are made from renewable resources like sugarcane
- **Metals** require mining. Aluminum is made from bauxite ore mined and is very resource-intensive to produce (4 lbs. bauxite for 1 lb. aluminum). Steel is made from iron ore. Metals can be endlessly recycled in a closed-loop process.



- **Glass** used to make containers is made from sand, soda ash, and limestone. Glass can be endlessly recycled in a closed-loop process.
- **Paper and cardboard** are often made from wood fibers, but may be made from rags, flax, cotton lint, or sugar cane residues. These products are made from renewable resources.



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Most of the packaging and products we use daily are made from these natural resources – ideally, these would be made with recycled content as well as these virgin resources.

Image from Pixabay: <https://pixabay.com/photos/fracking-oil-drilling-699657/>

What is Zero Waste?

“Zero Waste: The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health.” – the Zero Waste International Alliance, <http://zwia.org>

Zero waste is a systems change:

- Rethinking how we do things
- Improving processes to minimize negative impacts like waste
- Small-scale at the individual level



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Individuals can make informed purchasing to reduce their personal impact and waste output

Image from Pixabay: <https://pixabay.com/photos/recycle-reuse-recycling-recyclable-57136/>

Maine's Waste Hierarchy

Maine's waste hierarchy places waste reduction and reuse over recycling and composting:

- It takes substantial resources to transport, process, and manufacture products
- Reducing waste conserves more energy and resources than recycling
- Repair and reuse extend the life of belongings, which is highly preferable to recycling them
- Recycling has many benefits, but is still an energy-intensive process, which is why waste reduction is preferable



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Source reduction and reuse are even higher up on Maine's waste hierarchy than recycling and reduce emissions even more than recycling. Recycling has many benefits, but is still an energy-intensive process that does generate some emissions. Reusing goods and reducing purchases of new items means avoiding consumption of resources altogether.

EPA's WARM Tool

- The U.S. Environmental Protection Agency (EPA)'s Waste Reduction Model (WARM) estimates GHG emissions impacts (only) of adjusting waste management practices.
- WARM estimates of GHG emissions from: avoiding raw material acquisition, manufacturing from more refined rather than virgin materials, transportation, and any material decomposition that would occur in a landfill.
- Recycling reduces greenhouse gas (GHG) emissions because making products from recycled materials typically uses less energy than extracting the natural resources to manufacture products from virgin materials.
- Access the WARM tool here: <https://www.epa.gov/warm>



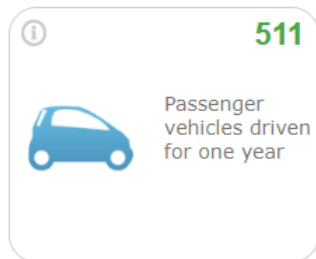
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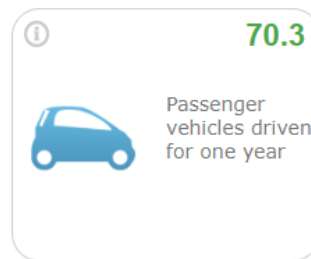
Important to make the connection between greenhouse gas emissions to production, use, and disposal of products

Prioritizing Reduction

Below are EPA's Waste Reduction Model (WARM) tool estimates for **GHG emissions prevented** by reducing or recycling 200 tons of material instead of landfilling it. (50 tons each of phone books, mail and magazines, plastics, and portable electronic devices)



Waste Reduction vs. Landfill



Recycling vs. Landfill

Passenger vehicles: 2-axle 4-tire vehicles (cars, vans, pickup trucks, and SUVs)



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Phone books and mailers – you can unsubscribe. Plastics – you can try to cut back, although it is difficult to avoid. Portable electronics – repair or donate for reuse instead of recycling.

Definition from <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>

Calculations using WARM and EPA GHG Calculator

Prioritizing Reduction: Food Waste

Below are EPA's Waste Reduction Model (WARM) estimates for **GHG emissions prevented** by eliminating 50 tons of food waste or diverting food 50 tons of food scraps from the landfill.



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Preventing food waste and keeping food scraps out of the landfill reduces emissions, conserves landfill space, and (for compost and anaerobic digestion) creates valued products like soil amendment or animal bedding. This scenario is food waste that includes meat, requiring a commercial composting or large pile – backyard composting numbers have a much smaller emissions reduction because it is based on plant foods only (13-14 cars off the road for a year)

Greenhouse gas (GHG) emissions are often measured in metric tons. The U.S. Environmental Protection Agency (EPA) translates metric tons of GHG emissions into relatable measures, like annual emissions from cars.

Organics can constitute over 40 percent of our waste stream by weight. EPA Warm tool used for modeling emissions.

Note on passenger vehicle emissions: In addition to carbon dioxide (CO₂), automobiles produce methane (CH₄) and nitrous oxide (N₂O) from the tailpipe and hydrofluorocarbon emissions from leaking air conditioners. The emissions of these gases are small in comparison to CO₂; however, the impact of these emissions can be important because they have a higher global warming potential (GWP) than CO₂. From EPA <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

Reduce



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Simple Steps to Get Started

Make a portable zero-waste kit:

- Reusable utensils
- Reusable travel mug
- Reusable water bottle
- Cloth napkin
- Handkerchief
- Reusable produce bags
- Reusable grocery bags
- Reusable metal, silicon or bamboo straws
- Reusable storage containers for leftovers or takeout



Reusable items should be durable and washable. For example, cloth grocery bags can last for years and be thrown in the washing machine.



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Image from Pixabay: <https://pixabay.com/photos/lunch-box-lunch-dishes-korean-749367/>

Embrace DIY

- Cleaning products often contain lots of water and unknown chemicals. Making cleaning products can avoid plastic waste, shipping water, and toxic emissions and save you money.
- Find recipes on Boston Zero Waste: <https://bostonzerowaste.com/businesses/diy-cleaning-zw-gear/>
- Turn old, worn out clothing into rags or transform garments. Find tips and ideas: <https://www.thegoodtrade.com/features/how-to-recycle-and-repurpose-clothing>
- One easy option is to have your old shirts sewn into a quilt: <https://www.projectrepat.com/>



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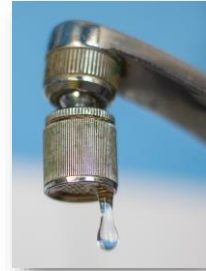
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Image from Pixabay: <https://pixabay.com/photos/old-jeans-pile-of-jeans-recycling-3589262/>

Thoughtful Consumption

Production, consumption, and disposal of products and foods = **42% of U.S. GHG emissions**¹. Zero waste is using only what we need and conserving when we can. For example,

- Precycle (pre + recycle): Seek to reduce waste by buying unpackaged, reusable, or recyclable products and using reusable bags.
- Look for ways to save water and energy:
 - <https://www.watercalculator.org/save-water>
 - <https://www.energystar.gov/campaign/waysToSave>
- Measure your carbon footprint:
 - <https://www3.epa.gov/carbon-footprint-calculator/>



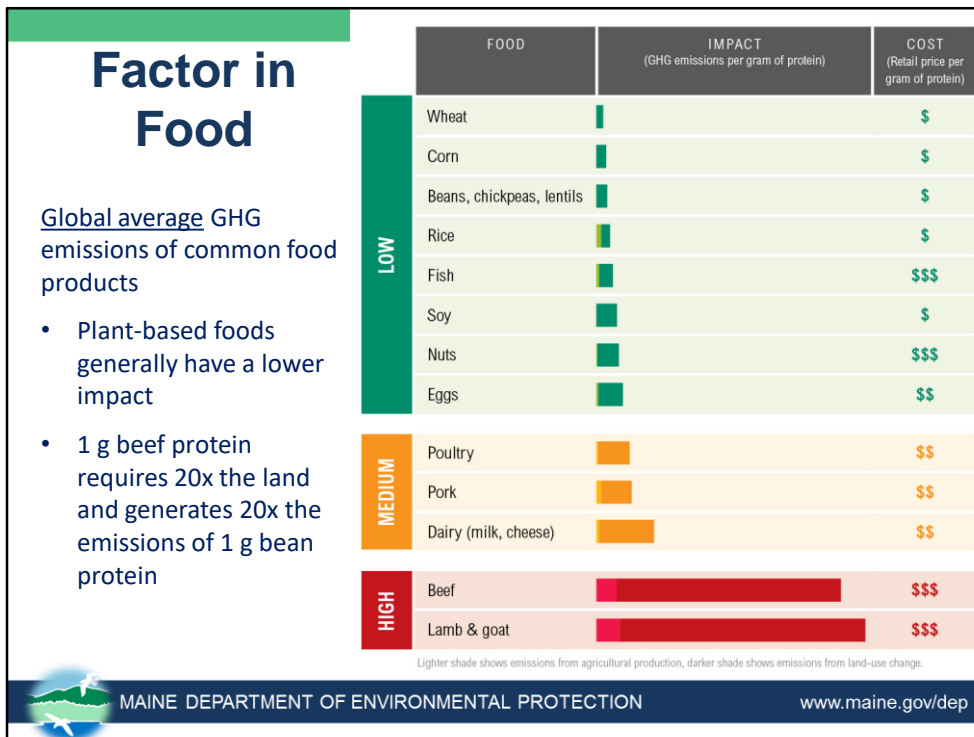
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Oxford Dictionary definition of Precycle is cited here.

Image from Pixabay: <https://pixabay.com/photos/tap-water-kitchen-faucet-1728103/>

1. Source: Community Zero Waste Roadmap 2016, ecocycle



Graph is looking at emissions from land use changes and agricultural production, with the darker shade showing land use emissions (most of impact is here)

From the World Resources Institute <https://www.wri.org/resources/data-visualizations/protein-scorecard>

Facts from: <https://www.wri.org/blog/2018/10/we-cant-limit-global-warming-15c-without-changing-diets>

Resources to Reduce Food Waste

The websites below provide resources to reduce food waste, including meal plans, recipes, and storage tips.

- EPA's Food too Good to Waste Toolkit:
<https://www.epa.gov/sustainable-management-food/food-too-good-waste-implementation-guide-and-toolkit>
- Further with Food is a comprehensive source on food waste and solutions: <https://furtherwithfood.org>
- Stop Food Waste has recipes, storage tips, and a food waste audit guide: <http://stopfoodwaste.org>
- Still Tasty has a large database of food shelf life information: <https://www.stilltasty.com>



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Organics can constitute over 40 percent of our waste stream by weight.

Low-Impact Lawns

- Take the Pesticide Pledge: don't use pesticides.
 - Every chemical (good or bad) has the potential to end up in our water and air.
 - We don't yet know how many chemicals will impact the planet and our health (see www.earthday.org/pesticide-pledge)
- According to U.S. EPA, pesticides are one factor in the decline of bees (see www.epa.gov/pollinator-protection/colony-collapse-disorder)
- [“How one man's laziness is saving the environment around Pushaw Lake”](#)
Bangor Daily News, September 16, 2019



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Resources to Reduce Trash

Reducing waste is a process – but each small change adds up. Work your way toward zero waste at your own pace.

- Room-by-room guide to reducing household waste:
<https://zerowastehome.com/tips>
- A thirty-day waste reduction plan:
<https://zerowastenerd.com/beginners-guide>
- 100 ways to cut back on plastic trash:
<https://myplasticfreelife.com/plasticfreeguide>
- Or, for a global view, see Zero Waste International Alliance:
<http://zwia.org>



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Reuse



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Consider Secondhand Clothing

- The average American disposes of 80 pounds of clothing every year and 85% of it ends up in a landfill.



- Buying secondhand clothing avoids the environmental impacts of clothing production, like water use and emissions.
- Textile production generates about 1.2 billion tons of CO2 equivalent (CO2e) per year - more than international flights and maritime shipping combined.
 - Clothing makes up about 60% of the textile industry.



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The EPA, under the Resource Conservation and Recovery Act, considers many textile manufacturing facilities to be hazardous waste generators. The manufacture of polyester and other synthetic fabrics is an energy-intensive process requiring large amounts of crude oil and releasing emissions including volatile organic compounds, particulate matter, and acid gases such as hydrogen chloride, all of which can cause or aggravate respiratory disease.

Textile facts from:

The price of fast fashion. (Nature.com, 2018). Retrieved from <https://www.nature.com/articles/s41558-017-0058-9#Bib1>.

And *The 35 Easiest Ways to Reduce Your Carbon Footprint.* (Columbia University blog, 2018). Retrieved from <https://blogs.ei.columbia.edu/2018/12/27/35-ways-reduce-carbon-footprint/>.

and *A New Textiles Economy: Redesigning Fashion's Future* (Ellen MacArthur Foundation, 2017).

Also see: <https://www.wri.org/blog/2017/07/apparel-industrys-environmental-impact-6-graphics>

Image from Pixabay: <https://pixabay.com/photos/tshirt-shirt-clothes-casual-2428521/>

Local Secondhand Resources

Bath:

Buy Low Baby Consignment
J'adore Consignment
Patten Free Library Bookstore

Brunswick:

Estilo Consignment
Goodwill
It's All Good Consignment
Salvation Army
Woods + Waters Gear Exchange

Newcastle:

Consigning Women

Damariscotta:

The Lady's Room
Young'uns
Women of Substance

Topsham:

Goodwill
Habitat for Humanity ReStore



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Repair Clinic

A repair clinic (a.k.a. fix-it clinic or repair café) is an event where community members get together to share knowledge and fix things.

- Repair electronics, clothing, appliances, bicycles, furniture, and much more
- Locate and invite subject matter experts
- Locate and gather appropriate tools
- Libraries, community centers, faith centers, or schools may be good venues



Quick-Start Guide to Running a Repair Clinic:

<https://www.maine.gov/dep/waste/recycle/documents/starting-a-repair-clinic.pdf>



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File:Repair Cafe by Ilvy Njiokiktjien.jpg from:

https://commons.wikimedia.org/wiki/File:Repair_Cafe_by_Ilvy_Njiokiktjien.jpg

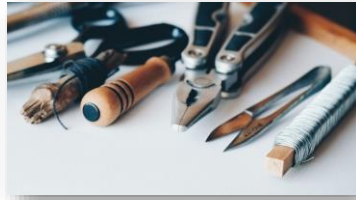
Tool Lending Library

Lending libraries conserve resources by giving community members access to the tools they need when they need them.

- Some libraries charge a membership fee
- May lend hammers, saws, kitchen appliances, gardening tools, camping gear, and more
- Best to stick to durable, low-maintenance items that can be repaired
- Can be large and official or small and casual

Visit the Portland Tool Library website to see an example:

<http://portlandmainetoollibrary.org/>



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Potential resource to share: <https://www.shareable.net/blog/how-to-start-a-tool-library-in-your-community>
Image from Pixabay

Recycle



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Recycling Progress Reports

LD 112 - An Act To Implement Changes to Maine's Solid Waste Laws
Pursuant to a Review of the State Waste Management and Recycling Plan

- Amended 38 M.R.S. §2133, sub-§7 so municipalities will now submit biennial (every two years) recycling progress reports rather annual
- The municipal report is NOT the same as the transfer station report, which is specific to activities at and affecting the transfer station as outlined in 06-096 CMR ch. 400, section 3(E)
- The municipal recycling progress reports demonstrate progress toward helping us meet our statewide recycling rate goal of 50% (see 38 M.R.S. §2132 “State goals” and 38 M.R.S. §2133 “Municipal recycling”)



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Arrowsic's Diversion Impact

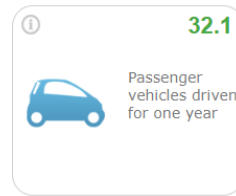
- Arrowsic has an average diversion rate of 45%
- Recycling decreased slightly over past few years, but so did tons of waste generated
 - Per capita disposal of 0.10 tons in 2018 - well below state goal of 0.55 tons per capita by January 1, 2019
- Diversion for the past three years - estimated impact is equivalent to preventing emissions from about 110 cars...



2016 – 89 tons diverted



2017 – 82 tons diverted



2018 – 74 tons diverted



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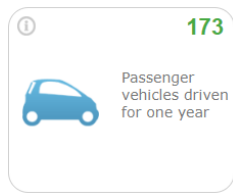
	disposal	recycling	compost	total diversion	total tons
generated	recycling rate				
2016	121.37	66.07 47%	23	89.07	210.44
2017	121.08	59.43 46%	23	82.43	203.51
2018	125.1	51.4 42%	23	74.4	199.5

Figures are rounded – this is different from their annual report because the 37% didn't include bottle bill credit of 0.05

Maine met state goal in 2018, but likely 2019 report will show drop in recycling and increase in landfilling as numerous towns dropped recycling programs – goal is 0.55 tons disposed per capita by January 1, 2019 and to further reduce the statewide per capita disposal rate by an additional 5% every 5 years thereafter.

Georgetown's Diversion Impact

- Georgetown has an average diversion rate of 52%
 - Opportunity to increase diversion even more through composting
- Recycling decreased over past few years, particularly in 2018
 - Per capita disposal of 0.26 tons in 2018 - well below state goal of 0.55 tons per capita by January 1, 2019
- Diversion for the past three years - estimated impact is equivalent to preventing emissions from about 490 cars...



2016 – 279 tons diverted



2017 – 269 tons diverted



2018 – 237 tons diverted



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generated	disposal	recycling	compost	total diversion	total tons
2016	306.78	276.76 52%	0	276.76	583.54
2017	291.88	268.76 53%	0	268.76	560.64
2018	295.14	236.65 50%	0	236.65	531.79
Avg		52%			

Georgetown data pulled from transfer station reports – looks like municipal report for 2018 may not have been submitted(?)

Woolwich's Diversion Impact

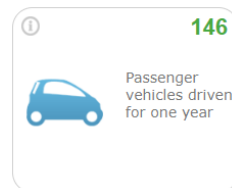
- Woolwich has an average diversion rate of 26%
 - Opportunity to increase diversion - compost, education and outreach
- Recycling has held fairly steady, disposal up in 2018
- Per capita disposal of 0.37 tons in 2018 - well below state goal of 0.55 tons per capita by January 1, 2019
- Diversion for the past three years - estimated impact is equivalent to preventing emissions from about 440 cars...



2016 – 237 tons diverted



2017 – 234 tons diverted



2018 – 235 tons diverted



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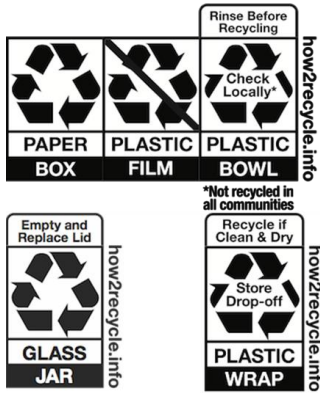
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Woolwich

generated	disposal recycling rate	recycling	compost	total diversion	total tons
2016	859.32 27%	237.38	0	237.38	1096.7
switch to ecomaine					
2017	850.27 27%	233.78	0	233.78	1084.05
2018	892.41 26%	234.71	0	234.71	1127.12
					Avg
					recycling rate
diversion tons divided by total tons					2016
26.6%					population
that total, add 0.05 for bottle bill					2017
26.6%					3,072
multiply by 100					2018
0.37					25.8%
Avg					26.3%

Recycling Tips

Look for this how-to label on packaging. Visit [how2recycle.info](http://www.how2recycle.info) to learn more.



Find drop-off locations for plastic bags at www.plasticfilmrecycling.org

- Cereal bags
- Mattress bags
- Furniture wrap
- Zip lock, sandwich bags, etc.
- Bubble Wrap
- Stretch film/pallet wrap
- Pellet bags (turn inside out, shake)
- Dry Cleaning bags
- Newspaper Sleeves
- Ice bags
- Bread bags
- Salt bags
- Produce bags
- Case over-wrap (from toilet paper, etc.)



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Image from: <http://www.how2recycle.info/labels>

Maine's Product Stewardship Recycling Programs

Waste Item	Cost	Find drop-off locations
Architectural paint: latex or oil-based (in liquid form)	Free	Visit paintcare.org
Mercury thermostats	\$5 reward	Visit thermostat-recycle.org or maine.gov/dep/helpmecycle
Mercury-added light bulbs: fluorescent, neon, black light, UV, HID	Free	Visit lamprecycle.org or maine.gov/dep/helpmecycle
Electronic waste	Low cost or free	Visit maine.gov/dep/helpmecycle
Rechargeable batteries and cell phones	Free	Visit call2recycle.org or your local service provider



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Maine's product stewardship programs help residents recycle certain items that are hard to dispose of and/or illegal to throw in the trash.

Other programs being considered

- Mattresses LD 710
- Packaging LD 1431
- Tobacco products LD 544
- Single-use batteries LD 1594
- Pharmaceuticals LD 1460



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General schematic

Producer puts **readily recyclable** materials on the market



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General Schematic

Producer puts packaging on the market that is **not readily recyclable**

Producer does not collect and recycle packaging and it is disposed



Producer pays trash fee to stewardship organization



Trash fees distributed to municipalities on a per capita basis



Producer collects and recycles packaging of the type it put on market



No payment to system for material collected and recycled



Mail-back Recycling

TerraCycle recycles waste not accepted in most municipal recycling programs, like juice boxes, toothpaste tubes, snack food wrappers, and even medical waste and cigarette butts.

- There are free and paid programs.
- Individuals, schools, businesses, or municipalities can participate.
- Participants receive a cardboard box via mail for collecting materials and shipping them back.

Programs can be viewed online at [terracycle.com](https://www.terracycle.com)



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Image from Pixabay: <https://pixabay.com/illustrations/letters-email-mail-hand-write-2794672/>

Closing the Loop

Each arrow in the recycling symbol is one step of the process:

1. Collecting recyclables
2. Turning recyclables into products/packaging
3. Purchasing items with recycled content



We can help by providing quality recyclables for collection:

- Know how to prepare recyclables
- Know what does and doesn't belong in the recycling bin
- Break the habit of "wish-cycling" unacceptable items

Putting recyclables in the bin is only the first step. We close the loop of recycling when we buy recycled-content products.



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Further Steps



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Conduct a Waste Audit

- Collect or track waste for one week:
 - Include food scraps, trash, and recycling
 - Separate and assess each category
- Look to move material up the hierarchy by:
 - Switching to a reusable or rechargeable alternative
 - Changing purchasing behaviors
 - Donating, recycling, or composting
 - Finding or creating new outlets for necessary items
- Learn more: <https://earth911.com/home-garden/conducting-home-waste-audit-part-1/>



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Image from Pixabay: <https://pixabay.com/photos/checklist-check-list-marker-2077020/>

Municipal Options

- Pay-As-You-Throw (PAYT)/Save-Money-And-Reduce-Trash (SMART) – equitable unit-based pricing for trash
- Cost transparency – do residents have information about how waste reduction saves money?
 - Handling materials (recycling and trash) costs money
- Mandatory recycling ordinances
 - ✓ Arrowsic already has one!
- Hosting a town event?
 - Consider reusable bags, travel mugs, or other waste-reducing prizes instead of a t-shirt



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Photo from Pixabay <https://pixabay.com/photos/bottles-water-steel-glass-774466/>



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