

“Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use.

Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and **not burn or bury them**.

Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.”

Peer-reviewed definition of Zero Waste, by the Zero Waste International Alliance

www.zwia.org/standards/zw-definition/

Zero Waste Hierarchy

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[An earlier version of our hierarchy was the basis for the Zero Waste International Alliance zero waste hierarchy, available at: www.zwia.org/standards/zero-waste-hierarchy/]

SHORT / SWEET VERSION:

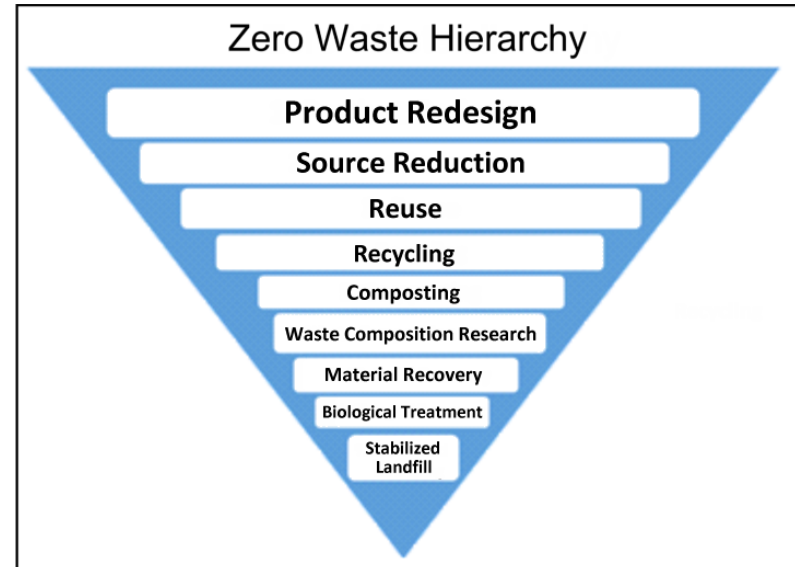
Redesign

Reduce

Reuse / Repair

Source Separate: (recycling, composting and trash)

- **Recycle** (multi-stream)
- **Compost** (aerobically compost clean organic materials like food scraps and yard waste to return to soils)
- **Waste:**
 - **Waste Composition Research** (examine trash to see how the system can be improved upstream)
 - **Material Recovery** (mechanically remove additional recyclables that people failed to separate)
 - **Biological Treatment** (composting or digestion of organic residuals to stabilize them)
 - **Stabilized Landfilling** (biological treatment reduces volume and avoids gas and odor problems)



MORE DETAILED VERSION:

- Redesign – make products durable, recyclable or compostable, and from materials that are sustainable or recycled
- Reduce
 - Toxics Use Reduction
 - Reduce amounts of toxic chemicals in production
 - Replace toxic chemicals with less toxic or non-toxic alternatives
 - Consumption Reduction
 - Reduce pervasive advertising (especially toward children, like Channel One in schools)
 - Teach people to use less, to buy products with less packaging, and to avoid disposables and non-recyclables products
 - Packaging Reduction
 - Includes polystyrene and PVC plastic bans and single-use paper/plastic bag bans and taxes
- Reuse & Repair
 - Mandate deconstruction of buildings
 - Thrift stores & charity collections
 - Legalize wastepicking / dumpster diving
 - Encourage discard exchanges like Freecycle
 - Incentivize food recovery
 - Paint recycling / exchange
 - Repair centers for bikes, computers, furniture, appliances, etc.
- Source Separate:
 - Avoid [single stream](#) (paper mixed with bottles/cans) and “[one bin for all](#)” (no source separation)
 - Better separation at the source of discarded materials = more valuable materials to market

- Recycle
 - Dual-stream recycling (paper separate from glass/metal/plastic) to a Material Recovery Facility (MRF)
 - Incentivize recycling through per-bag utility pricing, called “Pay As You Throw” (PAYT) or “Save Money and Reduce Trash” (SMART) – this immediately cuts waste generation by 44% on average
 - Adopt a bottle bill
 - Buy recycled and create local markets for materials, especially glass
 - Seek the highest end-use and avoid “downcycling”
 - Create recycling programs for electronic waste (*e-Stewards* certified), household hazardous wastes, etc.
 - Residuals from recycling (that which can’t be recycled at a MRF) jump down to the research step below
- Compost
 - Weekly curbside collection of recyclables and organics can be done while decreasing the collection of trash to every other week (what smells in trash is the compostables, so this encourages composting).
 - Ban clean organics (not [sewage sludge!](#)) from landfills. Sewage sludge, even once digested, does not belong on farm fields or in urban gardens. Clean compost from food scraps and yard waste can be used in landscaping and non-food agriculture uses.
- Research
 - On a regular basis, do a waste sort and see what remains in the waste stream and feed that into Extended Producer Responsibility campaigns, product bans and other measures to eliminate these residual materials from the waste stream by ensuring that they’re dealt with further up in this hierarchy.
- Material Recovery
 - For the remaining waste, mechanically pull out additional recyclables. This uses the sorting capability of a “Dirty MRF,” or “Mixed Waste Processing” facility, but should never be a replacement for source separation and upstream recycling and composting, as it will get people out of good recycling habits and will degrade the quality of recyclables, lowering their value, and far less will actually be recycled.
- Biological Treatment
 - The small portion that remains, if there is enough organic material in it, should be stabilized with aerobic composting (or, to be more thorough, anaerobic digestion followed by aerobic composting to dry it out). This avoids having gassy and stinky landfills. Using digestion helps remove all methane generating potential from the waste, and is the only so-called “waste-to-energy” component of a zero waste system.
 - Digested municipal waste residuals are too contaminated to be marketed as fertilizer or soil amendment.
- Stabilized Landfilling – monofill the stabilized waste in separate landfill cells at existing landfills
- Ensure proper landfill management (don’t mismanage the landfill by managing it for energy production):

If disposing of the stabilized residuals in a conventional landfill full of decaying organic material, it’s important to manage the landfill properly, as follows:

 - Minimize gas production: Don’t manage the landfill as an energy facility by stimulating gas production.
 - Keep out liquids: Cover the active face of the landfill with a temporary structure to keep out rainwater; Do not recirculate leachate
 - Cap landfills with permanent synthetic covers; install gas collection systems in months, not years.
 - Maximize gas collection:
 - Segregate organics in landfills for best gas collection
 - Maintain high suction on collection wells; do not damp down wells or rotate off the wells to stimulate methane production
 - Clean the captured gas prior to use
 - Filter toxins in the gas into a solid medium like a carbon filter; containerize and store on-site.
 - Do not send to carbon “regeneration” or “recycling” facilities (they simply incinerate the captured chemicals, polluting the air)
 - The purified gas can be used for heating purposes (burned in a high efficiency boiler), can be piped into gas lines, used to make alternative vehicle fuel, used in fuel cells, burned for electricity in a high efficiency turbine (less preferable to uses for heating), or the CO₂ and methane can be segregated and sold as industrial chemical feedstocks (but not for food industry use).
 - Landfill gas-to-energy should not be considered renewable (That allows it to undercut clean sources like wind and solar and puts source reduction, reuse, recycling and composting at a competitive disadvantage.)

The landfill management aspects are nuanced because it’s critical to ensure that greenhouse gas emissions from landfills are avoided, unlike how landfills are commonly managed today. For a full appreciation of the need for this type of landfill management, please review the materials at www.energyjustice.net/lfg/.