



Advancing towards a Hawaiian Circular Economy

Presented by: Nick Doyle
June 2025 Hawai'i County EMC Meeting, Hilo, HI

What does Mālama One Recycling do?

Mālama One Recycling (MOR) is a social impact venture facilitating Hawai'i's transition to a circular economy by providing resource recovery infrastructure that converts recyclables into 100% locally sourced, 100% recycled content raw materials for local Hawaiian manufacturers.



Concerns Affecting Our 'Āina



Microplastic pollution



Toxins associated with microplastics and their threat to human health and our public well-being

















Finding a long-term, holistic solution to the plastics pollution challenges we face every day in Hawai'i.



Potential Emissions















Not All Plastics are Created Equal

What are the primary consumer plastics?

 PETE	 HDPE	 PVC	 LDPE	 PP	 PS	 OTHER
polyethylene terephthalate	high-density polyethylene	polyvinyl chloride	low-density polyethylene	polypropylene	polystyrene	other plastics, including acrylic, polycarbonate, polyactic fibers, nylon, fiberglass
soft drink bottles, mineral water, fruit juice containers and cooking oil	milk jugs, cleaning agents, laundry detergents, bleaching agents, shampoo bottles, washing and shower soaps	trays for sweets, fruit, plastic packing (bubble foil) and food foils to wrap the foodstuff	crushed bottles, shopping bags, highly-resistant sacks and most of the wrappings	furniture, consumers, luggage, toys as well as bumpers, lining and external borders of the cars	toys, hard packing, refrigerator trays, cosmetic bags, costume jewellery, audio cassettes, CD cases, vending cups	an example of one type is a polycarbonate used for CD production and baby feeding bottles
						















Not All Plastics are Created Equal

Which are recyclable?

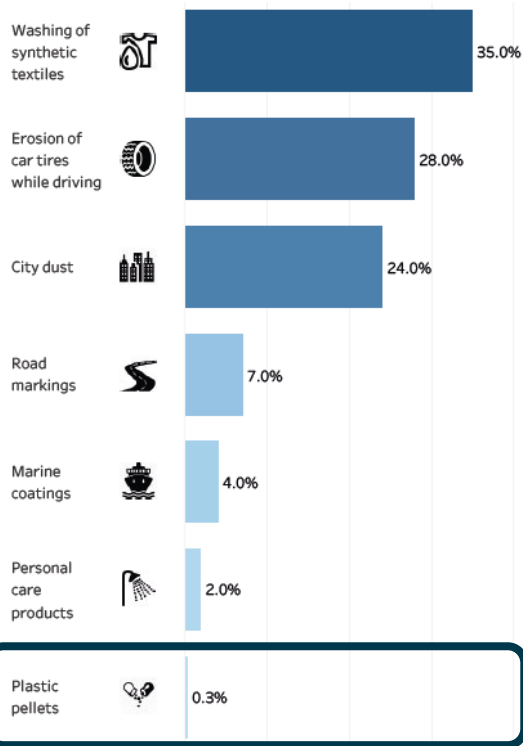
 PETE	 HDPE	 PVC	 LDPE	 PP	 PS	 OTHER
polyethylene terephthalate	high-density polyethylene	polyvinyl chloride	low-density polyethylene	polypropylene	polystyrene	other plastics, including acrylic, polycarbonate, polyactic fibers, nylon, fiberglass
soft drink bottles, mineral water, fruit juice containers and cooking oil	milk jugs, cleaning agents, laundry detergents, bleaching agents, shampoo bottles, washing and shower soaps	trays for sweets, fruit, plastic packing (bubble foil) and food foils to wrap the foodstuff	crushed bottles, shopping bags, highly-resistant sacks and most of the wrappings	furniture, consumers, luggage, toys as well as bumpers, lining and external borders of the cars	toys, hard packing, refrigerator trays, cosmetic bags, costume jewellery, audio cassettes, CD cases, vending cups	an example of one type is a polycarbonate used for CD production and baby feeding bottles
						

Not All Plastics are Created Equal

Which can be recycled back into it's original package form here in HI (ie Closed-loop in a Circular Economy)?

 PETE	 HDPE	 PVC	 LDPE	 PP	 PS	 OTHER
polyethylene terephthalate	high-density polyethylene	polyvinyl chloride	low-density polyethylene	polypropylene	polystyrene	other plastics, including acrylic, polycarbonate, polyactic fibers, nylon, fiberglass
soft drink bottles, mineral water, fruit juice containers and cooking oil	milk jugs, cleaning agents, laundry detergents, bleaching agents, shampoo bottles, washing and shower soaps	trays for sweets, fruit, plastic packing (bubble foil) and food foils to wrap the foodstuff	crushed bottles, shopping bags, highly-resistant sacks and most of the wrappings	furniture, consumers, luggage, toys as well as bumpers, lining and external borders of the cars	toys, hard packing, refrigerator trays, cosmetic bags, costume jewellery, audio cassettes, CD cases, vending cups	an example of one type is a polycarbonate used for CD production and baby feeding bottles
						

Primary Microplastic Contributing Sources



- Marine Debris Composition: Studies show that discarded fishing gear and other non-PET plastics make up more than half of ocean plastic pollution.
- PET bottles are a minor contributor considered at **0.06%** of total possible microplastic pollution sources.
- PET beverages barely register as potential microplastics contributor in comparison to the number one contributor, synthetic textiles.

Malama One Efforts to Mitigate Microplastics Release

Landfill Microplastic Diversion

The easiest and most impactful method of **reducing microplastic release is by diverting any plastic products** from the environment.

The Malama One facility addresses this issue in Phase 1B by **diverting any plastics** that would have otherwise degraded in a landfill.

Zero Liquid Discharge

Our unique **zero liquid discharge (ZLD)** system not only conserves water in a **closed loop system**, it also ensures ALL particulate waste accumulates in a final catch-all.

This is then used as a feedstock to make **Resin8, an environmentally friendly** sand alternative in concrete that can be trialed for affordable housing in the county in Phase 1B.

Universal Washing Machine Microplastics Filter

While our microplastics mitigation for phase 1 is admirable- its a tiny dent in comparison to washing of textiles (34%).

To address the single largest contributor, we have developed a universal filter capable of **capturing 99.9% of possible microplastics**.

This filter is **inexpensive** and the **most effective solution** to curbing microplastic pollution in Hawai'i

Ensuring Toxin-Free Recycled Plastic Packaging

How do we ensure that our recycled content plastic packaging is free of known toxins?

Adequate Collection Programs

- Deposit Return Schemes – HI-10
- Curbside collection for recycling



Stringent Federal Food Safety Standards

- US FDA Food Contact Standards
- Letter of No Objection



FDA Compliant Technology

- Starlinger Solid State Polycondensation system



Putting Food Safety Standards into Perspective - Globally

Just as not all plastics are created equal, not all recycled content plastic packaging is created equal. The source matters!



38.8%
Of the Global Population





24%
Of the world's sovereign nations represented

The Hard Truth:

- 76% of the World's sovereign nations didn't make the list.
- While just 5.1% of the World's sovereign nations classify as High Risk or Critical Risk because of poor food safety standards, that 5.1% represents the demand of nearly 3 billion consumers.

Comparative Impact Study (per annum)

What if Hawai'i replaced all the HI-5 eligible PET with locally produced glass, aluminum or 100% post-recycled PET (rPET) today?

	Glass	Aluminum	rPET
	7,500 MWh 700,000 less homes with power	70,000 MWh 6,500,000 less homes with power	-3,384 MWh Able to power more than 300,000 additional homes
	13,500 tons Equivalent to an extra 900 full garbage trucks	3,700 tons Equivalent to an extra 243 full garbage trucks	Equivalent waste (800 tons) The amount of waste generated by rPET is equivalent to PET. This goes to zero in a closed loop system
	2 million gallons Enough to fill 113 swimming pools	1.6 million gallons Enough to fill 113 swimming pools	-2.5 million gallons 138 swimming pools of water saved
	11,000 tons CO ₂ eq Equivalent to using 26,000 barrels of oil	34,250 tons CO ₂ eq Equivalent to using 80,500 barrels of oil	-4,100 tons CO ₂ eq Equivalent to saving 10,000 barrels of oil

Comparative Emissions Impact Assessment

Who We are and What We are Not

Virgin Plastic Refinery



<u>Toxin/Pollutant</u>	<u>EPA/OSHA /NAAQS</u>	<u>Unit</u>
1,4-dioxane	1	ppb
Nickel	1	ppb
Ethylbenzene	100	ppm
Ethylene Oxide	5	ppm
Benzene	1000	ppb
Sulfur Oxides	75	ppb
Nitrous Oxides	53	ppb
Methanol	200	ppm
VOCs	200	ppm

Waste-Energy Incinerator



<u>Toxin/Pollutant</u>	<u>EPA/OSHA /NAAQS</u>	<u>Unit</u>
Volatile Metals	0.1	mg/m3
HCl	200	ppm
Sulfur Dioxide	75	ppb
Nitrous Oxide	53	ppb
VOCs	200	ppm
PCDD	no limit set	
PCDF	no limit set	
PAH	0.2	mg/m3
PCP	no limit set	
PCB	50	ppm
HBCD	no limit set	
PBDE	1 to 7x10 ⁻⁴	mg/kg/d
PM 10	9	mg/m3
Heavy Metals	9	mg/m4

Closed-Loop, Zero Waste, Bottle to Bottle Recycling



<u>Emission</u>	<u>EPA/OSHA /NAAQS</u>
VOC's	well under limit
Water Vapor	not regulated

MAHALO
for your Kōkua in Hawai'i
to Mālama 'Āina and Create
Meaningful, Measurable
Change so future
Generations may Thrive!



Contact: Nick Doyle, Malama One Recycling
Email: n.doyle@malamarecycling.org