What is the best disposal option for the "Leftovers" on the way to Zero Waste?

www.ecocycle.org/specialreports/leftovers

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Why focus on “leftovers”

Maximizing the 3Rs is the most important thing to keep working on

Getting to Zero Waste is a journey, takes time, still producing trash along the way

Big $$$$ already invested in landfills and incinerators

Wrong investment jeopardizes a community’s Zero Waste future

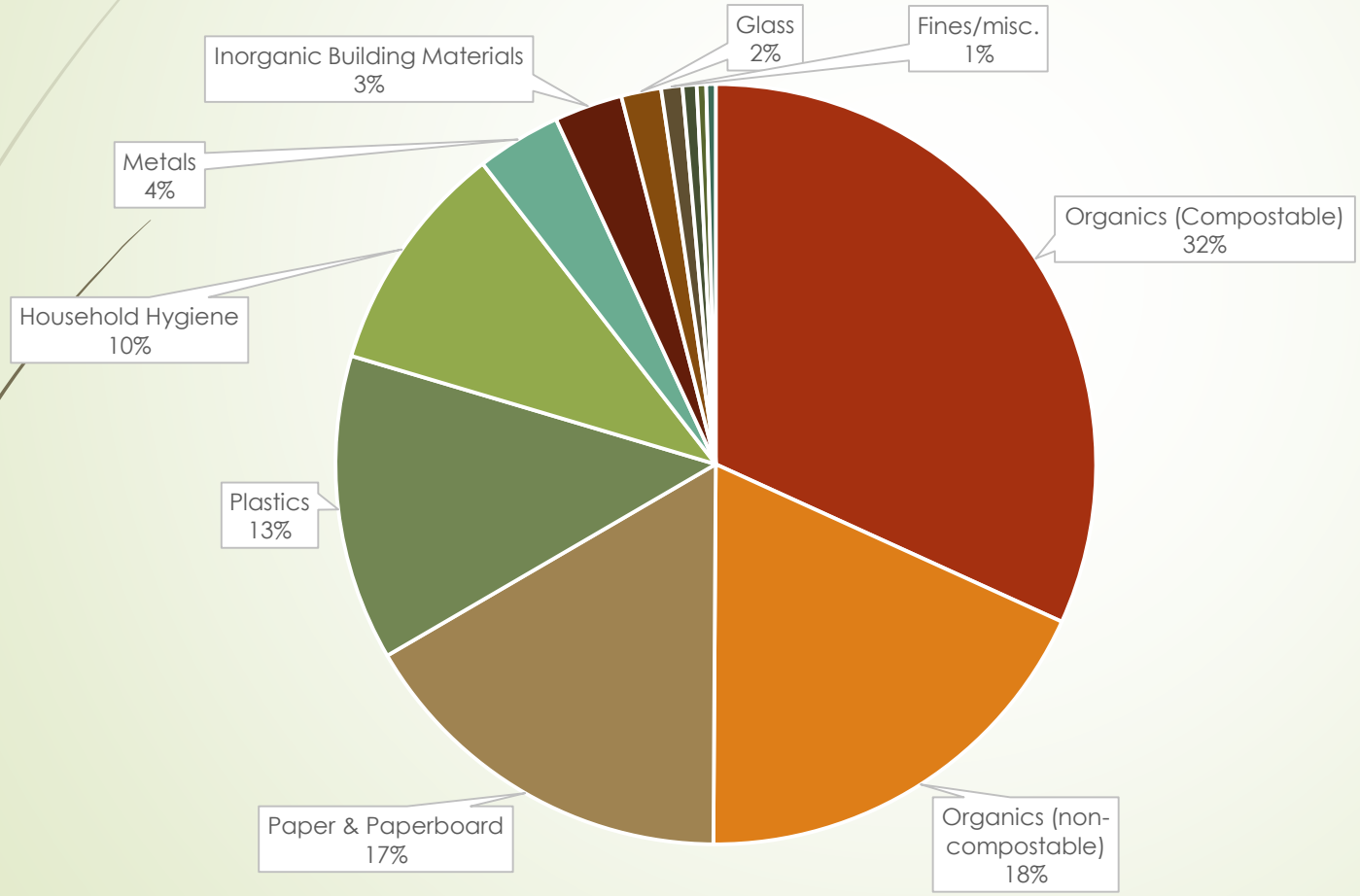
“Is this true?”

“We think [our clients should] absolutely [be] pushing the recycling, but then looking to do the best with what´s leftover after that recycling. And clearly, the answer, whether you listen to the [European Union], the U.S. EPA or any kind of policy initiative, the best environmental answer after you´ve recycled is to convert what´s left over into energy.”

-- Anthony Orlando, CEO, Covanta

Waste & Recycling News, April 16, 2012

Household "leftovers" after 71% recovery in Seattle, WA



Top materials remaining in leftovers	
Food	30%
Animal byproducts	13%
Disposable diapers	10%
Compostable/soiled paper	7%
Mixed low-grade paper	5%
Other plastic film	4%
Textiles/clothing	3%

Every disposal option requires a landfill

Direct to landfill

- **LFGTE 80%:**
  80% of landfill gas captured and used for energy production
- **LFGTE 40%:**
  40% of landfill gas captured and used for energy production

LFGTE = landfill-gas-to-energy:
Gas capture rates are controversial, ranging from 20% lifetime capture to 90% point-in-time capture

WTE to landfill

- **WTE:**
  mass burn incineration with energy recovery

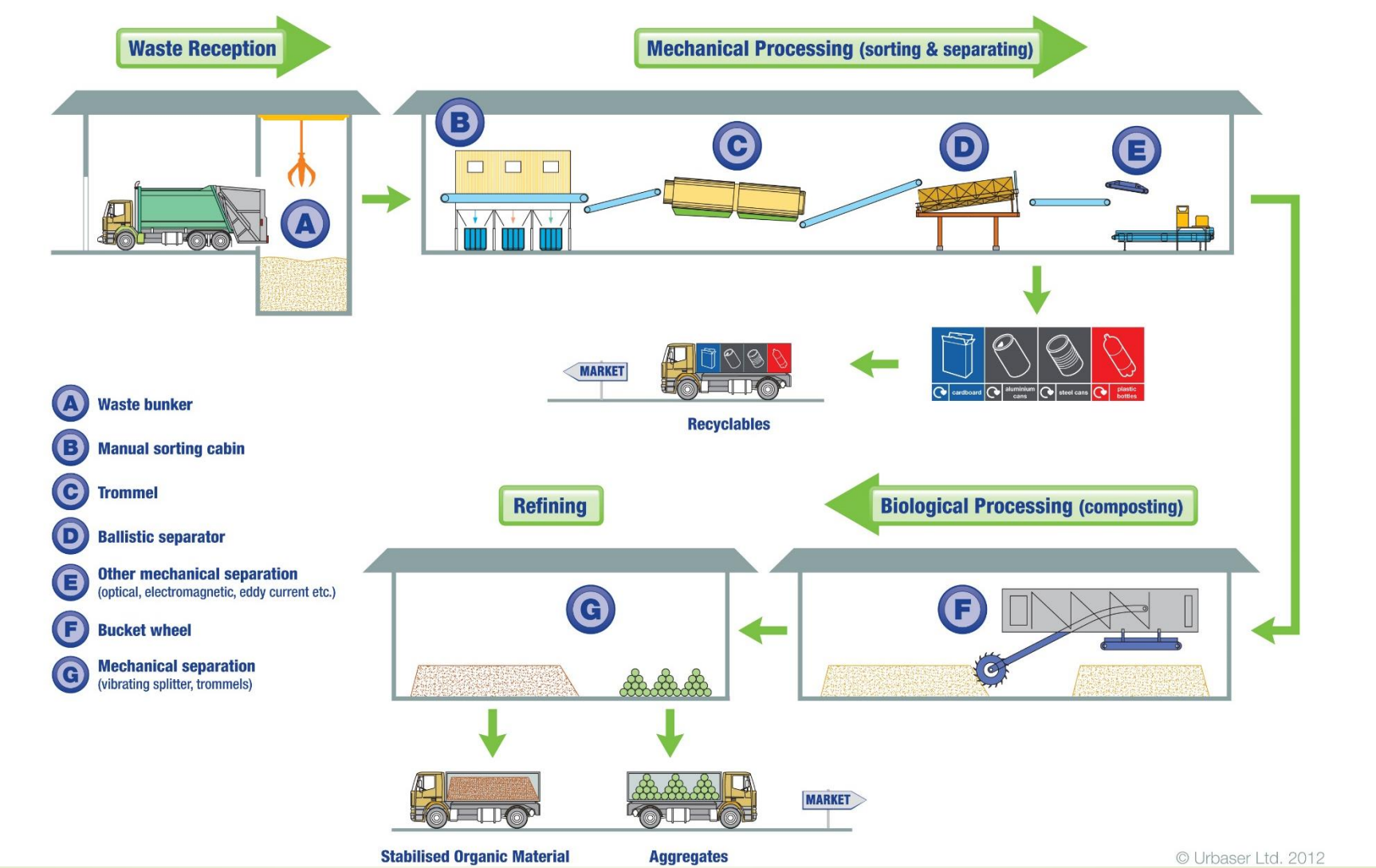
WTE = waste-to-energy:
No "conversion techs" were analyzed because no commercial-scale emissions data available; assumed 10% residue by weight to landfill, 25% by volume

MRBT to landfill

- **MRBT Hi**
  higher recovery of recyclables,
  no landfill gas capture
- **MRBT Lo**
  lower recovery of recyclables,
  no landfill gas capture

MRBT = material recovery, biological treatment:
No energy/fuel is produced as a product

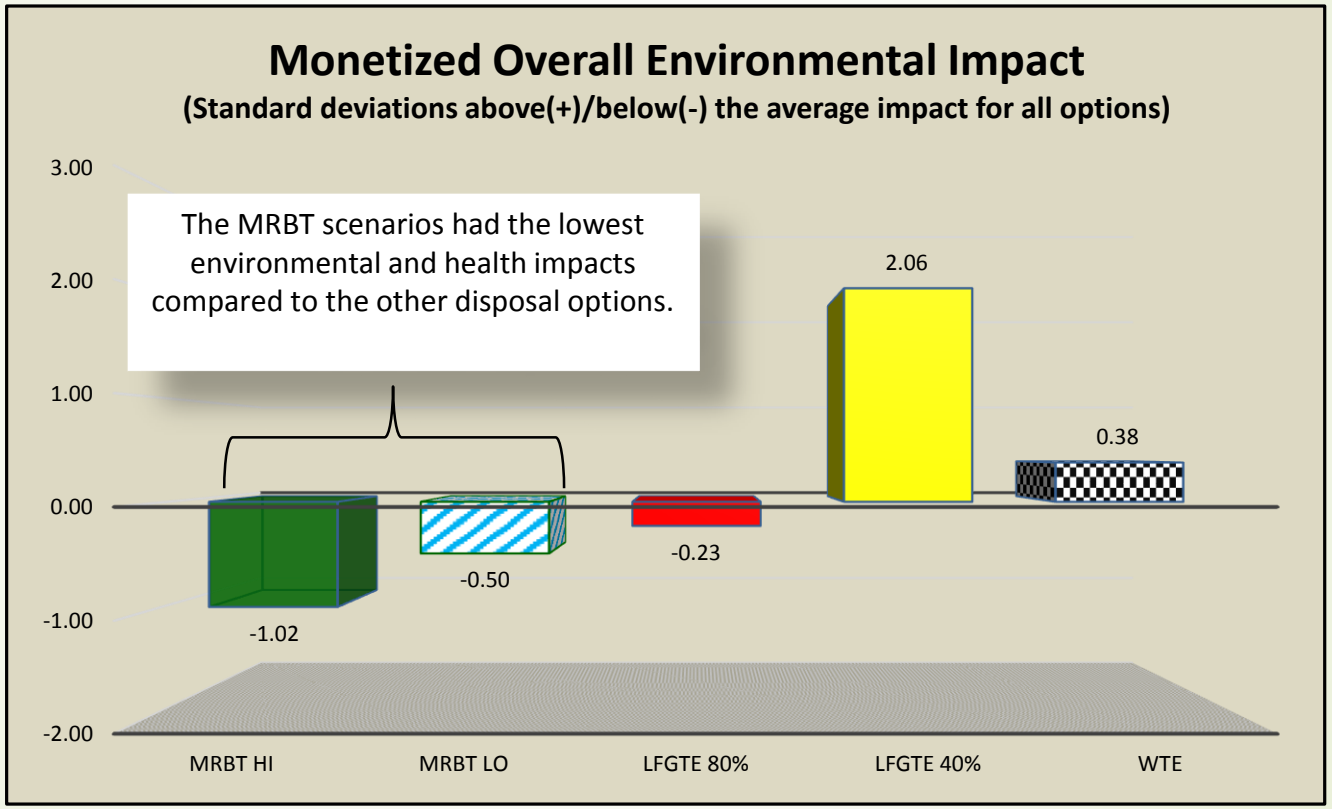
What is MRBT ?


Waste Reception
Mechanical Processing (sorting & separating)
A
B
C
D
E
MARKET
cardboard
aluminium cans
steel cans
plastic bottles
Recyclables
Refining
Biological Processing (composting)
G
F
MARKET
Stabilised Organic Material
Aggregates
A Waste bunker
B Manual sorting cabin
C Trommel
D Ballistic separator
E Other mechanical separation (optical, electromagnetic, eddy current etc.)
F Bucket wheel
G Mechanical separation (vibrating splitter, trommels)
© Urbaser Ltd. 2012

Results: MRBT the clear winner

- Highest reductions in overall environmental impacts
- Lowest environmental impact in 5 of 7 categories
- Environmental benefit valued at $7 and $13 per ton of leftovers

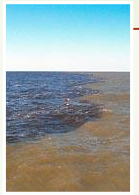
Overall impacts with standard deviation



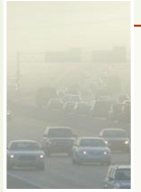
Analyze impacts with MEBCalc™

Climate Change (eCO2)

Acidification (eSO2)

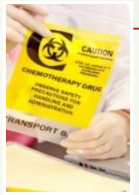


Eutrophication (eN)



Respiratory (ePM2.5)

Non-cancer (eT)

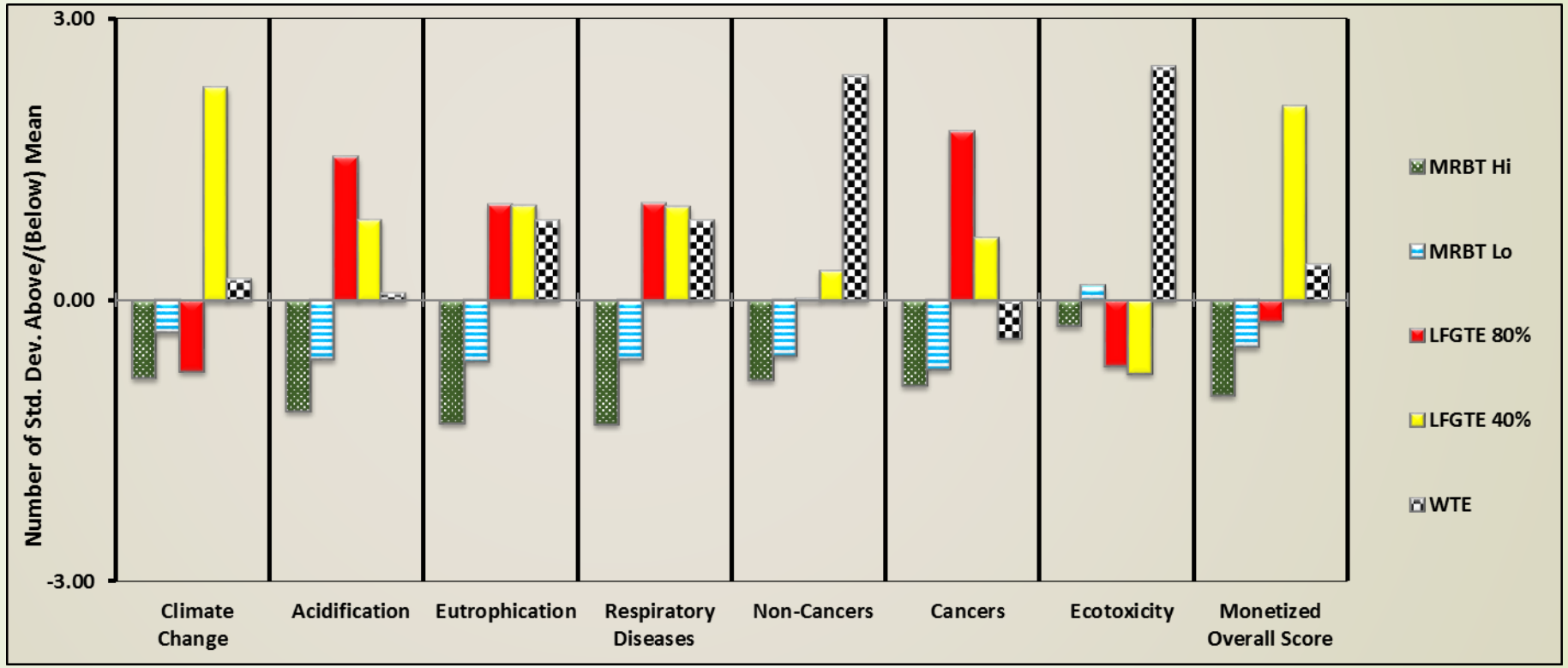


Cancer (eB)

Ecotoxicity (e2,4-D)

- More assumptions and background at ww.ecocycle.org/specialreports/leftovers

Standardized environmental impact scores for the five management options



Detailed analysis in MEBCalc™

Impact Category	Increase/Decrease in Environmental Impact Potential (measured in pounds of each impact category's indicator pollutant per incoming ton)					Monetized Impact ($/Ton of Emissions)
	MRBT Hi	MRBT Lo	LFGTE 80%	LFGTE 40%	WTE	
Climate Change (eCO_2)	-3.90E+02	-1.50E+02	-3.60E+02	1.10E+03	1.30E+02	$40
Acidification (eSO_2)	-2.50E+00	-1.40E+00	2.80E+00	1.50E+00	-3.40E-02	$290
Eutrophication (eN)	-1.80E+00	-1.30E+00	1.30E-01	1.20E-01	-1.10E-02	$4
Respiratory ($ePM_{2.5}$)	-7.00E-01	-4.90E-01	2.70E-02	1.50E-02	-2.80E-02	$10,000
Non-cancer (eT)	-5.20E+01	-4.10E+01	-1.20E+01	1.20E+00	9.70E+01	$30
Cancer (eB)	-3.20E-01	-1.50E-01	2.30E+00	1.20E+00	1.70E-01	$3,030
Ecotoxicity (e2,4-D)	1.00E-03	1.60E-03	3.60E-04	2.30E-04	5.10E-03	$3,280
MONETIZED OVERALL SCORE	- $13	- $7	- $3	+ $25	+ $4	

The actual environmental impacts of each leftovers management strategy with the total environmental impact expressed as an economic cost in the bottom row through a technique called monetization.

Hierarchy of disposal options

Results ranked from lowest to highest negative impact

- MRBT to landfill (both scenarios) — **#1 and #2**
- LFGTE 80% — **#3**
- WTE — **#4**
- LFGTE 40% — **#5**

WTE ***not*** the best option

- Next to worst overall option
- Still relies on landfills for 10% by weight
- Environmental damages are greater than the environmental benefits of creating energy

Costs of environmental damages: $4 per ton

Additional benefits of MRBT over WTE

Quicker and cheaper to build and operate

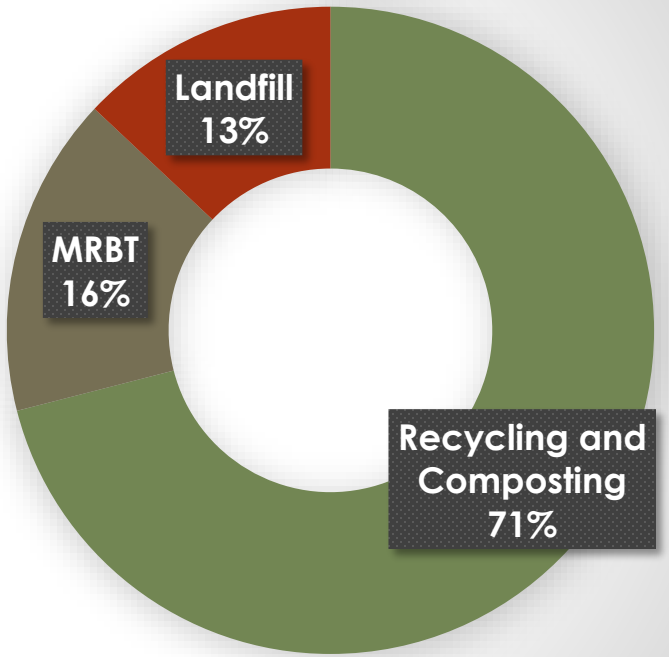
Flexible to meet local needs and growth of source separated collection system

More politically attractive

MRBT facilities are "**flexible and dual-purpose**" since they work for both source-separated materials and mixed-waste trash

Material recovery a bonus - Screening for non-recyclables an education

87%
landfill reduction
projected for
city of Seattle
households
using MRBT



Sorting residuals in Italy & partnering with industry

- ✓ Capannori, Italy – ZW Research Centre
  - ✓ First target – coffee capsules
  - ✓ Dialogue with Lavazza, "Italy's favorite coffee"

ZERO WASTE EUROPE

If you are not for Zero Waste, how much waste are you for?

Conclusion

- **MRBT-to-landfill is not a replacement for source-separated recycling and composting, but it is a valuable tool for helping communities reduce the environmental impacts from the disposal of their leftovers on the way to Zero Waste.**

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