



Alternative Metrics and Methods for 21st Century Waste Management

MRN and SWANA
Mid-Atlantic Annual Conference
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Waste Management Recycling

Where We Recycle

- Material Recovery Facilities (MRFs)
- 43 Single Stream
 - 4 Dual Stream
 - 37 Paper Only or Other Commercial Materials
 - 8 Construction and Demolition Debris
 - 6 High Grade
 - 6 Other



WM CORE: Urban Solution to Food Waste



37 compost sites, 4 CORE, facilities, 3 chipping operations

WM's Recycling/Composting Tonnages

Material	Tonnage	Material	Tonnage
Paper/OCC	8,925,573	Metals	525,473
Mixed Organics	2,694,334	Plastics	416,160
Glass	766,038	E-waste/Other	117,618
C&D/Wood	100,982	Fly Ash	1,177,618
Total all materials:			14,723,193

WM is a net reducer of GHG emissions

EPA's recommendation for Lifecycle Thinking

Lifecycle information offers greater visibility into the benefits of how we manage and use products and packaging through their entire life. Lifecycle thinking helps us to:

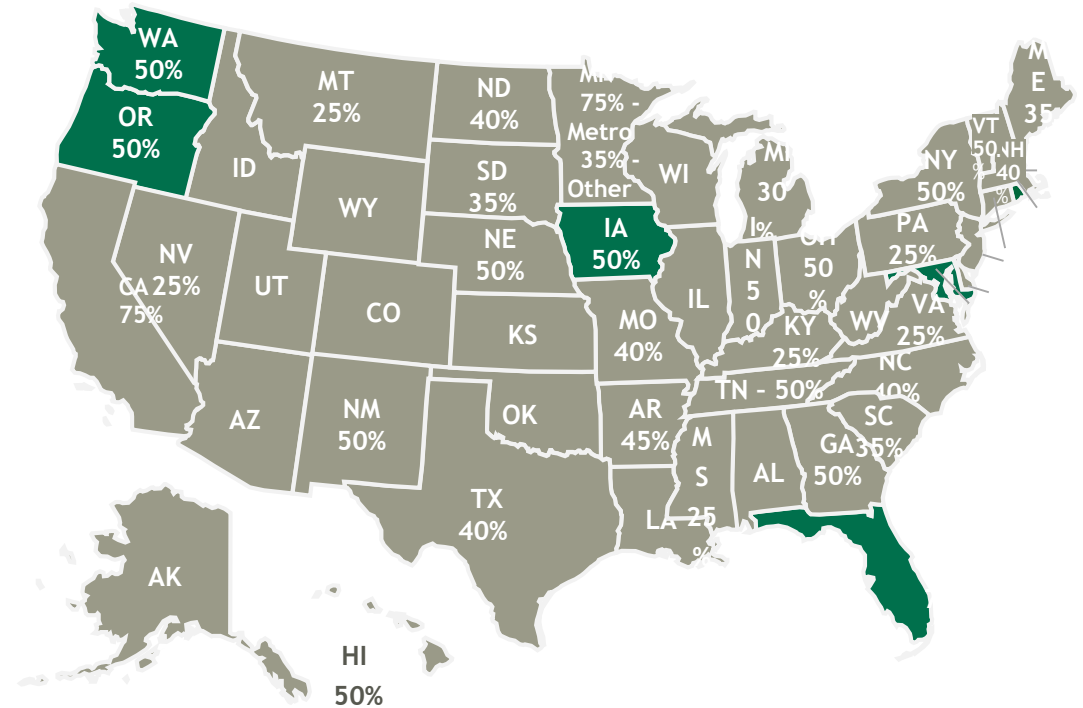
- Prioritizing and strategic planning.
- Challenging preconceived ideas about how materials can and should be managed avoiding unintended consequences.
- Find the best use/place for the material.

How do we make the shift from simple weight based goals to lifecycle thinking?

Evolving, not starting from scratch.....

National discussions are focusing on metrics and measurement. In addition to **Oregon**, several states are trying to determine how to best evolve their goals, recognizing their own priorities:

- **Florida** considering switch from 75% recycling goal to a 75% GHG emission reduction goal
- **Iowa** is considering updating their goals
- **Washington** - and separately, the **City of Seattle** - both looking to update their goals. Seattle's to incorporate "social goals."
- And, of course, **Maryland** is in the process of implementing the Governor's June 2017 SMM Executive Order.



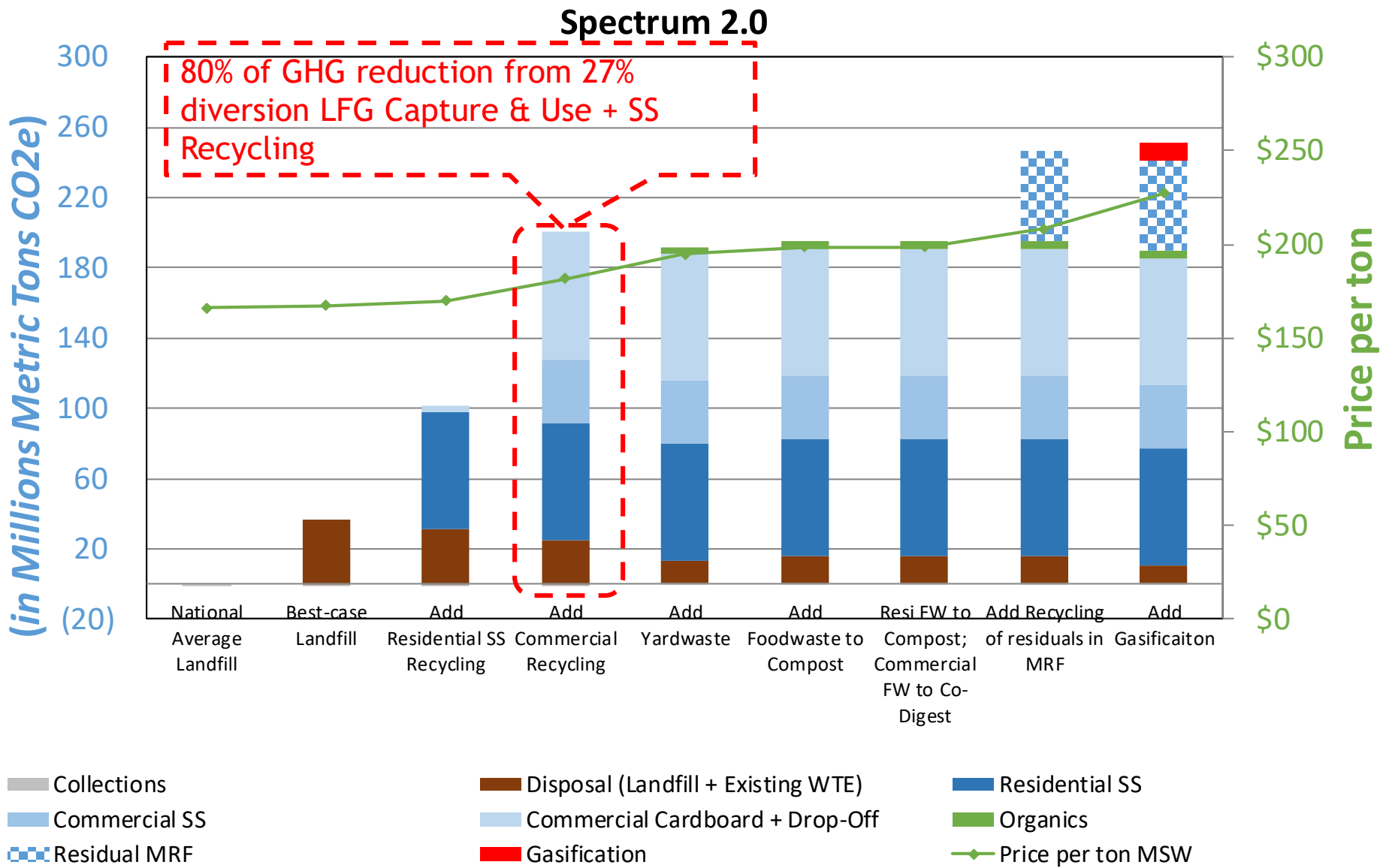
China's import restrictions are changing the recycling dialogue

- Prioritizing programs allows us to rethink/reset recycling programs to reduce contamination.
- Which materials offer the best bang for the buck?
- As the cost of recycling increases, should we be looking more closely at the benefits of reduction? Lifecycle thinking allows us to develop programs that look upstream.
- Weight based goals have created unintended consequences. We need to measure progress via tons, but weight should not be our goal: Environmental benefits are our goal.



Recycling

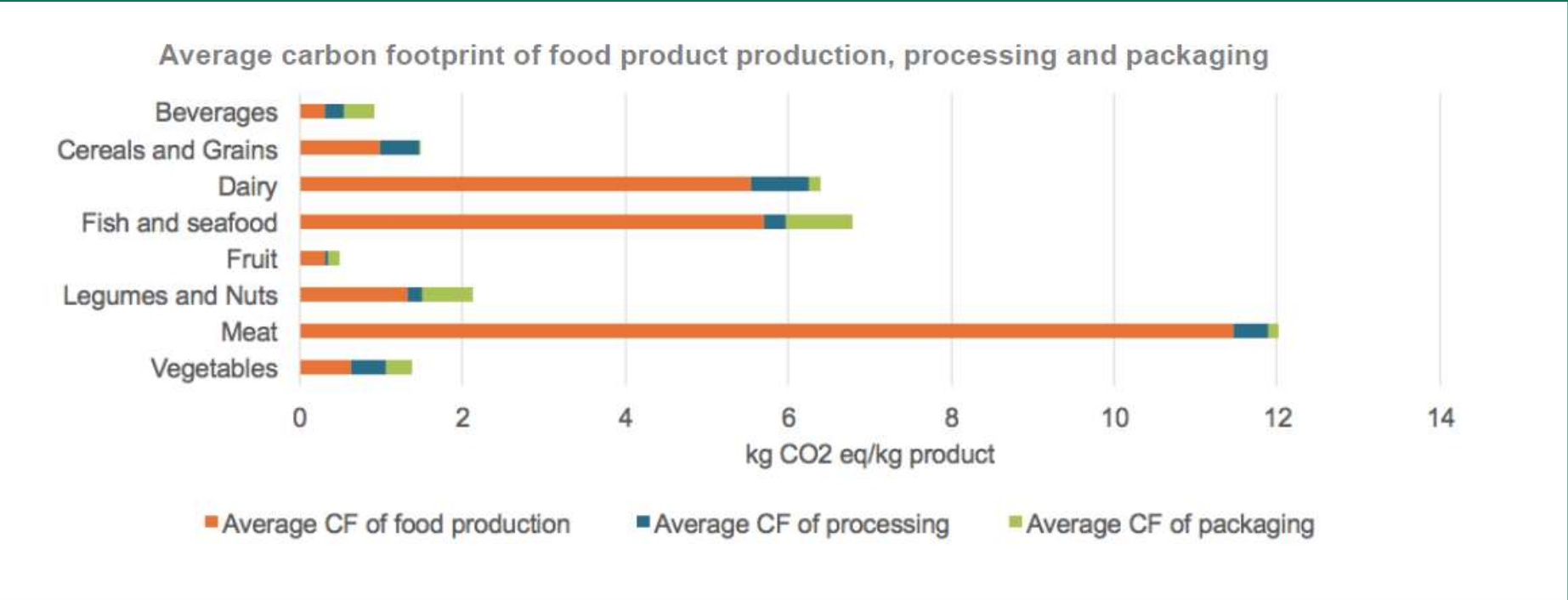
GHG Emissions Reduction from Baseline
(in Millions Metric Tons CO₂e)



- Recycling = Aluminum and steel cans, paper, cardboard, plastic and glass bottles & commercial film
- Scenarios build upon each other
- 80% GHG benefit from aggressive LFG capture & use + recycling 27% of MSW
- More processing = high incremental cost for low incremental GHG reduction

NOTE: LF Baseline emissions of 15 Million MTCO₂e

Organics: Focusing on upstream reduction or end-of-life management?



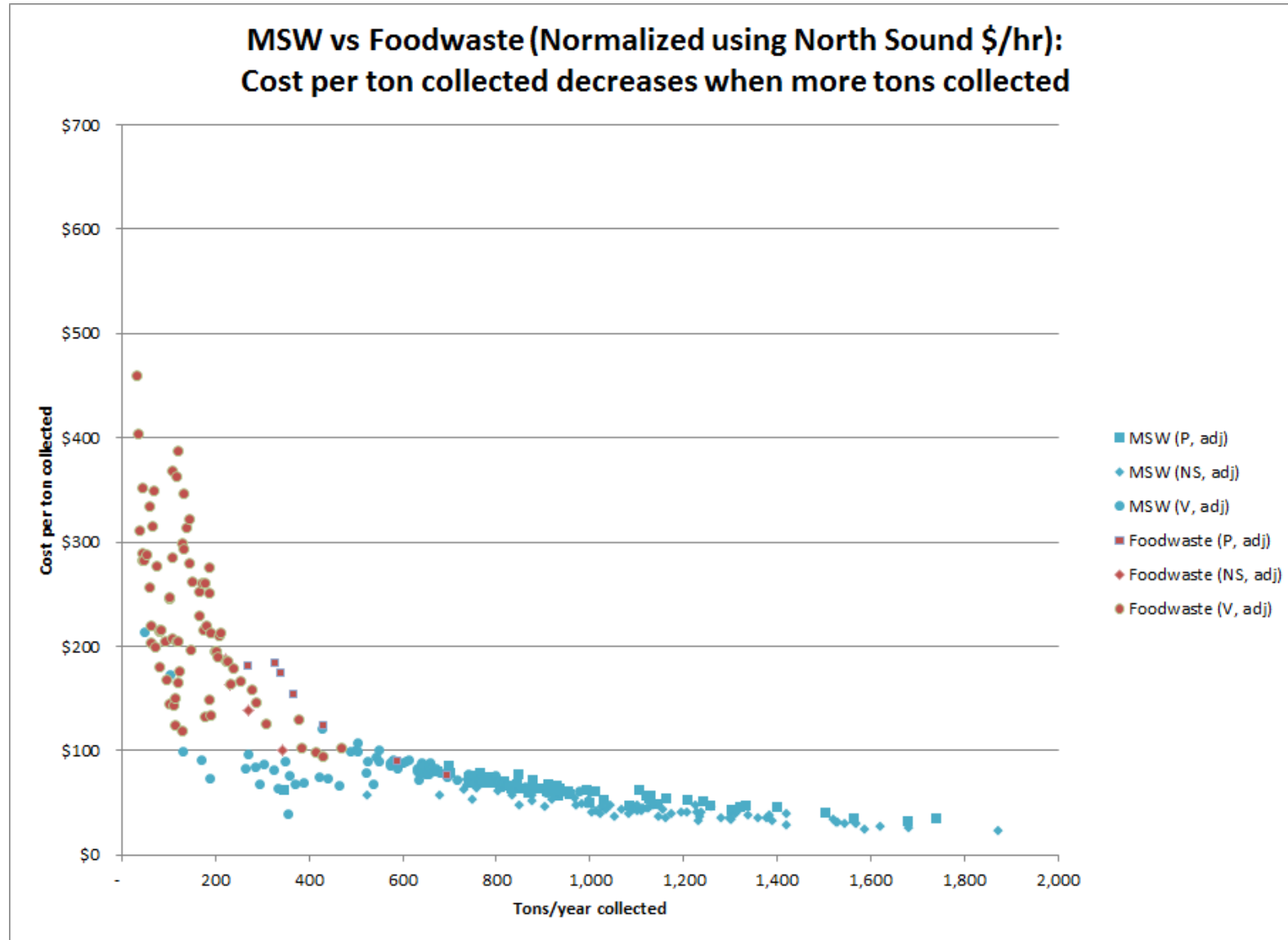
City of Oregun
Department of Environmental Quality

Energy Demand	51%	6.5%	3.5%	3.5%	3.0%	1.5%	17%	15%
Lifecycle Process	Food Supply	Primary Packaging	Secondary & Tertiary Packaging	Transport from Factory	Retailing	Selection	Storage	Cooking



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Collecting source separated food from the commercial sector



The cost of the most efficient foodwaste collection route compares to cost of the least efficient trash route



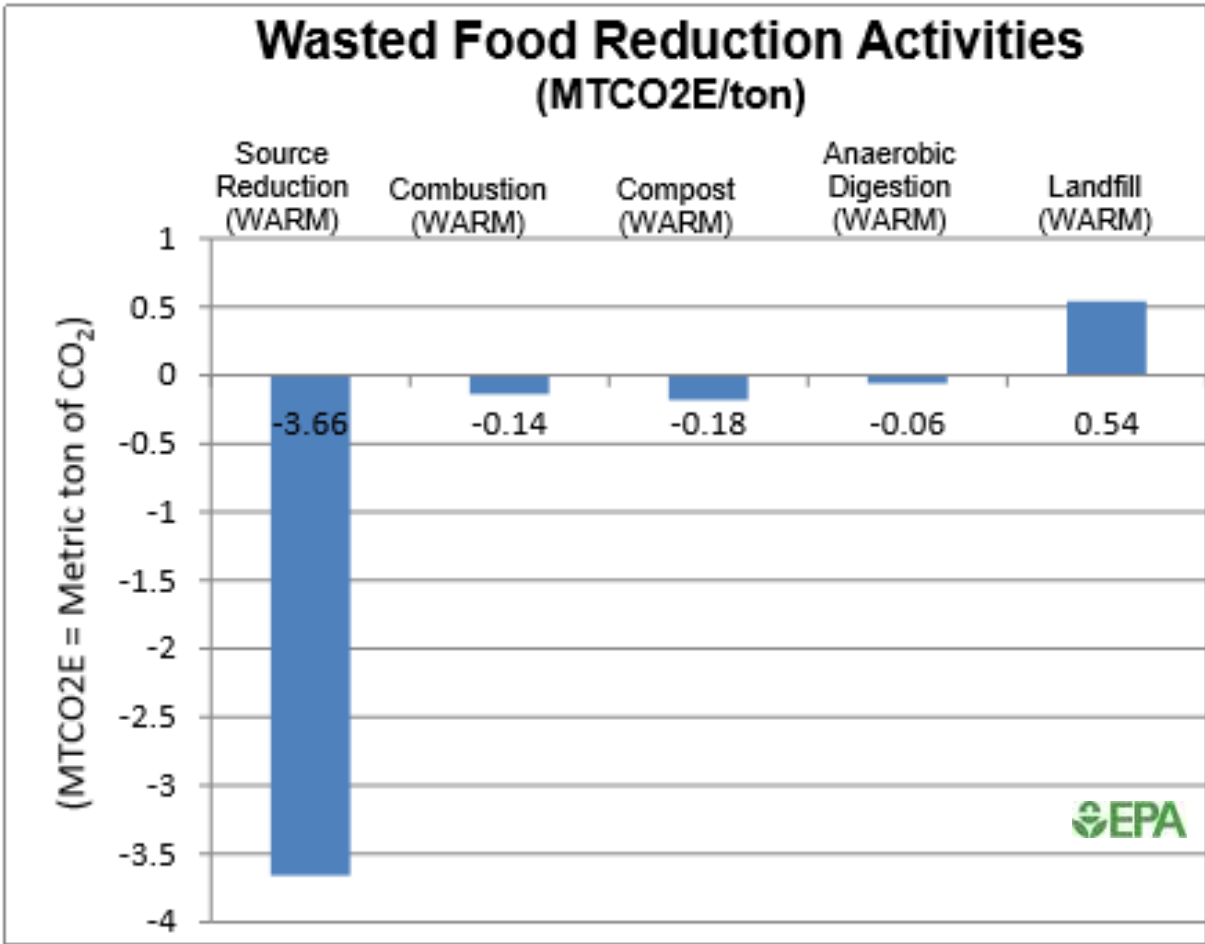
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The value of programs that reduce foodwaste

Oregon's Food Reduction Plan

1. Wasted Food Measurement Study
2. Messaging
3. Consumer Outreach
4. Schools
5. Commercial Sector
6. Edible Food Rescue
7. Labelling
8. Coalition of Interested Regional Parties
9. Research Not included elsewhere
10. Guiding Principles for Project implementation

Programs focus on reduction, not end-of-life infrastructure



Reduction has 6 times the environmental benefits of composting, and 7 times the environmental benefits of anaerobic digestion



Reduction: Environmental benefits

Liquid Packaging Format	Product Weight	Packaging Weight	Product-to-Packaging Ratio	Packaging Weight per 100g Product	MSW Landfill per 100 g Product
Glass Bottle & Metal Cap	8 ounces (236 g)	198.4 g	1:1	83.9 g	54.5 g
Plastic PET Bottle & Cap	8 ounces (236 g)	22.7 g	10:1	9.6 g	6.0 g
Metal Can	8 ounces (236 g)	11.3 g	21:1	4.7 g	2.4 g
Stand-up Flexible Pouch	6.75 ounces (199 g)	5.7 g	35:1	2.8 g	2.8g



A new way of looking at goals, metrics and tons



Step 1:

Waste Characterization
Complete waste characterization study

Step 2:

Evaluate Environmental Impact
Use waste characterization and LCA to prioritize goals based on environmental benefits

Step 3:

Set Goals
Develop material specific waste reduction & recovery goals to maximize environmental benefit

Step 4:

Develop Programs and Measure in tons
Convert goals to material specific tons to measure reduction and recovery

Measuring success using GHG emissions and tons

- **Reduction goals established (by material), and identified as a reduction of GHG emissions/energy, as a percentage from the base year.**
- **Once goal(s) have been established, reduction can be converted to a measurement of tons.**
- **Measurement will always be in tons reduced to capture materials reduction efforts.**

Tons generated = Tons recycled + tons composted + composted disposed

Tons reduced/per capita = $\frac{\text{tons recycled} + \text{tons composted}}{\text{tons generated}} \times \text{population}$

Conversion to per capital measurement compared to a Base Year allows for measurement towards reduction goals.

Making SMM & Lifecycle Thinking Simple and Relevant

SMM looks beyond the concept of diverting more tons, considering the environmental benefits of our policies and programs. It makes sense from an environmental perspective, a social perspective and an economic perspective:

Goals that emphasize reducing environmental impact use current data regarding lifecycle thinking.

Prioritizing programs based on broader environmental impacts can help customers focus on those areas with the best environmental impacts. Establish programs based on the greatest opportunity for impact.

Measure progress in tons - and remember reduction. Keep it simple by using existing GHG/energy calculators (US EPA's WARM tool) and measuring progress in tons. Review tons on a per capita basis from a base year to see reduction.

Prioritize infrastructure investments - help customer dollars go farther

In this day and age of limited funding, it is important to identify those areas where we can have the greatest impact at the least cost.

Recycling program design matters

- ✓ Current focus on diversion has ignored the benefits of reduction and has created unintended consequences
- ✓ Consider material benefits in program design



It's time for a paradigm shift:
The goal is to reduce environmental impact

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Thank you!

