Compost Operators Training Certificate Course

Overview

- Goals and Objectives
- Chapter 1: Collection & Hauling
  - Value Added w/Organics and Collaborative Partnerships
- Chapter 2: Material Characteristics
  - What from Where
- Chapter 3: Providing Options
  - Container Rental, Cart Washing, Education, Training & More
- Chapter 4: The Organics Processing Puzzle
  - Utilize & Grow Local Infrastructure
- Wrap-Up

Goals / Objectives

1. How to gain new business with institutional, commercial and municipal waste generators
2. How to develop collaborative partnerships that
   - minimize collection and hauling costs
   - lower GHG impacts on the environment
   - utilize and grow local composting options
3. How customized services can develop a long term sustainable program for generators
   - certified compostable foodservice ware
   - cart and dumpster rental
   - container washing
   - training on in-house collection procedures for ease of use and odor minimization
4. How to provide consistent and quality supply of organics to composters

Characterization and Collection

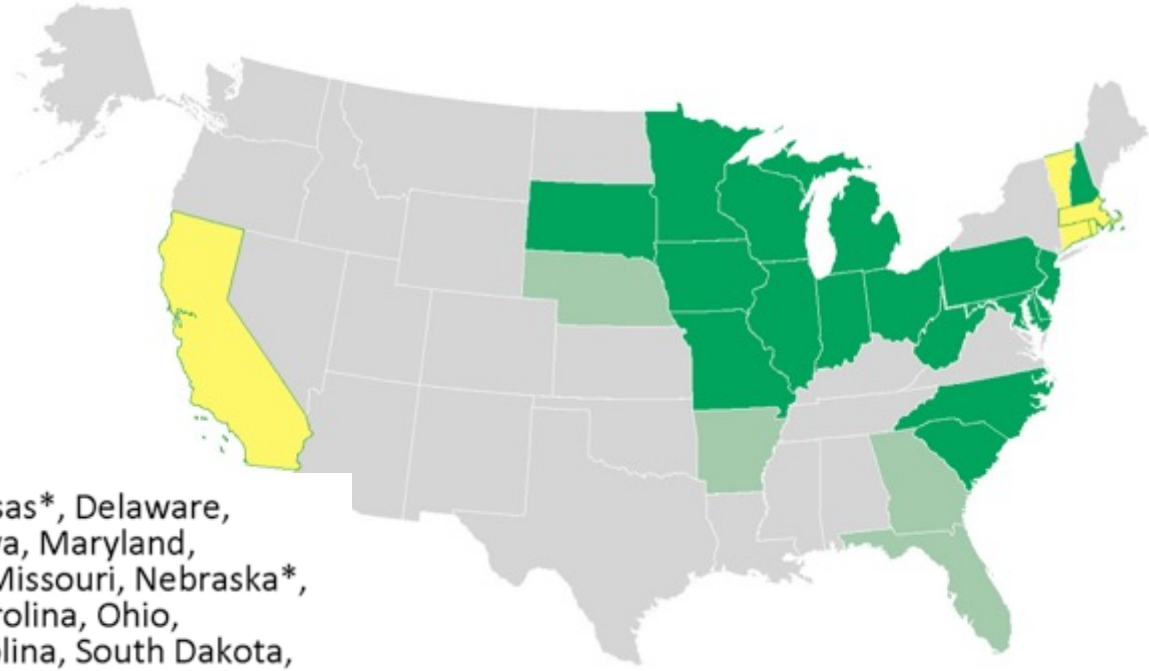
Value Added w/Organics and Collaborative Partnerships

Collection & Hauling

- Value Added
- Benefits of Collaborative Partnerships
- Needs of Customers
- Keeping Costs Down and Right Sizing

Characterization and Collection

States that Ban Organics or Mandate Organics Recycling - October, 2014



Ban/mandate some yard debris: Arkansas*, Delaware, Florida*, Georgia*, Illinois, Indiana, Iowa, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska*, New Hampshire, New Jersey, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, South Dakota, Vermont, West Virginia, Wisconsin

*Allow yard debris disposal in landfills that generate energy

Ban/mandate food scraps: California, Connecticut, Massachusetts, Rhode Island, Vermont.
Also of note: New York City, Seattle

Source: Haaren, Themelis and Goldstein, State of Garbage in America, BioCycle Magazine, Oct 2010, updated 5-2011, 3-2012, 4-2013, 6-2014, 10-2014

Collection of Food Waste

- Next big "gain" for recycling, meet zero waste goals
  - Nationally, in 2012, 36 M tons generated, only 5% diverted
  - In the US, there are 198 communities with food waste collection programs representing 2.74 M households participating.
  - 29% of Michigan's municipal waste stream
  - Compost sites managing only 10% of that
- Yard waste:
  - Nationally, 32.9 M tons generated, 64.7% diverted
- Other benefits:
  - Costs: Avoided disposal costs, reduction in over-purchasing
  - Community: reduction in methane production in landfills, food donation

- Residential Organic Waste Diversion Program
- Institutional or Commercial Organic Waste Diversion Program
- Compost Facilities That Accept Food Waste

The Numbers Behind Your Food Waste

Food waste represents **25%** of US methane emissions

1 ton Methane = 12 tons CO_2 Equivalent

Sustainable waste management, reduction, and disposal practices are a valuable piece of the supply chain.

1/3 of MSW

is food-related waste

5 lbs

per day, per person

FOOD WASTE PILES UP THROUGHOUT THE CHAIN, BUT WE THE MOST AT THE CONSUMERS STAGE

Equivalent of $165 Billion Per Year

10% of institutional food purchases become waste

another 4%-10% become waste before ever reaching the customer

In cafeterias, each meal tray generates ½ lb of food waste.*

A closed system is a good place to start a zero waste campaign

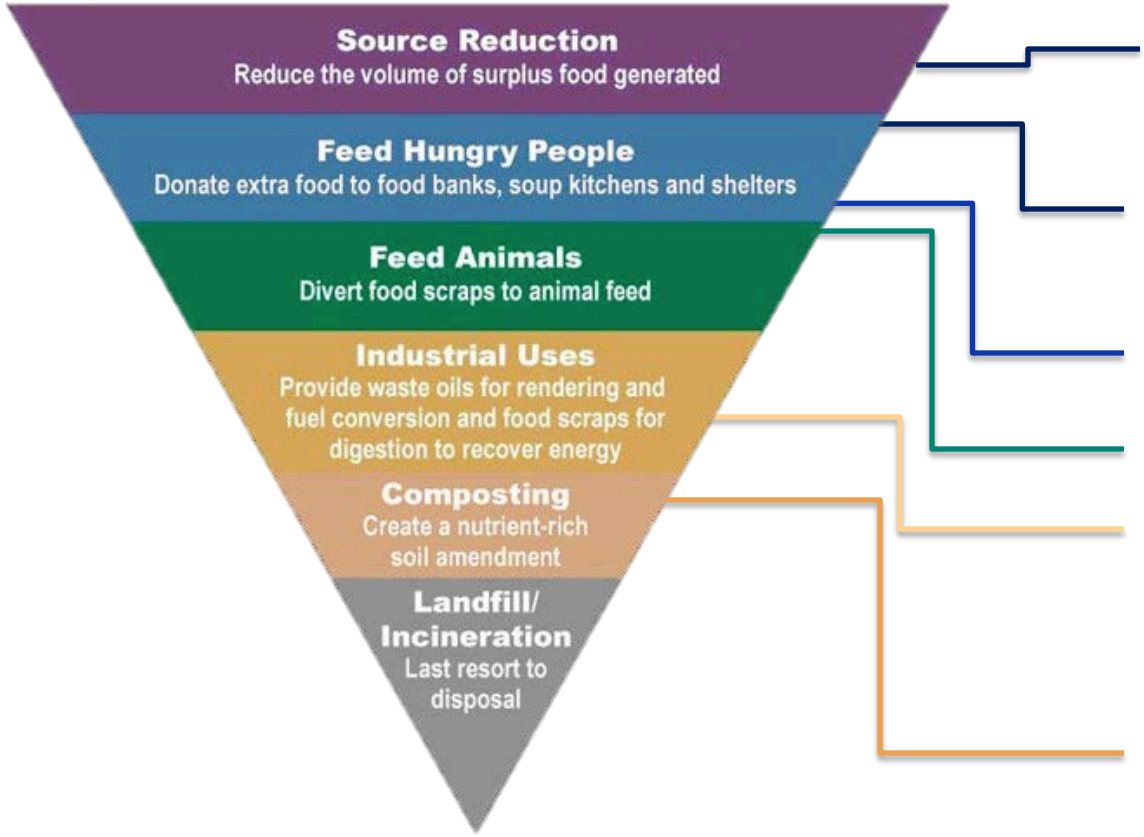
Source: Wasted: How America Is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill; Author Dana Gunders, Natural Resources Defense Council

Other Benefits of Food Waste

- ✓ Reduces methane generation from landfills from anaerobic decomposition
- ✓ Removes a high water content stream from leachate production in landfills
- ✓ Improves compost characteristics of other feedstocks like yard debris
- ✓ Positive economic benefits
- ✓ Improves soil tilth when finished compost is used as an amendment
- ✓ Positive public image

Characterization and Collection

How to Reduce Food Waste?
What can be done with Leftover Food Waste?



Reduce purchasing volumes and packaging; use reusable foodservice ware

Educate on food preservation / expiration dates

Donate to a food bank

Send residuals to a hog farm

Industrial Uses – Provide fats for rendering and biofuel and food scraps for digestion

Compost

Source: www.epa.gov/foodrecoverychallenge

Characterization and Collection

Collection Variables

Meeting Needs of Customers while Controlling Costs for Sustainable Program

Variable	
	ates for collection

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Characterization and Collection

Chapter 2: Material Characteristics & Generation

What from Where

Material Characteristics & Generation

- Generator types
- Individual generator needs
- Material characteristics
- Collaboration around contamination

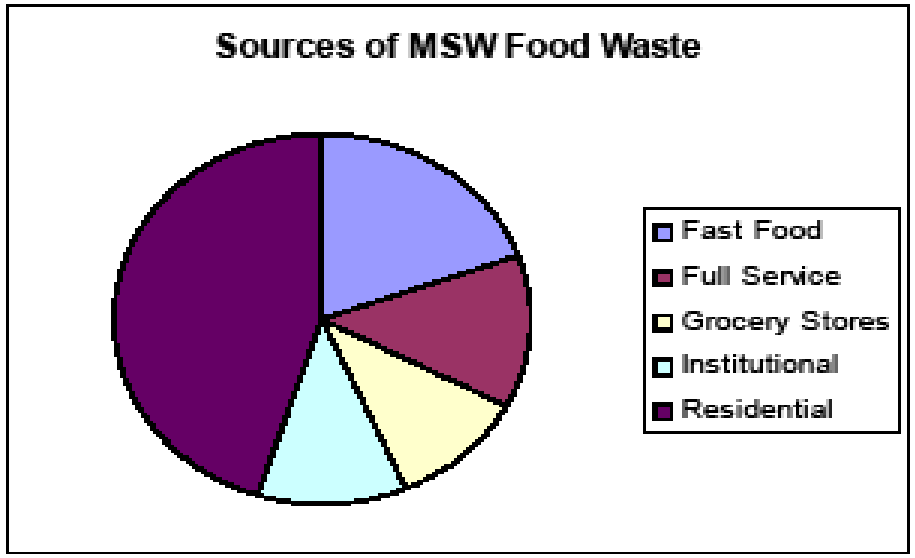
Biggest Sources of Food Waste

(in order)

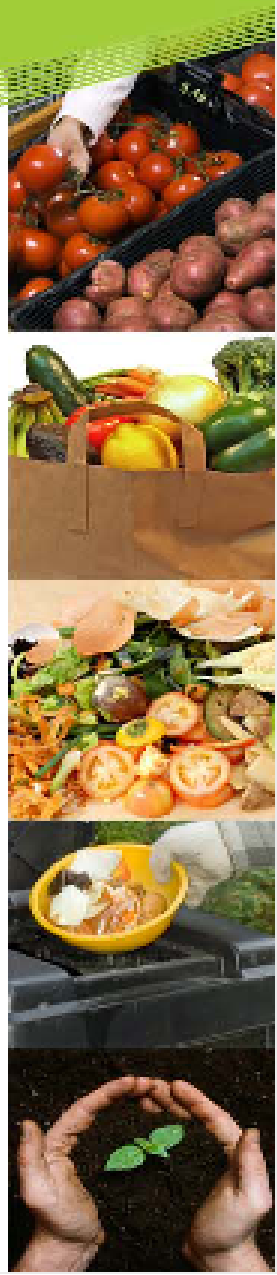
Food Service Industry

- Commercial
  - **Restaurants**
    - Quick Service
    - Full Service
  - **Grocery Stores**
- Institutional
  - K-12, Universities, Hospitals, Nursing Homes, Prisons

Residential



Does not include agricultural and industrial food wastes



EPA United States Environmental Protection Agency

Volumes & Sourcing Considerations

- Survey and Pilot to collect data on participation and volumes
- Evaluate volumes of different compostable materials (FW, YW, woodchips, compostable serviceware, soiled paper)
- In-building collection and material preparation considerations (bins, pulper, digester, compactor, dock space)
- Seasonality, food donation and other collection programs affect availability

Yard Waste Generation Factors

- Urban, rural, suburban
- Community affluence
- Climate, seasons
- Maturity of trees in the area
- Average lot size
- Yard waste reduction incentives

Estimating Volumes and Sources

- Household

FW Generation	350 lbs/hhld/yr
Food Waste Density	600 lbs/CY
FW Participation Rate	45%
YW Generation	500 lbs/hhld/yr
YW Density	350 lbs/CY
YW Participation Rate	75%

YW varies

- Commercial

Participation Rate	25%
FW Annual Generation (tons)	150 tons/est/yr
FW Density (lbs/cy)	600 lbs/CY

- Institutional

Hospital lbs	1.8 lbs/bed/day
FW Hospital Participation Rate	80%
Prison lbs	1 lbs/inmate/day
FW Prison Participation Rate	80%
University lbs	0.35 lbs/student/day
FW University Participation Rate	80%
Public Schools lbs	0.35 lbs/student/day
FW Public Schools Participation Rate	80%

Other Food Waste Assessment Tools:
http://www.epa.gov/foodrecovery/tools/index.htm

See EXCEL worksheets

Yard Waste Generation Rates (hh/yr)

Material	*Pounds*	*Cubic Yards Loose*
Leaves	160	0.8
Grass	1,040	2.6
Brush	300	1.0
Total	1,500	4.4

Total Organic Waste Generated (sample)

- 4.4 cubic yards of yard clippings per household per year
  - ~1500 pounds annually
  - ~2 to 5 paper bags per week (average)
  - 18%-25% of the residential waste steam
  - 60% generated May - September
- Other organics
  - food and soiled paper
  - 10%-17% of the residential waste steam

Material Characteristics

	Volume	Characteristics
Leaves	160 lbs/ household /yr *0.8 cubic yards, loose*	C:N ratio: 80:1 Moisture content: 10-50% Density: 150-700 lbs/cy High carbon & mineral content Composts alone, but slowly, with little odor Stockpile to add to grass in spring/summer
Grass	1,040 lbs/ household /yr *2.6 cubic yards, loose*	C:N ratio: 15:1 Percent moisture: 60-80% Density: 400-800 lbs/cy Decomposes quickly Good nitrogen source Strong potential for odor
Brush and Tree Trimmings	300 lbs/household/yr *1 cubic yard, loose*	C:N ratio: 200-500:1 Percent moisture: 40-50% Density:250-500 lbs/cy Very slow to break down Collect chipped, bulk or with leaves/grass
Food	255 lbs/household/year 1.64 tons/empl/yr (food service) 0.71 tons/empl/yr (restaurants) 19.29 tons/empl/yr (food processors)	C:N ratio: variable, typical 15:1 Percent moisture: variable Density: 800-1000 lbs/cy Good nitrogen source Need to mix with leaves, potential for odor Significantly increases organic diversion rates

Characterization and Collection

Coordination around Contamination

- Level of acceptable contamination set by composter
  - Traditional plastics yardwaste bags are not allowed at majoring of sites
  - Food waste and foodservice ware may be considered contaminants
  - Hauler sometimes has to pre-sort material before delivering to compost site to avoid fines and rejected loads
  - Composters often only accept food waste from pre-qualified haulers

COMPOSTABLE FOOD SERVICEWARE QUICK GUIDE

Compostable

Look for the logo signifying BPI (which certifies products meet ASTM D6400/D6868 Standards). If applicable, look for facility approvals such as Cedar Grove. Ensure that products labeled generically "compostable", and not carrying certification, comply with ASTM D6400/D6868 Standards.

Decomposable - Degradable - Biodegradable

These terms (and similar ones) are unqualified and generic. They do not address how a product will biodegrade in a specific environment (compost, soil, marine, etc.). These terms are commonly misused in the market to promote products which are made with traditional (and non-biodegradable) polymers such as PP, PS, PE, PET, etc. which may contain additive(s) claimed to promote biodegredation. See "Other Resources" for further information.

Biobased - Made from Plants - Plant Based

Being made from renewable resources (e.g. plants) does not mean that it is also compostable. USDA, for example, has developed the BioPreferred Program where products must meet specifications to show that renewable resources were used in part, or in whole, to create a product. For compostability, look for the BPI or other applicable facility certification/labels (e.g. Cedar Grove), or ensure the product(s) is compliant with ASTM D6400/D6868 Standards.

Why?

- Using **Compostable** food serviceware will allow for greater food waste diversion.
- Using **Compostable** food serviceware can help municipalities in reaching zero waste goals.
- Putting the wrong products in the composting stream can result in increased processing and collection costs and contamination of our soil and water.

Please choose appropriate food serviceware to support food scraps diversion

1. Check with your local composting facility or hauler to ensure which products they accept.
2. Make sure to buy/use properly labeled food serviceware so that customers and employees can distinguish the non-compostable from **Compostable** food serviceware.

Summer 2014 endorsed by the US Composting Council

Characterization and Collection

Chapter 3: Providing Options

Containers, Cart Washing, Foodservice Ware, Education, Training & More

Providing Options

- Collection / Commingling Options
- Customized services for generators
  - allow certified compostable foodservice ware
  - cart and dumpster rental
  - container washing
  - training on in house collection procedures
- Delivering a consistent and quality supply of organics to composters

➢ Long-term sustainable programs

Commingling Materials

– single container for all organics

Advantages

- Convenience = high participation
- One collection truck
- Carts and automated loading mechanism
- Lower collection labor
- Lower overall cost of collection

Disadvantages

- Commingled “hard” & “soft”, wet wastes must all be ground at processing site
- Where plastic bags are used for collection, extra labor is required to debag
- Brush separation may be required:
  - For higher product grades
  - With curbside chipping

Separated Materials

– brush/wood set out separately from leaves/grass/food waste

Advantages

- Increased processing efficiency
- Reduced site processing costs
- Faster decomposition of soft-only wastes
- At the processing site, wood chips can be added as needed to balance C:N

Disadvantages

- Increases promotion and education costs
- Requires specialized trucks (e.g., compartmentalized) or 2 trucks or chipper
- Potentially more collection labor than for a commingled method
- May require separate collection routes for trucks

Loose Material Collection

– raked out to curb, no bags or carts

Advantages

- Convenient – conducive to participation
- Amount of material set-out is unrestricted
- Contaminants are more visible
- No container costs
- No bags to remove in processing

Disadvantages

- Potentially greater contamination than for contained material
- Requires specialized equipment to move materials from curb to truck
- Wet material is difficult to handle, and may cause odors; materials may clog street drains
- Food waste still needs a container and collection

Contained Material Collection

– in bags or carts

Advantages

- Less equipment and potentially less labor than for loose material
- Potentially less contamination than for loose material
- Material is not litter-prone or problematic for traffic, parking, sewers
- May promote participation
- Carts may reduce rodents and can be locked/bear-proofed

Disadvantages

- Initial capital costs for containers may be high
- May require specialized trucks (automated or semi-automated)
- Amount of material set-out may be limited to container capacity
- May need separate leaf collection program to handle the large volume of leaves in the fall
- Carts may need washing

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Plastic Bags

- Plastic bags – not recommended and in most communities, banned from use
  - Can develop anaerobic conditions, odor
  - Plastic blows around processing site
  - Plastic fragments remain in finished compost
- Compostable plastic bags
  - Higher cost than paper bags
  - Plastic fragments can remain in finished compost if not completely decomposed

Paper "Kraft" Bags

Advantages

- Less expensive than compostable plastic bags (25¢-39¢ vs. $1)
- Bag can be shredded by windrow turners – no debagging, less costs
- Allows airflow during collection process
- Stand upright, less likely to tear

Disadvantages

- More expensive than traditional plastic bags (9¢)
- May lose strength under prolonged wet conditions, making handling difficult
- Non-degradable items (such as glass bottles, bricks, cans) cannot be seen through the paper

Carts and Bins

Advantages

- Fewer vehicles and workers required for collection = lower costs
- Carts are durable and can be locked/bear-proofed
- Easy for generators
- Small 5-gallon containers can be used for oil and grease
- 2-cy to 8-cy dumpsters for food waste from institutions
- Place for logo/program marketing

Disadvantages

- Initial investment is high if municipality or hauler provide carts
- Automated tipping equipment may be needed for curb carts and possibly bins
- Front or rear-load truck needed for dumpsters
- Smaller bins have limited capacity, especially for fall leaves

Collection Equipment

Gathering and Transport

- Front-end loader and dump truck
- Leaf vacuum truck or leaf loader
- Mobile chipping unit for wood waste
- Rear-loading packer truck (also semi-automated)
- Automated or semi-automated side-loading truck
- Compartmentalized body for 2 or 3 streams
- Roll-off truck for large containers / drop-offs

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Generator Site Considerations:

Commercial or Institutional Waste Collection

- Food prep wastes directly into brute/barrel or slim jims, lined or unlined
- Sometimes run through pulper or dewatering machine, then into barrel
- Space in kitchens can be limited
- Tray washers and Dishwashers
- Barrels rolled to dock and emptied into dumpster lined with cardboard

Generator Site Considerations:

Foodservice Ware

- Switching to reusables reduces waste and saves money over the long-term
- Switching to compostable foodservice ware can be an incentive to reduce number of products (but can cost up to 100% more than disposables, depending on product line)

Generator Site Considerations:

Commercial or Institutional Waste Collection

Generator Site Considerations:

Dock Collection and Upgrades

- Containers
  - Cart-swap program
  - Emptied into compactor, or 2, 4 or 8-cy dumpster lined with cardboard
  - Cart washing on or offsite
  - Container rental and maintenance
- Dock Modifications
  - Dumpsters
  - Compactors / Electrical
  - Docks / Railings

Training and Outreach

- Collection procedures
- Kitchen staff and practices
- Operations / housekeeping staff
- Lined vs. unlined carts
- Compostable ‘to-go’ containers
- Equipment (disposals, pulpers)
- Transportation / Dock operations
- Minimizing odors
- Alignment with Sustainability Goals
- Signage
- Kick-off program
- Monitor and re-educate

Create a Business Case for your Customer

- Develop a business case analysis to consider the options, and to provide a quote to your customers
- Review capital and operating costs specific to your location and staffing
- Make the case for your customers' leadership and employee buy-in
    - Financials / pay-back
    - Sustainability /diversion goals

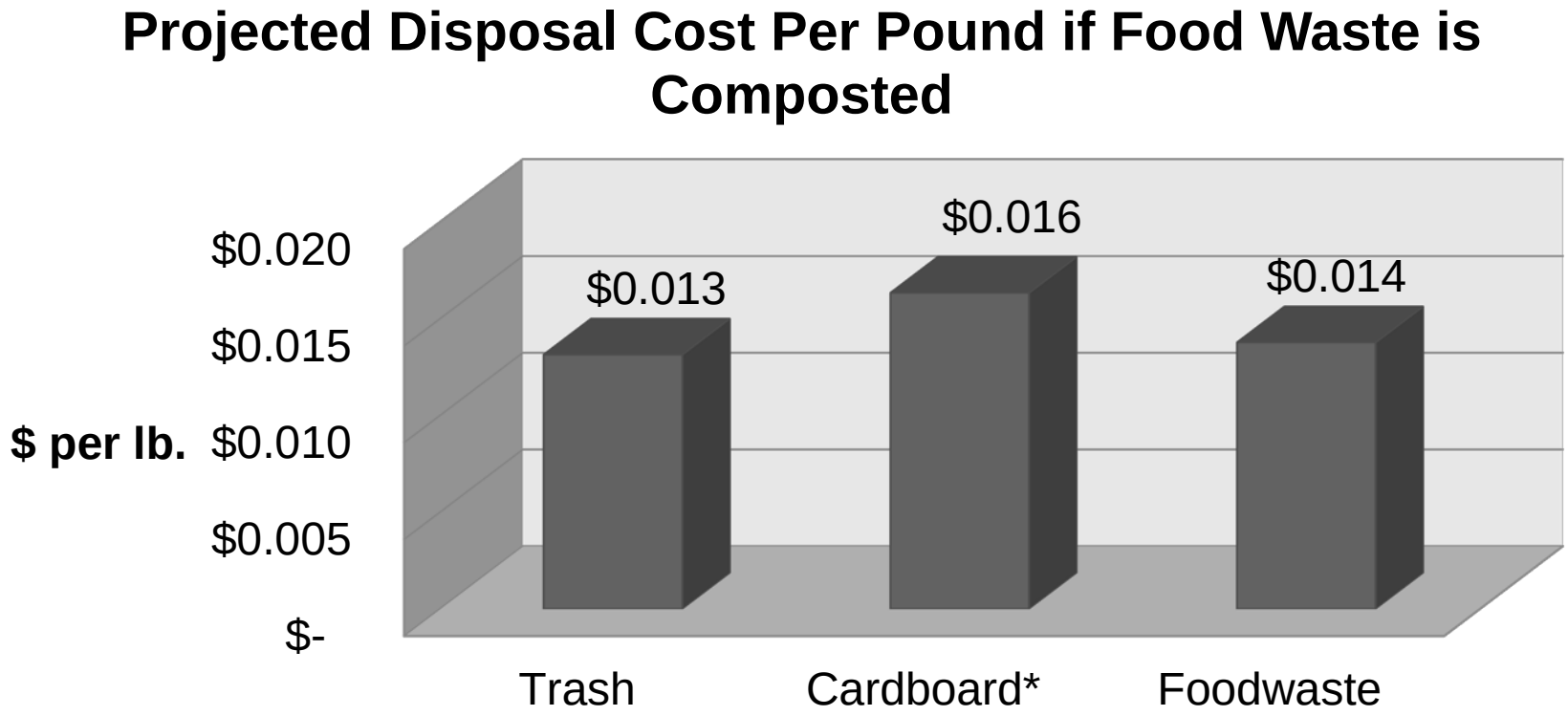
Case Study: Hospital Program

Summary of Costs of Hospital Wide Food Waste Composting Program	
Total Start-Up Costs* (includes first 3 months of service)	$11,400
Total Annual Ongoing Costs (includes foodservice ware)	$597,475
Total Annual Avoided Cost (includes foodservice ware)	($510,077)
Overall Annualized Costs (additional costs over sending to landfill)	$87,674 (~$180/ton)

* Preliminary costs only, based on all-phase roll out:
1.32 tons/day or 481 tons/year
and dedicated food waste collection to off-site compost site

- Currently Phase 1 Light ~80 tons/year

Characterization and Collection



*Does not include any revenue received from recycling

Environmental benefits

Total Environmental Benefits of Food Waste Collection		
	Waste Diverted From Landfill	**481 tons**
	or the equivalent of	13 large compactor loads
	Avoided CO2 Emissions	**387 metric tons CO2 Equivalent**
	or the equivalent of taking	76.9 cars off the road for 1 year
	Total Change in Energy Use	**97 million BTUs**
	or the equivalent of	780 gallons of gasoline

Case Study: Municipal and Commercial Program

Overview

- Backup/depreciated recycling automated side loader truck

Commercial

- 1x to 3x/week collection from Restaurants only
- Add Institutions and Groceries as volume is needed or when capital for dumpsters and front or rear-loading truck is available

Residential

- Low population density (70 people per square mile) is a challenge
- Weekly pickup

Pilot (16-weeks in high season)

- 400 HH
- 34 Restaurants
- 96-gallon carts provided (food + YW) and 32 gallon for restaurants
- No collection fee

Full Program

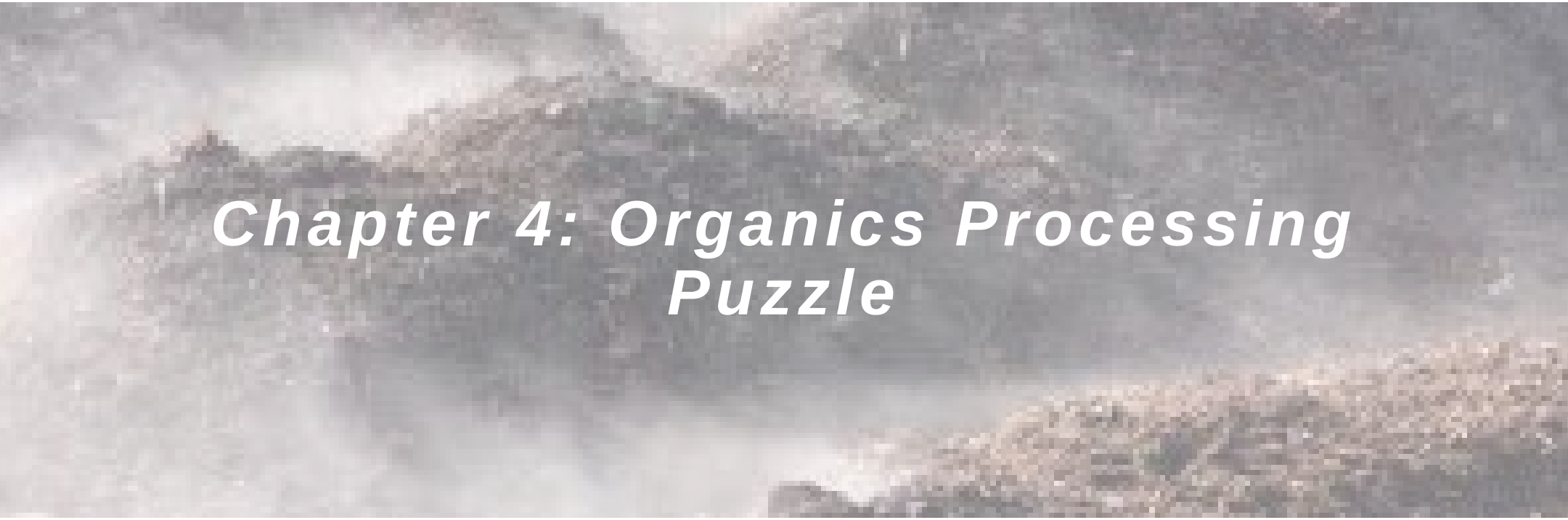
- 7,600 HH in high season, 3,800 in low season
- 48 Restaurants
- 96-gallon or 32 and 64-gallon carts if yardwaste is not included
- $1 weekly service fee
- Program financially dependent sales of finished compost

Case Study: Municipal and Commercial Program

Scenario 1 Pilot: Restaurants Only
Scenario 2 Pilot: Restaurants and Wednesday Homes
Scenario 3 Pilot: Restaurants and Wednesday Homes (no YW)
Scenario 1 Full: All Listed Restaurants (no institutional/large scale)
Scenario 2 Full: All Listed Restaurants and all homes
Scenario 3 Full: All Listed Restaurants and all homes (no YW)

	Based on 16 weeks			Based on 52 weeks		
	Scenario 1 Pilot	**Scenario 2 Pilot**	**Scenario 3 Pilot**	**Scenario 1 Full**	**Scenario 2 Full**	**Scenario 3 Full**
Total Projected Collected Tonnage	**171.4**	**211.7**	**188.2**	**511.7**	**1154.2**	**828.3**
Total Projected Collected Cubic Yards	**685**	**847**	**753**	**2047**	**4617**	**3313**
Annual Costs	$ 10,575	$ 16,121	$ 15,541	$ 92,745	$ 276,143	$ 258,849
Annual Costs per Marginal Ton	$ 61.71	$ 76.16	$ 82.59	$ 181.26	$ 239.25	$ 312.51
Potential Revenue from Additional Compost	$ 7,129	$ 8,806	$ 7,827	$ 21,285	$ 48,016	$ 34,457
Potential Revenue from Collection Fees	$ -	$ -	$ -	$ 2,496	$ 260,964	$ 260,964
Total Potential Revenue	$ 7,129	$ 8,806	$ 7,827	$ 23,781	$ 308,980	$ 295,421
Net Marginal Revenues	**$ (3,447)**	**$ (7,315)**	**$ (7,713)**	**$ (68,964)**	**$ 32,836**	**$ 36,572**
Net Marginal Revenues per Marginal Ton	$ (20)	$ (35)	$ (41)	$ (135)	$ 28	$ 44

Characterization and Collection



Chapter 4: Organics Processing Puzzle

Utilize and Grow Local Infrastructure

Organics Processing Puzzle

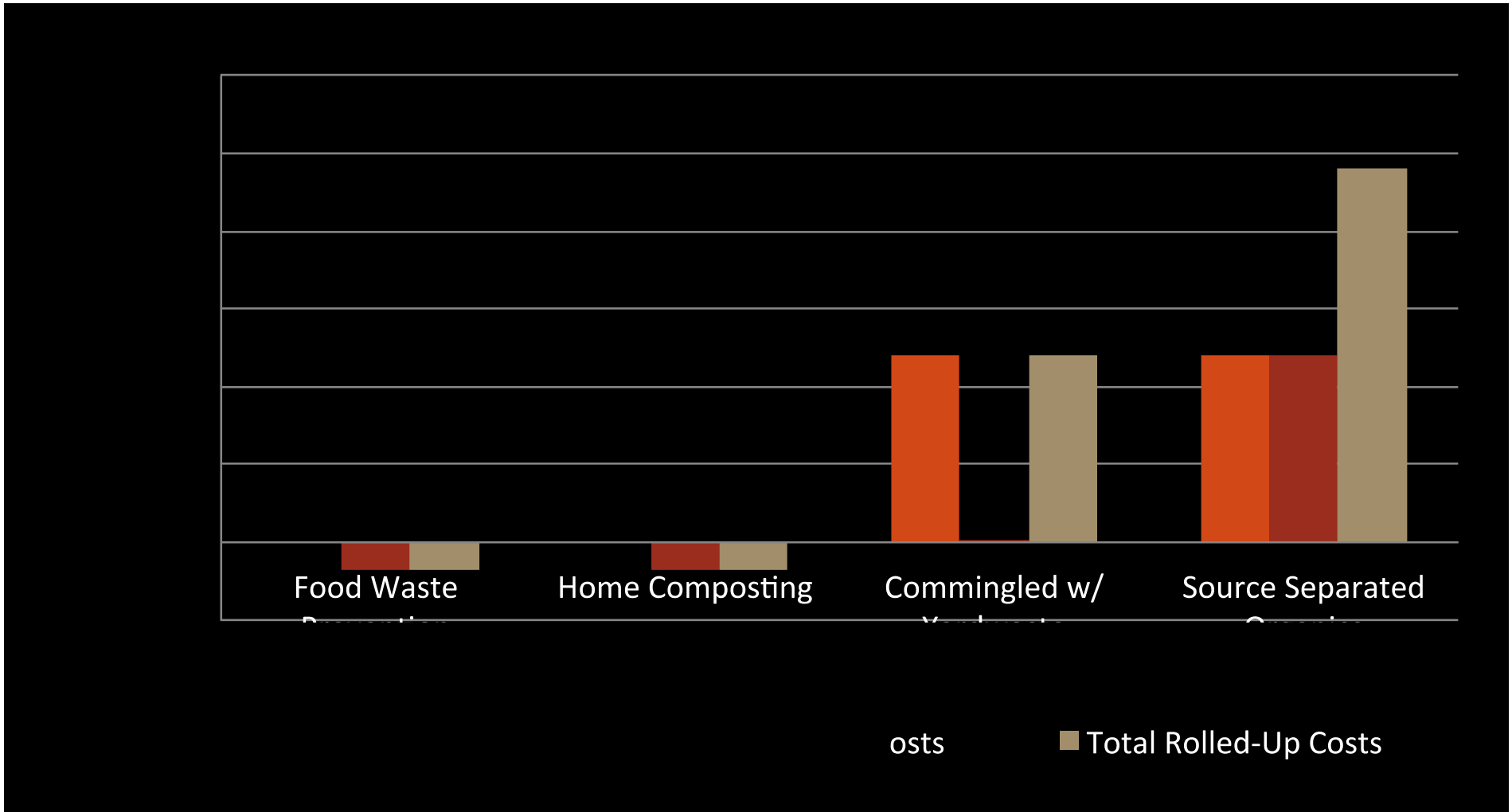
- Composting is local
- Available infrastructure
- Utilize and grow infrastructure

Support the Development a Local Market and Community Awareness

- Use compost to grow local, healthy food – deliver organics to local farms
- Use in generator's landscaping and gardens
- Add foodwaste to existing yardwaste sites
- Collaborate with other generators, haulers, processors

Decentralized, local systems
support local farmers,
create local jobs and
promote community awareness

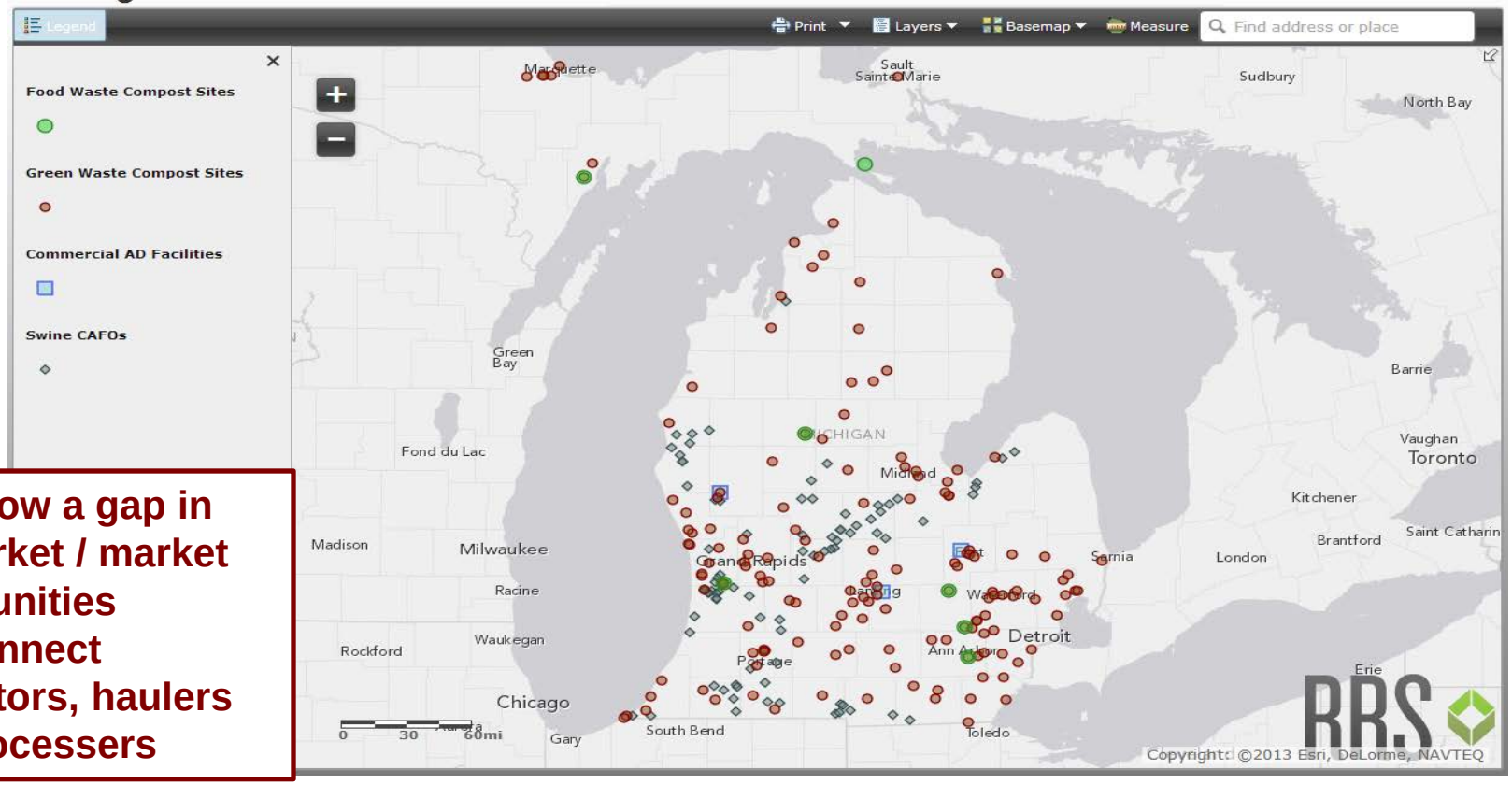
Collection Performance



Characterization and Collection

Using Technology to Create Solutions for Diversion

MI Organic Waste Infrastructure



- Can show a gap in the market / market opportunities
- Can connect generators, haulers and processers

Characterization and Collection

Case Study: University of Michigan

- Program began in 1997
  - 5 Dining Halls, 1 Catering Kitchen, 1 Coffee Shop
- 67 tons of food waste annually
- 32-gal bins picked up 2-3 times/week
- Organics processed at WeCare / City of Ann Arbor Compost Facility - $38/ton compost tip fee
- All organics + bioware from Business School processed at Tuthill Composting
- Significantly more organics available
  - animal bedding, yard waste (currently composted at UM grounds), post-consumer foods and products, fats, oils, greases, soiled paper towel, napkins and cardboard
- Up to 5,269 tons plus yardwaste!

Case Study: Metro Health Hospital

- Program began in 2009
- 300-bed facility
- Six days a week, New Soil picks up two lined 2-cy dumpsters of hospital food waste + OCC (approx. 0.5 tons/day
- Delivers it to Spurt Industries Composting Facilty
- Costs about $50/ton
- Accepts bioware and cardboard

Case Study: City of Ann Arbor Commercial and Residential

- Commercial
  - Semi-automated side loader
  - Vegetative food waste stored in 64 and 32-gal city-provided carts
  - 3x/week collection
- Residential
  - 96, 64 and 32-gallon Compost Carts for semi-automated collection yard waste+ food waste
  - Weekly seasonal pickups, Apr – Nov (break in winter months)
  - Residents may wrap produce waste in newspaper to help keep carts clean

Thank you! Questions?

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