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ASSOCIATION

BEYOND COMPOSTING Alternative Technologies for Processing Source Separated Organics



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Introductions **Organics in the U.S.** **Organics Management**



Technology Review **Conclusions & Recommendations**

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The GBB team
Quality – Value – Ethics – Results



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GBB Overview



- Established in 1980
- Solid Waste Management and Technology Consultants
- Helping Clients Turn Problems into Opportunities



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GBB Waste Technology Services

- Economic, technical and environmental reviews
- Waste characterization and sourcing
- Process planning and design
- Independent feasibility consultant
- Procurements
- Due diligence




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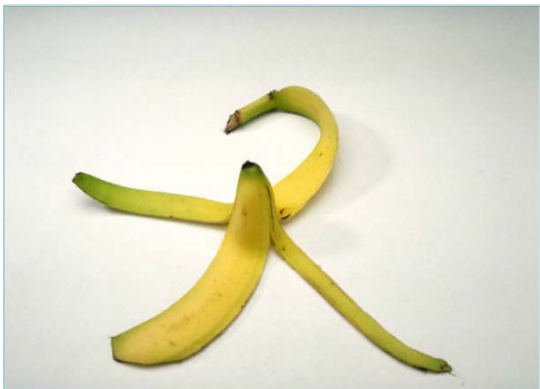


Ljupka Arsova
GBB Consultant II
On the phone

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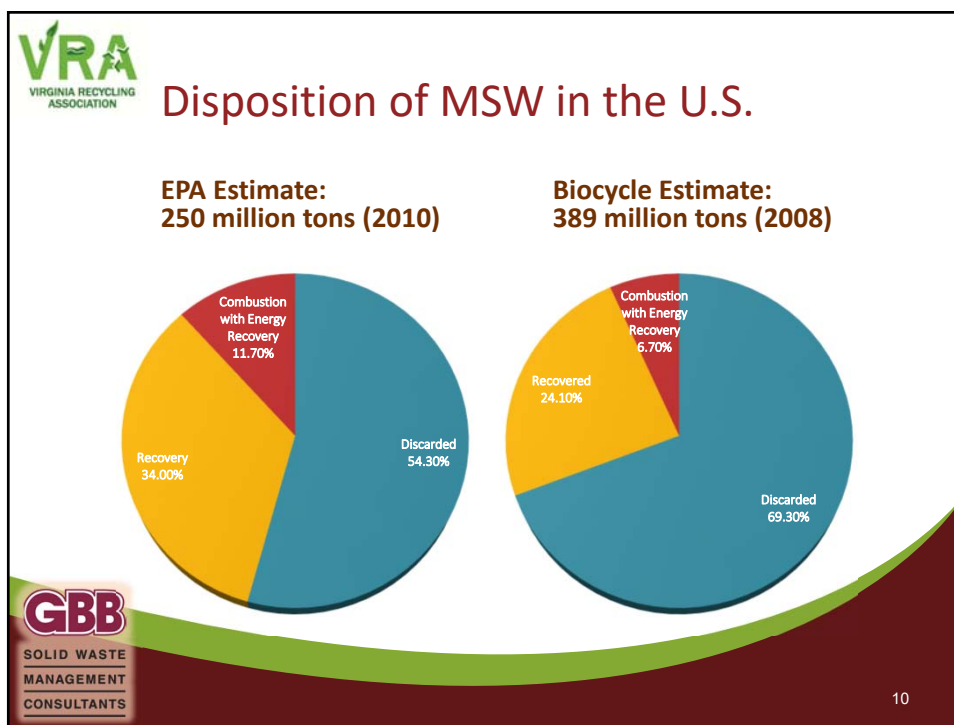
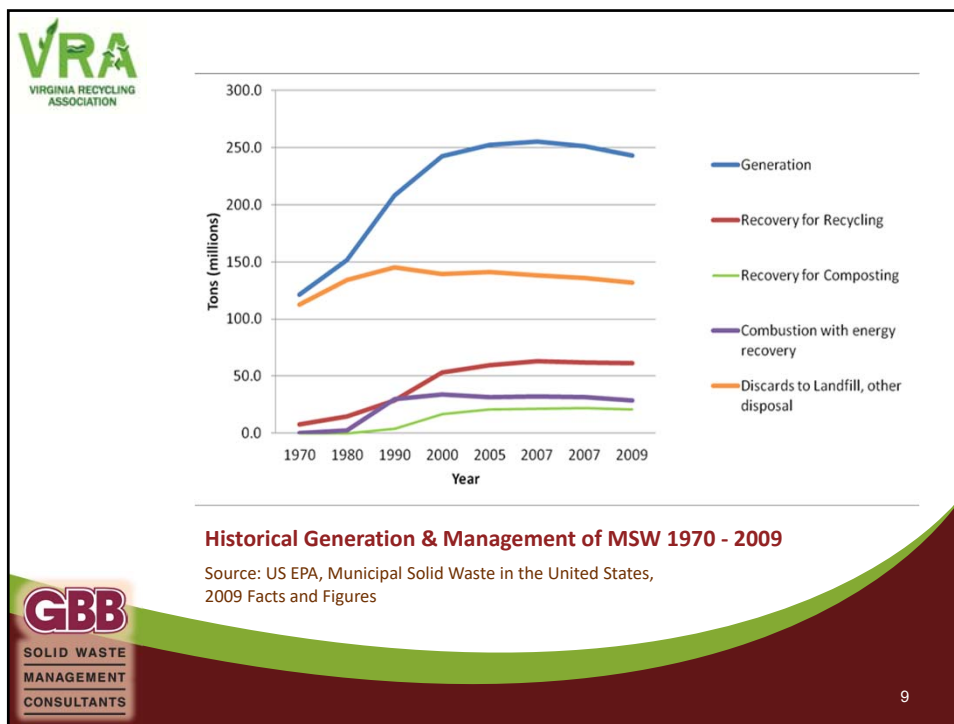
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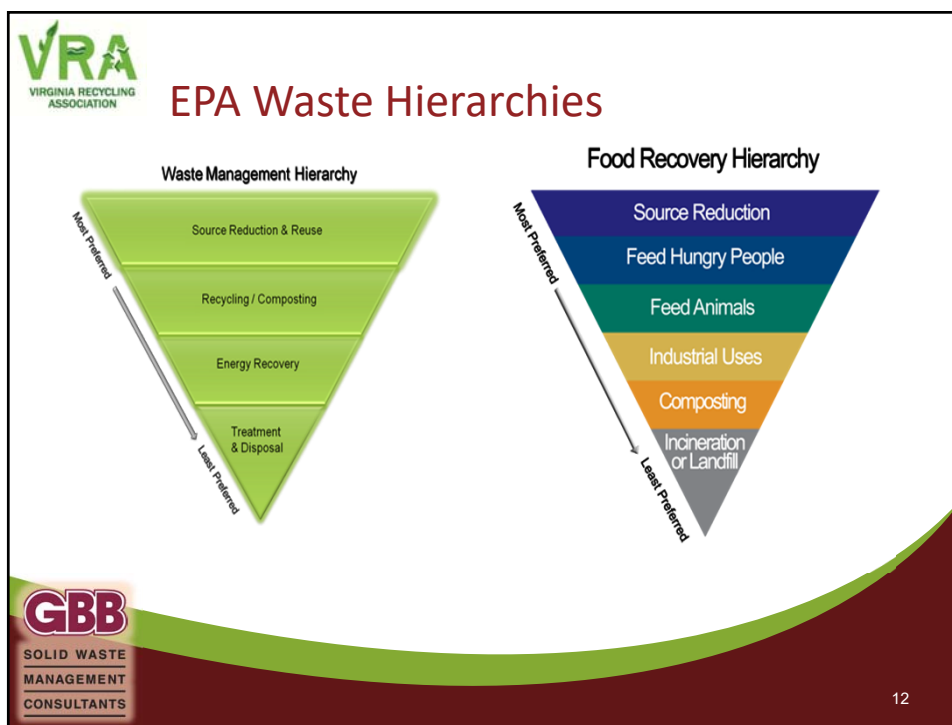
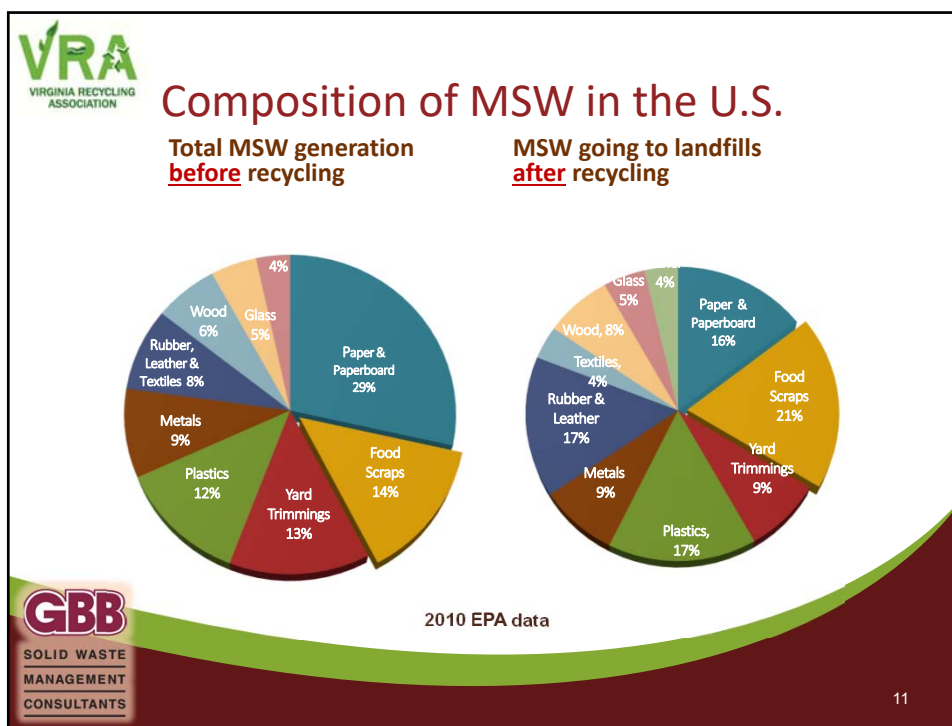


Organics in the U.S.
Why communities pursue organics

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Management Practices

Today we're focusing on source separated organics

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**Who has
curbside
collection of
food waste?**

Latest data from
BioCycle Magazine,
March 2013

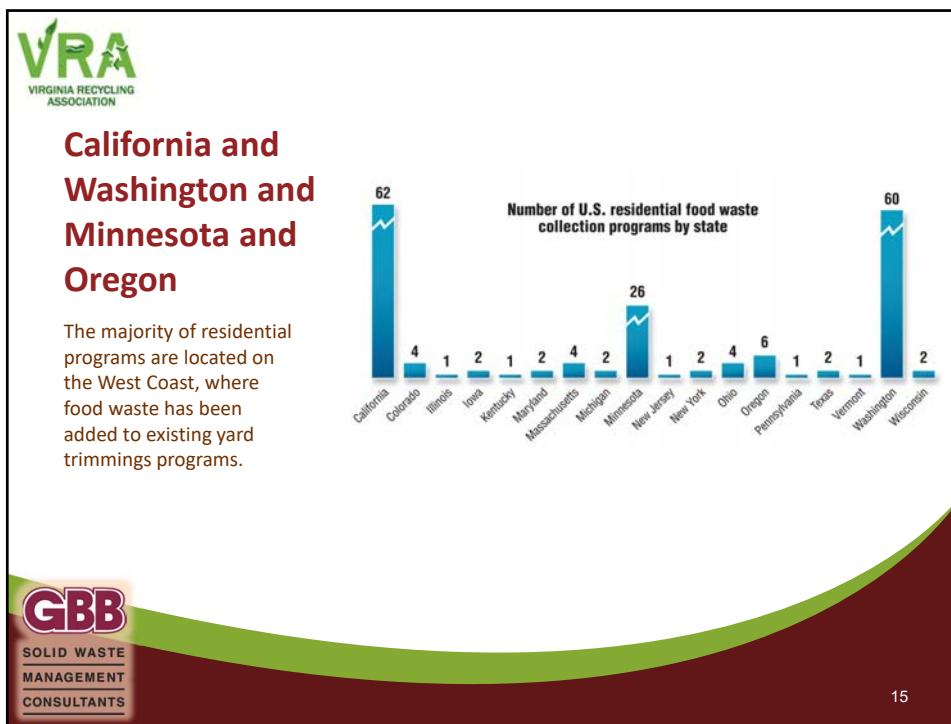
**183 communities offer
curbside collection of
residential food waste**

18 states	2.55 million households	726,250 tons in 2012*
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* 79% of programs reporting

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Going for it: Portland, OR



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Can we just ramp up composting?

- Adding food waste is a challenge
- Needs about 1 acre per 3000 CY of yard waste (~13,200 tons)
- Slower throughput
- Biogas and energy recovery

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Aerobic Composting
Plasma Gasification Pyrolysis
WTE Anaerobic Digestion
Gasification
Ethanol Fermentation
Others

Almost 600 Companies

Most of the companies offering this technology have no experience in the US.

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Source: Gershman, Brickner & Bratton, Inc., April 2012

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Technology review

Existing and emerging technologies

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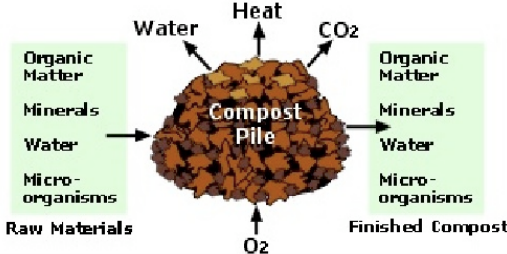
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Aerobic Composting

Biological decomposition of organic waste under well aerated conditions

- Compost / soil amendment is the resulting product
- Great for yard and green waste
- Cannot be done on 100% food waste



There are nearly 2,300 composting facilities in United States. About 50 are taking some quantity of food waste.

BioCycle, April 2013

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Anaerobic Digestion

Biological degradation of organic material in absence of oxygen

Results are biogas and digestate:

- Biogas is used as fuel for electricity and/or heat production. It can be conditioned to pipeline quality
- Digestate can be used as a soil amendment, animal bedding, or rolled into a composting process



There are 13 AD plants accepting food waste in the U.S., including demonstration, pilot and commercial projects.

Renewable Waste Intelligence, March 2013

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Anaerobic Digestion on the Waste Management Hierarchy

Expanded hierarchy of Waste Management by Prof. N. J. Themelis (2008)

Expanded Hierarchy of Waste Management

Waste reduction
Recycling
Anaerobic composting
Aerobic composting
Waste-to-energy
Modern landfill recovering and using CH₄
Modern landfill recovering and flaring CH₄
Traditional landfill

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AD plants in the US and types of feedstock they process

1500 digesters at Wastewater Treatment Plants (250 use the biogas)

192 farm digesters

13 pilot, demonstration and commercial plants processing commercial food waste

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Types of Feedstock

- Requires pre-sorting, even if it takes “mixed MSW.”
- Source separated organic (SSO) waste from households and institutions
- SSO waste from commercial generators such as restaurants, cafeterias, fresh markets and supermarkets.
- By-products and refuse material from food processing industry



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Companies at work




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Anaerobic Digestion Facility Examples



Cleveland, OH- Quasar Energy



Toronto, Canada- CCI Bioenergy



Monterey, CA- Zero Waste Energy

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Gasification


- Partial combustion in an air-controlled environment
- Product: Syngas for production of electricity chemicals/ fuels (ethanol)
- Feedstocks: biomass, medical waste, demonstration-scale MSW
- Plasma gasification: a plasma arc is used as a heat source

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 **Enerkem**

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INEOS Bio

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Pyrolysis?

- Thermal conversion in the absence of oxygen
- Non-recyclable plastics to oil

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Technologies and Risk

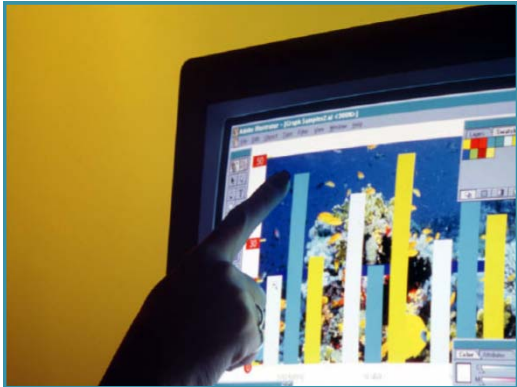
Alternative	Risks/Liability	Risk Summary
Anaerobic Digestion	Proven technology; limited U.S. commercial experience	Moderate to Low
Pyrolysis	Previous failures at scale, uncertain commercial potential; no operating experience with large -scale operations	High
Gasification	Limited operating experience at only small scale; subject to scale-up issues	High
Chemical Decomposition	Technology under development; not a commercial option at this time	High

Source: GBB, March 2012

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Conclusions and recommendations
The marketplace and your place in it

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Conclusions

- Food scraps are the low-hanging fruit toward increasing recycling/diversion
- Anaerobic digestion is the environmentally-sound option for material and energy recovery from organic waste
- The food processing industry, institutional and commercial sources have great quality feedstock for AD

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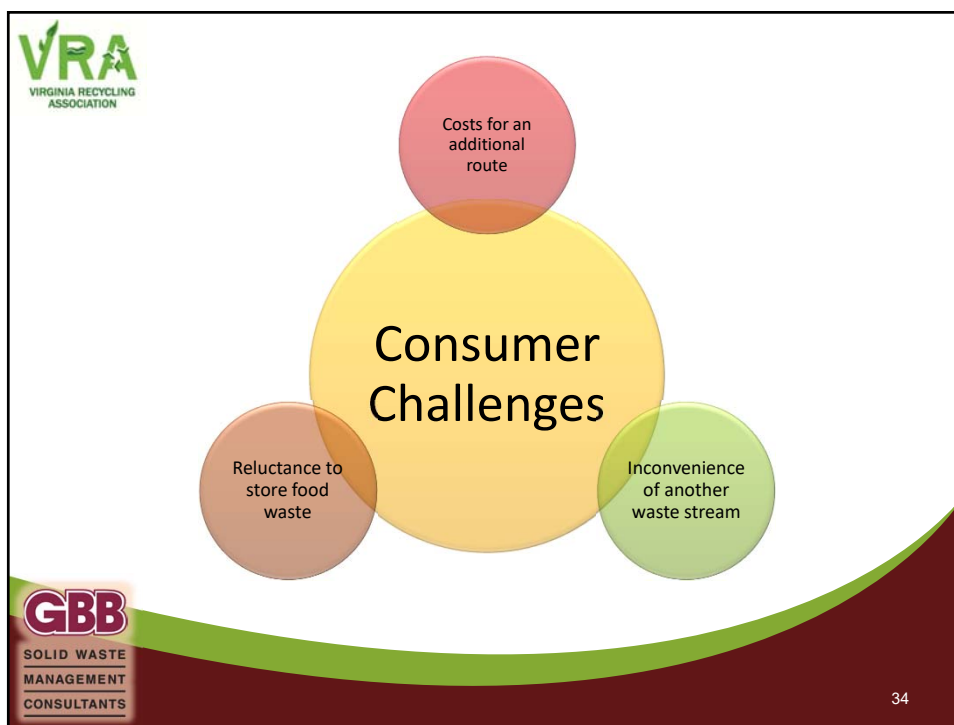
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Recommendations

- Educate yourselves on the challenges of implementing a food waste management system:
 - Consumer challenges
 - Collection and transportation challenges
 - Technology challenges
- Conduct a solid procurement process
- Get as much help as you can afford

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Before you begin evaluating a company,
you need to know:

What is their experience?

What is the technology?

How does it work?

What can it process?

What does it produce?

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Thank you!!

Questions and comments?

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