





Dedicated Feedstock Agreements

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Outline

- GBB Overview
- Introduction
- Feedstock Types and Sources
- Project Development
- Structure of the Relationships that can be Established
- Case studies: Barcelona & Toronto
- Summary points

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GBB Overview




- Headquartered in Fairfax, VA
- Established in 1980 as an objective adviser to governments, institutions, and businesses
- 30 years implementing innovative solutions for waste and recycling industry
- Dedicated exclusively to solid waste management; more focused than broad-based firms
- “Change Agents” to produce better services and facilities

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Celebrated our 30th Anniversary in 2010

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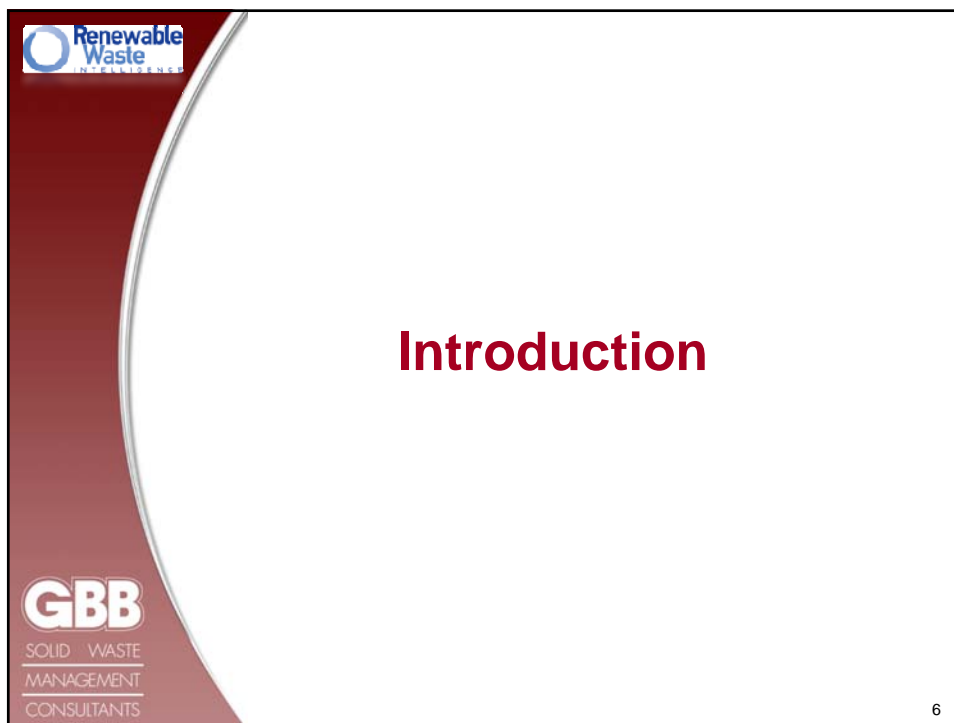
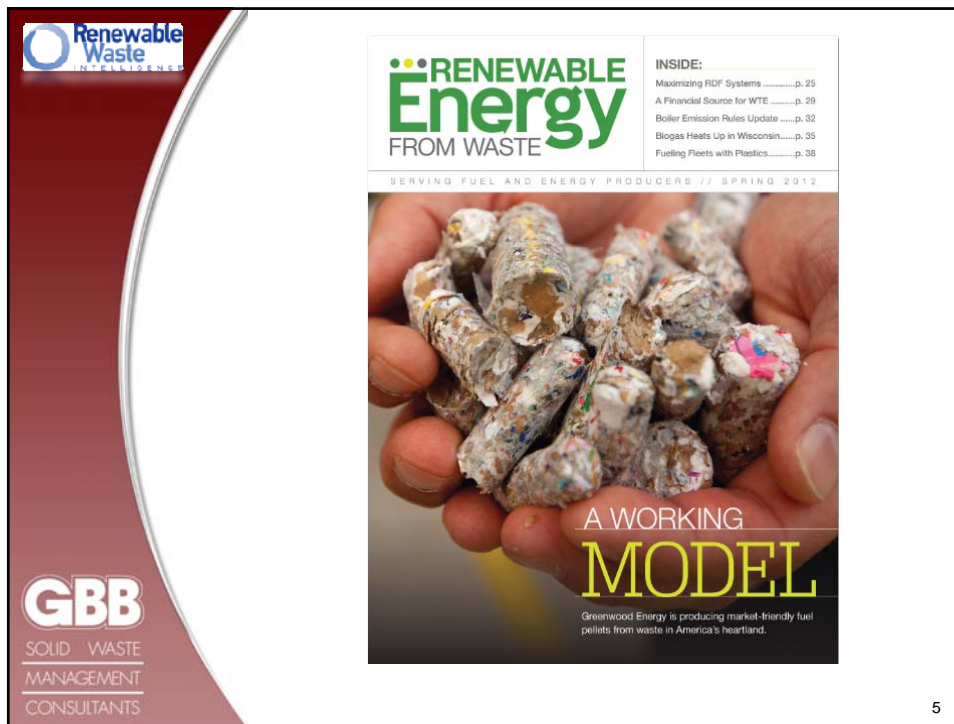
591 (and counting) Companies Offering Technology and/or Development Services

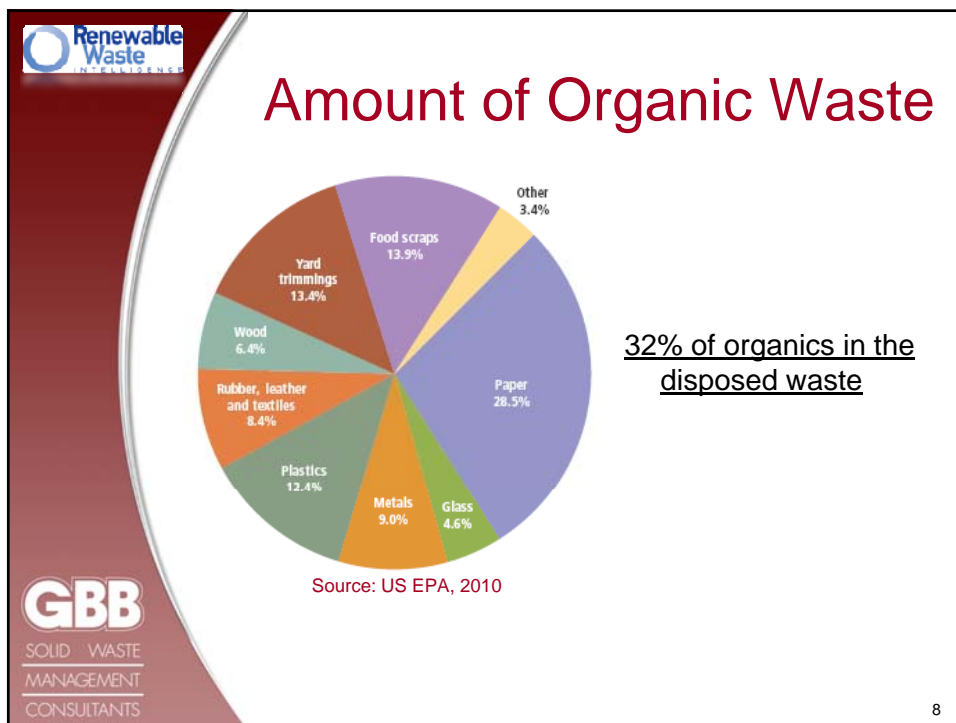
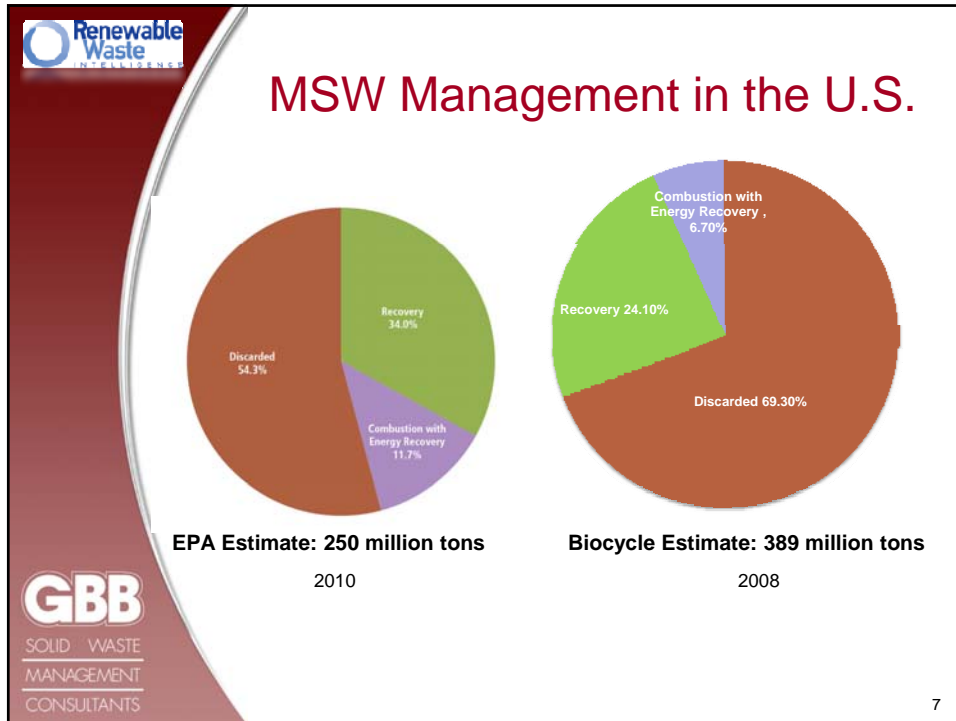
- 34 Aerobic Composting
- 109 Anaerobic Digestion
- 37 Ethanol Fermentation
- 169 Gasification
- 45 Plasma Gasification
- 52 Pyrolysis
- 60 WTE: mass burn, modular, dedicated boilers, and RDF
- 81 Others (agglomeration, autoclave, de-polymerization, thermal cracking, steam reforming, hydrolysis)



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

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Anaerobic Digestion on the Waste Management Hierarchy

- AD has a place in an expanded waste management hierarchy
- Securing continuous feedstock essential for success



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

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Why is the feedstock quality important?

- Determines the size of the plant and capital cost
- Overall performance of the system
- Quality of the compost & biogas
- Economic feasibility


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Technologies and Risk

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


Alternative	Risks/Liability	Risk Summary
Mass Burn/WaterWall	Proven commercial technology	Very Low
Mass Burn/Modular	Proven commercial technology	Low
RDF/ Dedicated Boiler	Proven commercial technology	Low
RDF/Fluid Bed	Proven technology; limited U.S. commercial experience	Moderate to Low
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
Mixed-Waste Composting	Previous large failures; No large-scale commercially viable plants in operation; subject to scale-up issues	Moderate to high
Chemical Decomposition	Technology under development; not a commercial option at this time	High




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Feedstock Types And Sources




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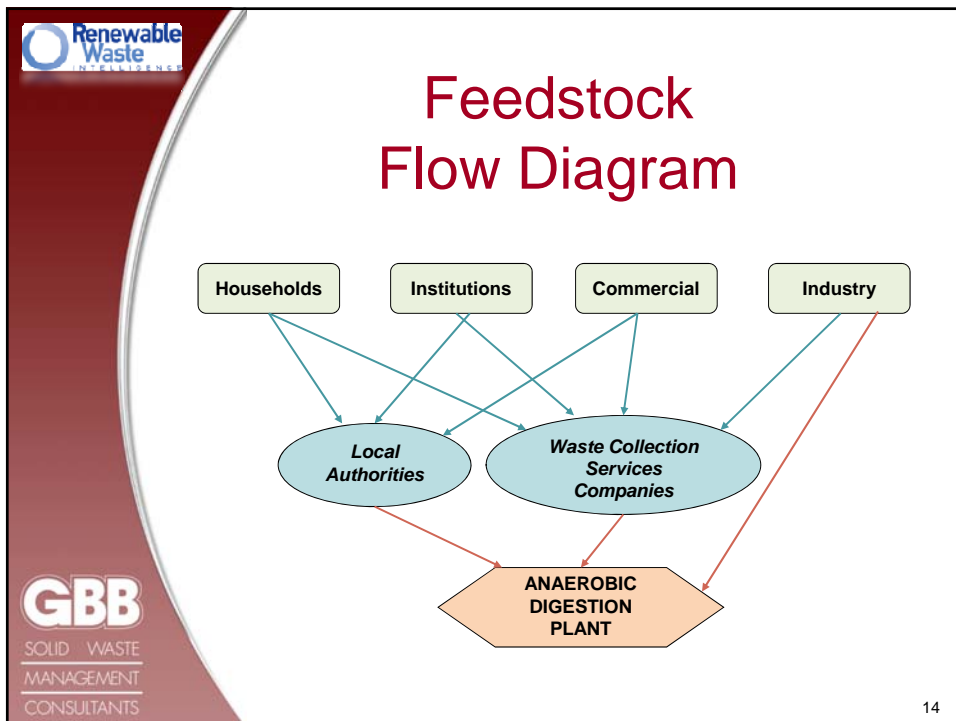


Types of Feedstock

- 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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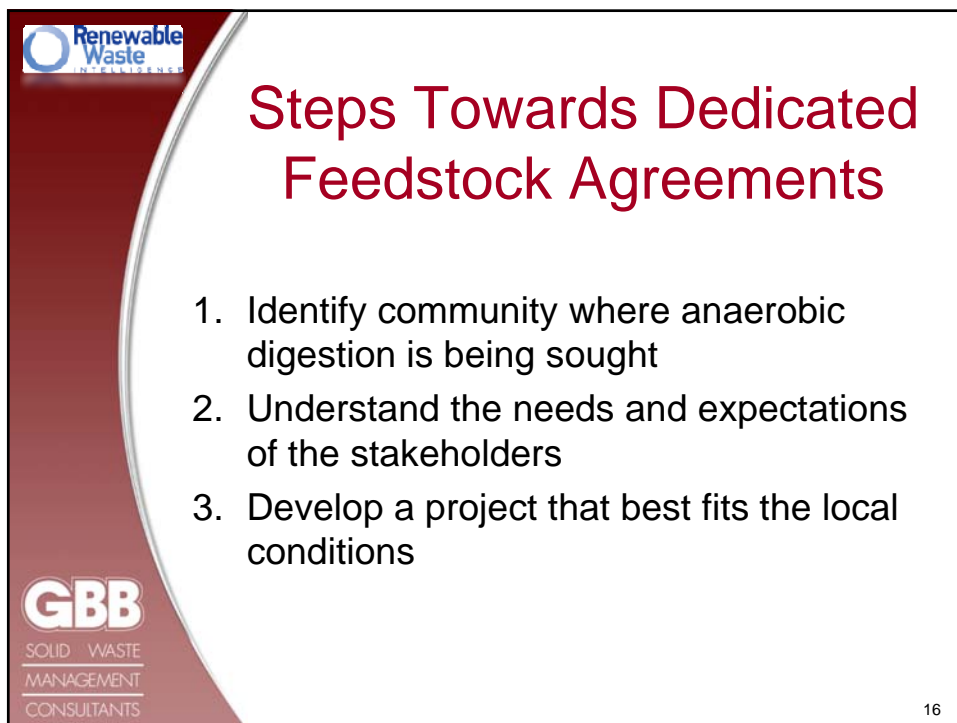
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Project Development

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This slide features a dark red curved background on the left side. The title 'Project Development' is centered in a large, bold, dark red font. The logos for 'Renewable Waste INTELLIGENCE' and 'GBB SOLID WASTE MANAGEMENT CONSULTANTS' are positioned in the top-left and bottom-left corners, respectively. The slide number '15' is located in the bottom-right corner.



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Steps Towards Dedicated Feedstock Agreements

1. Identify community where anaerobic digestion is being sought
2. Understand the needs and expectations of the stakeholders
3. Develop a project that best fits the local conditions

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This slide features a dark red curved background on the left side. The title 'Steps Towards Dedicated Feedstock Agreements' is centered in a large, bold, dark red font. Below the title is a numbered list of three steps. The logos for 'Renewable Waste INTELLIGENCE' and 'GBB SOLID WASTE MANAGEMENT CONSULTANTS' are positioned in the top-left and bottom-left corners, respectively. The slide number '16' is located in the bottom-right corner.



Step 1: Community Characteristics

- Limited capacity and high cost of disposal
- Elected officials willing to step forward for a long-term solution
- Public sector development resources
- Control of the waste (feedstock)
- Energy/fuel and materials market(s)
- Political support for facility siting
- Capital from loans/grants to reduce need for private debt and equity
- Landfill for residue and back-up disposal

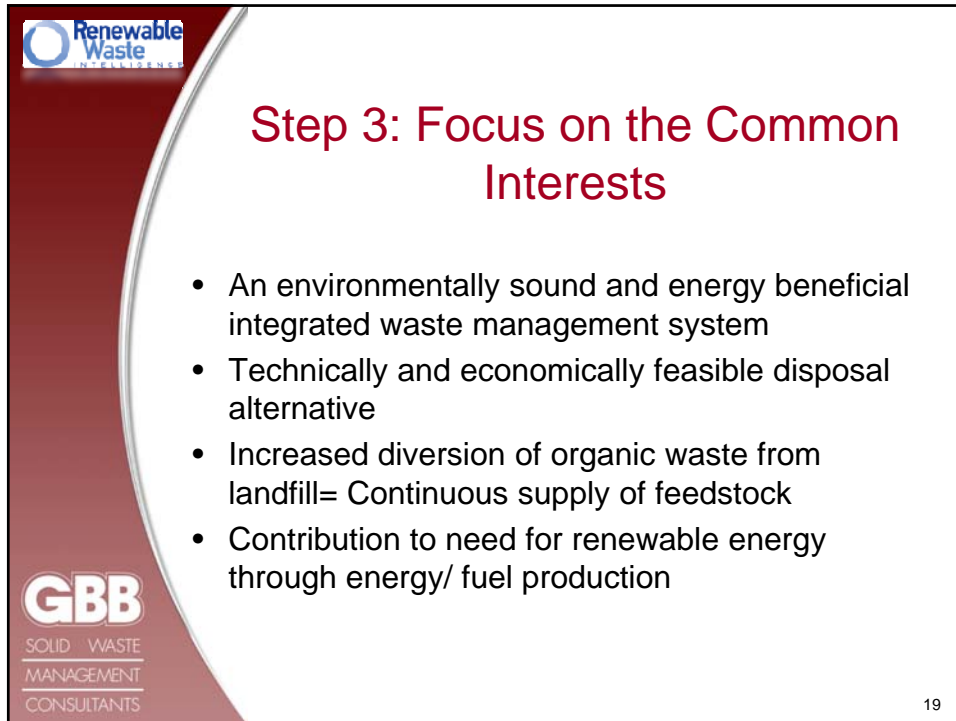
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Step 2: What Stakeholders Look For

- Waste Disposal Alternatives
- Minimal risk
- Proven technologies that meet environmental standards
- Contractors that can finance a project
- Technical feasibility
- Predictable and feasible economics
- Community acceptance
(work with community; don't surprise them!)

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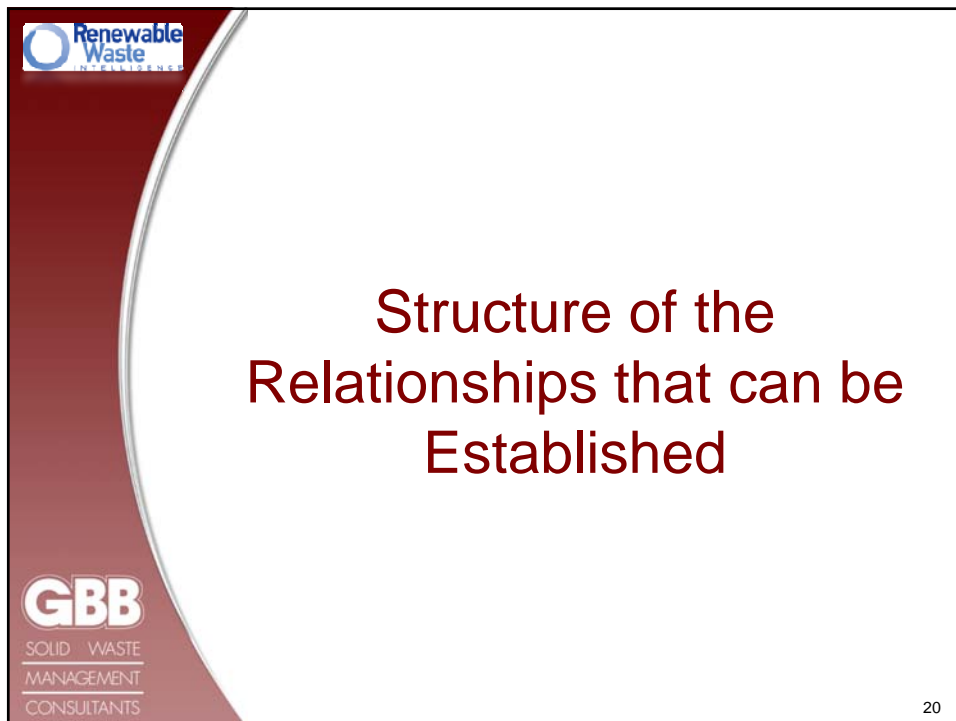
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Step 3: Focus on the Common Interests

- An environmentally sound and energy beneficial integrated waste management system
- Technically and economically feasible disposal alternative
- Increased diversion of organic waste from landfill= Continuous supply of feedstock
- Contribution to need for renewable energy through energy/ fuel production

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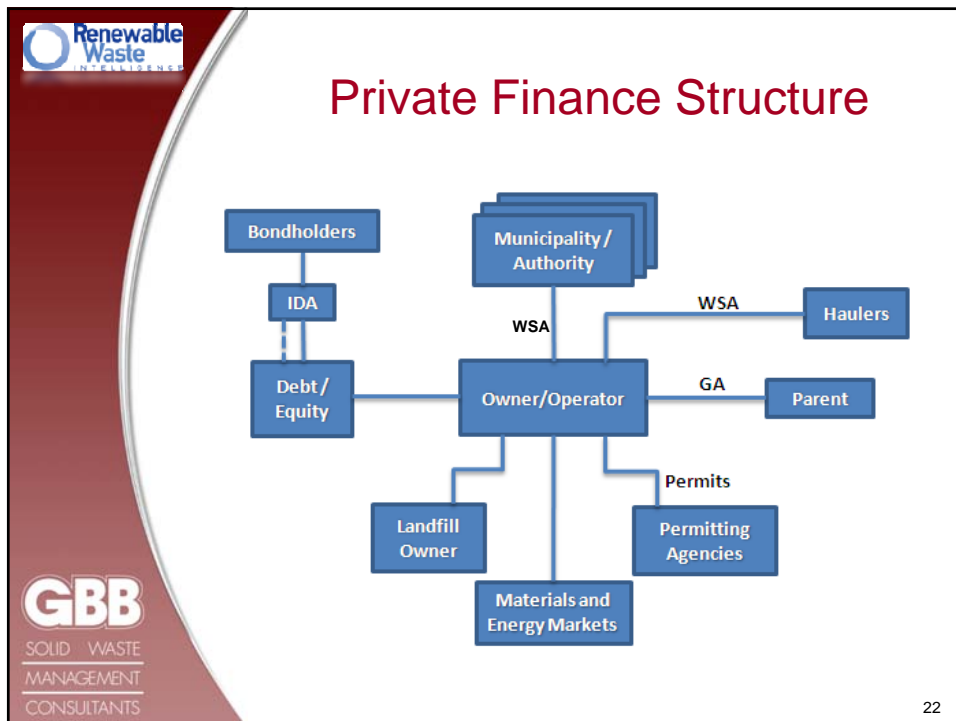
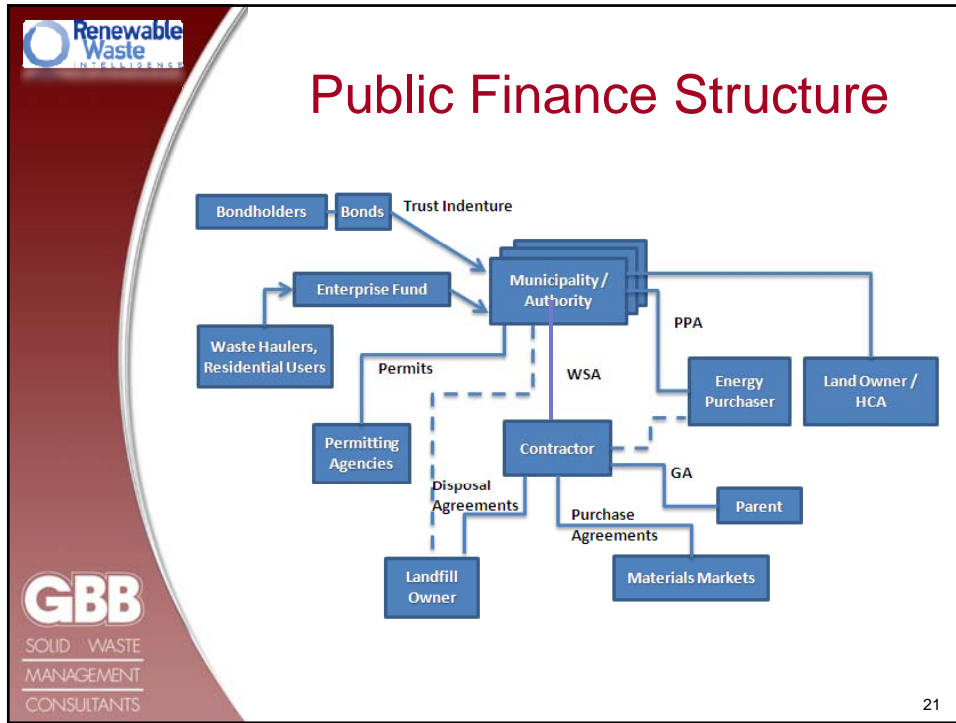


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Structure of the Relationships that can be Established

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Anaerobic Digestion as Integral Part of the Sustainable Waste Management Systems


Field trips: Barcelona and Toronto



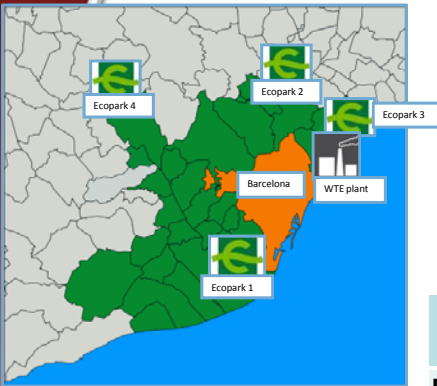

Source: Earth Engineering Center, Columbia University



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Case study 1. Barcelona, Spain




Map of the Metropolitan Area of Barcelona with locations of the Ecoparks

- Serving 3.12 mil people in the Metropolitan area of Barcelona
- Process 155,000 tons SSO/year
- Produce electricity and compost
- Public Private Partnership

AD plants in Barcelona

Facility	Technology	AD Capacity (TPY)
Ecopark 1	BTA	50,000
Ecopark 2	Valorga	120,000
Ecopark 3	Ros Roca	90,000



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AD plants in Barcelona, Spain



Ecopark 3- RosRoca Technology




Ecopark 2- Valorga Technology

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Case study 2. Toronto, Canada



Methanizer tank at the Dufferin AD plant.

Dufferin plant (demonstration):

- BTA technology
- Nominal capacity 25,000 TPY
- No energy recovery
- Solid residue transported to off-site composting facility



Methanizer tank at the Newmarket AD plant

Newmarket plant:

- BTA technology
- 150,000 TPY nominal capacity
- Closed for over a year now
- Owned and operated by Halton Recycling Ltd

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Case study 2. Toronto, Canada (cont'd)

- Public Private Partnership
- Dedicated feedstock- source separated organic fraction:
 - Residential green bag program
 - Commercial yellow bag program




New Anaerobic Digestion plants

- Dufferin Facility (upgrade of the existing demonstration plant)- under construction, expected to be completed spring 2012.
- Disco Road Facility under construction, expected to be completed during 2013




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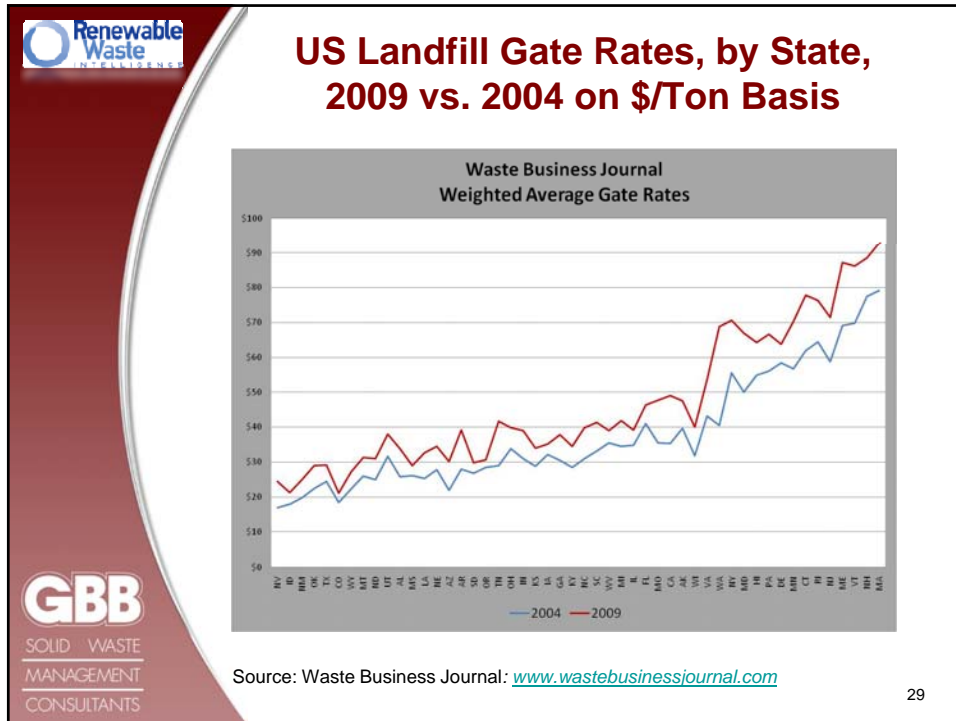
Costs of the AD plants in Barcelona and Toronto

AD facility	Opening year	AD capacity (TPY)	Capital cost (million \$ year built)	Gate fee (\$/ton)
ECOPARK 1	2001 (2006)	50,000	125	100 - 150
ECOPARK 2	2004	120,000	78	
ECOPARK 3	2006	90,000	56	
DUFFERIN	2000	25,000	10	
NEW TORONTO PLANTS	2012, TBD	2x55,000	69	



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Summary Points

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Anaerobic digestion...

- Proven technology successfully integrated into the sustainable waste management systems in EU and Canada
- AD developers will need 5-10 year to prove the technology on the US market and gain the trust of the municipalities
- Requires quality feedstock as source separated organic waste that can be secured through dedicated feedstock agreements
- Would require subsidies and incentives in order to be economically competitive to the disposal options in the US

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Thank you!!

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