Collection and Composting Economics for Open Windrow Operations

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Why Understanding The Economics of Composting Is Essential

- Approximately 87% of all composting operations in the U.S., that do not receive government subsidies fail after 5 years.

EPA 2012

- Composting is the only type of recycling that creates a **new** virgin product and it is the success of this product in the market that will allow composting to become sustainable.
- The beneficial results of well made compost are irrefutable.
- Diverting organic waste from landfills is a worthwhile endeavor, but doing so without any intention of making finished products out of the materials makes organic diversion just another exercise in good citizenry with a limited and finite future.

Begin with the end in mind

- The details of this presentation are based on the premise that every compost facility has the purpose of making a marketable product - whether the level of product is of a coarse nature to fill an erosion deterrent sleeve, for brownfield reclamation use, the backyard gardener, or the golf course superintendent
- Grinding leaves and letting them sit in a pile to decompose is not making compost.

- The materials in this presentation address open air windrow composting systems.
- Under cover, in vessel, and in building systems are not part of this economic modeling.
- Bio-solids composting operations are not included.

Cost Accounting

- The imprecisions and deviations among feedstocks that are an inherent part of composting operations impact traditional cost accounting principles.

Basic Cost Accounting Example

Processing for Leaves

- Dry 3/4
- Optimum 3/8
- Wet 1/4

6 Fundamental Cost Categories

Site	Feedstocks	Equipment
Labor	Overhead	Product Sales

Site Development Considerations

- Site Design and engineering
- Site preparation
- Access road and traffic flow
- Sub-surface and surface conditions
- Water management
- Wind direction
- Buildings

After reading all applicable regulations and evaluating the economic realities used to create your Performa-what is the purpose of the land you wish to use?

- Composting only and if so, what feedstocks will be accepted.
- Composting with customers using the site as the drop-off point for feedstocks.
- Will you sell the finished compost directly from the site? If so, will the site have ample space for trucks and personal vehicles to access your products?
- Does the site need to accommodate an office building?
- Where will the garage/building be to repair or house your equipment?
- What about fuel tanks for off road equipment and/or on road vehicles?

- After answering all the previous questions, you should know the size of the property you need to acquire. Remember, expansion and growth potential must be factored into your business plan.

Costs associated with Feedstocks

- Characteristics
- Handling
- Volume
- Impact on site
- Individualized tipping rates
- End product markets

Costs associated with Feedstocks

Characteristics


Pittsburgh
ZOO
Zoo Service Gate
Shipping & Receiving
Staff Parking Only
Zoo Entrance


Considerations

Costs associated with Feedstocks

Volume and Handling

Feedstock Volume

- Three main cost features
  - How much can be composted at a site – the bigger the throughput the less site and equipment costs associated with each batch.
  - **Reduction Factors – unique to the compost industry and it is crucial to get the tipping structure correct to account for it.**
  - How many times and in how many different ways does the compost operator have to touch it?

Feedstock Handling Volume & Characteristics

- Individualized tipping rates
- Impact on site

Costs associated with Feedstocks

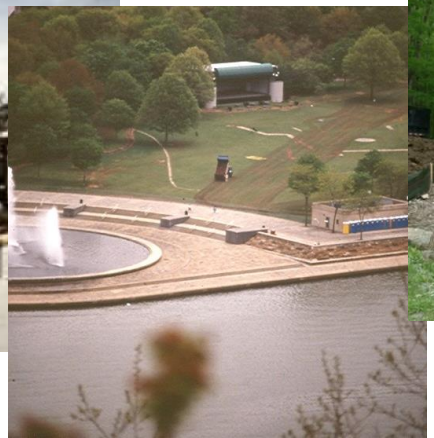
End product markets

End Product Markets

- DEP in Pennsylvania has identified over 250,000 surface acres of abandoned mine lands.
- USGA/PGA altering specifications for golf course construction to include compost.
- PennDOT approved
- Brownfields
- The diversity of the end-uses reflects the diversity of compost products that can be marketed.
- PLNA has identified that compost in PA is satisfying only 5% of the markets available product.

Sales Markets

- Landscape businesses
- Professional growers
- Golf courses
- Garden centers
- Lawn care companies
- Universities and schools
- Developers
- Florists
- Public entities
- Sod producers
- Landscape architects
- Agriculture
- Brownfields
- Abandoned mines
- Rooftop gardens/ green roofs



Costs associated with

Equipment & Labor

- Costs beyond the purchase price
- Use
- Impact on end product quality
- Safety features
- Other procedures

Costs associated with Equipment

Use

"The more you use it, the better the return."

Table 10.2
Time and costs of turning windrows four times annually

	Incoming material									Assumptions		
	1,000 cubic yards			5,000 cubic yards			15,000 cubic yards					
Equipment used	Total cost	Hours	Cost per cubic yard [a]	Total cost	Hours	Cost per cubic yard [a]	Total cost	Hours	Cost per cubic yard [a]	Capital costs	Hourly operating costs	Processing capacity (CYH) [b]
Small loader (40 horsepower); 1/3-yard bucket	$1,423	100	$1.42	$6,398	500	$1.28	$17,276	1,500	$1.15	$15,000	$10	25
Tractor (85 horsepower) and $6,000 loader attachment; 1-yard bucket	$1,116	33	$1.12	$4,800	167	$0.96	$11,669	500	$0.78	$45,000	$13	75
Front loader (135 horsepower); 3-yard bucket	$3,062	11	$3.06	$11,365	56	$2.27	$21,135	167	$1.41	$130,000	$22	225
Windrow turner (small, PTO-driven) with 40-horsepower tractor	$2,326	6	$2.33	$2,885	31	$0.58	$4,205	94	$0.28	$28,000	$13	400
Windrow turner (large, PTO-driven) with 100-horsepower tractor	$4,383	2	$4.38	$4,551	10	$0.91	$4,996	31	$0.33	$65,000	$19	1,200
Windrow turner (medium size, self-powered) with 80-horsepower tractor tow	$17,360	1	$17.36	$17,491	3	$3.50	$17,797	9	$1.19	$115,000	$32	4,000

Note: Operating and ownership costs are included. Turnings are assumed to be timed such that 2.5 times the incoming volumes are turned after accounting for shrinkage. Total compost turning hours are calculated by dividing the total volume to be turned by the assumed hourly processing capacity of each machine and, therefore, assume maximum efficiency with no breaks. The proportion of total hours of farm use attributable to composting is calculated by dividing turning hours by the sum of turning hours and typical hours of farm equipment use reported for each type of equipment in New York farm survey data. Ownership costs are annualized over ten years assuming 11.5% interest rates and 40% salvage values. Insurance and storage are assumed to be 2% of the purchase price annually. Operating costs assume $6.50 per hour labor for tractors. Other hourly operating costs are based on long-term rental rates or derived from O&M data provided by equipment manufacturers or New York farm survey data.

[a] Multiply costs per cubic yard by 4 or 5 for per-ton costs for leaf composting; less for denser materials.
[b] CYH stands for cubic yards per hour.

Windrow Turner (medium size, self powered)

1,000 cubic yards	→	Total Cost	$17,360
		Hours	1
		Cost per cubic yard	$17.36
5,000 cubic yards	→	Total Cost	$17,491
		Hours	3
		Cost per cubic yard	$3.50
15,000 cubic yards	→	Total Cost	$17,797
		Hours	9
		Cost per cubic yard	$1.19
Assumptions	→	Capital Costs	$115,000
		Hourly operating costs	$32
		Processing capacity	4,000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ONLY
NO TRASH, GLASS, PLASTIC OR METAL


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WHOLE FOODS MARKET

Equipment & Labor- Other factors

- Mobility
- Impact on product quality

Equipment- Costs beyond the purchase price

- Repairs
- Labor
- Interest
- Insurance

Labor

- Job conditions
- Supervision
- Weather (seasonally)
- Systematic routines
- Travel time
- Skill levels
- Safety practices

Overhead

- Composting includes both manufacturing and nonmanufacturing costs that must be assigned to each unit of feedstock processed.

Overhead

- Manufacturing
  - Fuel- Power
  - Equipment depreciation (equipment & buildings)
  - Extra support personnel
  - Site maintenance, etc.
- Nonmanufacturing
  - Rent/mortgage
  - Office utilities
  - Taxes
  - Cleaning-people and supplies
  - Vehicles to deliver finished products, etc.

The Forgotten Costs of Labor, Overhead, and Product Sales

- Overtime
- Training
- Multiple offices
- Communication efficiencies
- Product protection from the elements
- Bulk versus retail sales considerations
- Customer education

AgRecycle believes that for composting operations to be successful, sustainable businesses that they must be viewed using product manufacturing models that have been adapted to the unique feedstock variables indigenous to our industry.

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FROM FORGOTTEN to FERTILE™

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