



## **Municipal Composting Feasibility Assessment**

### *Report on Assessment Review*

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Submitted to: **Michele Elfers, City and Borough of Juneau, Alaska**

Submitted by: **Susan Thoman, Cedar Grove Advisory Team (CGAT)  
Cedar Grove Systems, LLC**



## **Introduction**

Cedar Grove Composting has offered commercial composting services to the greater Seattle area since 1989. Through the years, feed stocks have evolved from processing landscape yard and garden drop off materials, to processing over 300,000 tons a year of residential curbside commingled yard + food waste, and over 80,000 tons a year of source separated pre and post-consumer food waste received from restaurants, coffee shops, universities, school cafeterias, public events, military bases and sports stadiums. Over time, the gradual diversion of recoverable organics into Cedar Grove's compost process has resulted in the diversion of over 7 million tons of waste from the landfill since it started.

Many communities in the U.S. are interested in composting as a beneficial alternative to landfilling. The Cedar Grove Advisory Team (CGAT) is proud to offer feedback and some general insights to the City and Borough of Juneau (CBJ) in their admirable efforts to explore all feasible options to recover and reprocess organic materials through composting.

## **Process**

The process for this project involved the development of an assessment tool/questionnaire that required completion by CBJ staff. The purpose of the assessment tool was to allow CBJ to provide general facts, insights and descriptions of various characteristics of the area, governance, feed stocks, and solid waste structure that relate to the primary drivers for initiating a municipal composting program. This approach was offered and developed as the most economical approach to providing general advisory services without lengthy consulting meetings, travel and other associated costs normally involved in long-distance consulting activities. This also allowed CBJ the opportunity to gather specific information directly and submit it for review within its own timeline and process.

The feedback from the assessment tool was received by CGAT and initially reviewed, then followed up by conference call with CBJ staff to clarify points and information. Once all the information was discussed and compiled, the elements of inquiry were reviewed by various members of Cedar Grove's business development, operational, finance and executive teams. Main points and comments from that review process are presented in this report to address the primary drivers related to program feasibility, along with recommendations for CBJ to consider in light of both the limitations and advantages it has in considering composting as part of its comprehensive solid waste program.

## **Part One: Comments on Assessment Responses**

### **Community and Governance Is Favorable for Participation in Composting**

Successful solid waste programs are dependent upon government and the intractable community support that drives government plans and programs. Without willing participants to change daily norms within traditional solid waste systems, the likelihood that a composting program will get traction and root within a community is minimal. For that reason, the demographics make up part of the assessment in order to predict participation levels. Engaged community, school, government, and commercial stakeholders have a significant impact on the potential to launch a program and to sustain its success. In addition to the community support, having clear municipal champions to educate, methodically explore options and obstacles, and acknowledge all aspects of a municipally led community composting program is likely the most critical driver for a program's success. With that in mind, it is recommended that CBJ work to develop an ad hoc group made up of professionals and interested citizens in support of composting in Juneau.

The assessment shows us that CBJ will fare well in this area based on its solid waste department staff, past investment of staff in a general understanding of composting (SWANA 2015 training), and the processes clearly in place for educating internal and external stakeholders for engagement in the project. Additionally, the demographic drivers are favorable for participation based on various characteristics of the population.

### **Population Size, Density and Climate Limitations, Yet Landfill Rates are High- That's GOOD!**

CBJ's population size and density, combined with climate conditions, will inhibit the amount of feed stock sources available and the economics of source separated collection relative to other cities with composting programs. Tonnage projections for residential and commercial composting are generally derived from population size. If residential curbside collection of wood, grass and yard trimmings is implemented, the amount of material will be valuable, but not as significant as other U.S. areas that experience more gardening activities due to lengthier seasons and fewer rainy days. In addition, collection routes with low density are inherently more costly for collection, yet these costs are already known and the routes already developed with the current garbage and recycling programs already in place in CBJ. In addition, with local landfill rates as high as \$180 ton, composting would be worth exploring as rates should be on par or slightly below the current landfill option.

### **Available Feed Stocks are Limited Relative to Other Urban Areas in the Lower 48**

A cursory look at feed stocks available in Juneau and the surrounding area does provide a snapshot of some short term and long term potential (with further research or engagement of potential stakeholders) in growing a program incrementally for the whole region. Currently, in the span and scope of this project, and using available information to project potential tonnage from various local and regional sources, information in Table 1 (p.6) represents an initial snapshot of the high and low end of projected feed stock volumes and sources that, if captured, would help initiate and expand composting (barring unforeseen obstacles with collection infrastructure).

To address this, future consideration of residential yard waste collection or drop off programs during the appropriate seasons can help grow the tonnage, and investment in collection areas and public education to encourage collection will be necessary. Alternatively, encouraging the local collection of yard trimmings, grass and commingled food through current haulers operating under the Regulatory Commission of Alaska (RCA) should also be evaluated.

To ensure steady, local feed stocks are continually introduced to grow the program, commercial collection of feed stocks from hotels, schools, the legislative buildings, and local restaurants should be encouraged through the current collection system, or through other private haulers with the appropriate permits and track record for the proper management of source separated or commingled food scraps and other acceptable compostable materials.

### **Identified Carbon Sources for the Required Feed Stock Mix Are Low**

In various stages of potential development, the mix of feed stocks must be maintained at an ideal carbon to nitrogen ratio of 30:1. That being said, a future program dependent on limited residential and commercial yard and garden trimmings, landscaping debris, food waste and a wood waste level of 1800 tons/year (as identified by CBJ on the assessment response and the most common carbon source in composting) means that researching additional carbon sources would be necessary. Note that cellulosic material such as food impacted take-out pizza boxes, compostable coffee cups, non-recyclable waxed cardboard grocery produce boxes, and food soiled paper items are carbon sources that represent significant volumes (not captured overall on the tonnage projection sheet, p.6). to be explored as carbon based feed stock elements. Because they tend to be lightweight, they are not as highly contributory to tonnage totals, but do offer significant waste reduction opportunities within CBJ if health department and regulatory approval is in place for these feed stocks.

### **Financing and Budgeting, Capital for Technology, Permitting and Site Development**

For a small scale system or launch that may subsequently lead to a potential permanent facility, the financing and budget process and protocols are very clear and the process and steps well defined. The ability to finance capital for a progressively growing program through a 1% tax increase or public bonds helps provide investment capital for both a short term pilot program and a potential long-term facility development plan. In addition to the hard costs of equipment and technology, this investment would need to cover processing equipment (grinding, screening, loaders, etc.), site design, any required site development, permitting costs, any environmental review costs, and other related expenses not known without further research.

### **Land Requirements and Siting Limitations, Long Term Lease Research Needed**

The greatest single challenge to initiating a permanent composting facility in Juneau is the cost and lack of available land in the area. In addition, technology will vary with the type of feed stocks accepted (see reference for the types of technology <http://www.cool2012.com/tools/technologies/>).

As technology and program management has evolved within the last 10 years AND where landfill rates are high, full scale feed stock processing (green waste, wood, animal manure and mortalities, and all food types along with single use, compostable food service packaging, waxed cardboard, paper towels, etc.) is now being done at relatively low urban tonnage levels (< 20,000 tons/year). For that reason, for a short term or long term program to grow and develop, the best case scenario is to site an aerated static pile, in-vessel facility on CBJ owned land. With CBJ's gravel pit location, compost produced on the site

can be easily moved for soil blending using shared equipment and labor, dovetailing operations and minimizing fixed costs for both operations. In addition, additional benefits may be derived from available access to potential loam or sand blending stock (from the pit) that can be used for engineered soils such as bioretention soil, topsoil, green roof blends, and “specification” soils needed for D.O.T. and other low impact development work. Having a facility on CBJ land is ideal for this reason, in addition to the obvious long term CBJ controlled costs and usage advantage.

If CBJ land is not an option, appropriately zoned land lease options should be explored, and would take resources, planning, and an assured long-term leasing arrangement (10-20 years) to justify the investment in a permanent facility. If a program is determined to be favorable for the long term (after conducting an economic and environmental feasibility review), a 3 to 5 acre parcel of land would be needed for the appropriate technology (in-vessel) to process all the desired feed stocks mentioned.

See **Attachment 1** for an example of the general site design requirements for a permanent site using positive aeration, membrane laminate technology that exceeds WAC (Washington Administrative Code 173-350-220) for composting standards.

#### **Yard and Landscape Feed Stock Technology Limitations, Lower Tech Systems**

Environmental controls, technology and leachate management systems must be considered when processing source separated pre and post-consumer food waste feed stocks. The technology and site engineering must ensure that aerobic treatment and temperatures during processing meet the composting standards of PFRP (Processing for Further Reduction of Pathogens) to treat pathogen and bacteria levels in food. In addition, leachate collection plans for food should be factored into site design plans when offloading food or when other higher pathogen feed stocks (manure, mortalities, process wastes, etc.) are introduced to the stream.

If CBJ opted to process only wood, grass or landscape materials, the site will likely require less land, leachate collection and technology. Thus, if a 3-5 acre land parcel is not available, standard windrow technology could be employed to process the readily available 2700 tons of current green waste and wood waste currently going to landfill (per the CBJ assessment response), and potentially vegetative grocery produce (with agency approval). This could be done on a much smaller footprint and at a speculated cost per ton of \$70 to \$100/ton excluding capital investment and permitting (pending further research). This would, however, limit the program from receiving post-consumer food scraps, which means the exclusion of the legislative food service locations, regional hotels and restaurants and any potential cruise line food or floral sources.

**Table 1**

<b>CBJ Feedstock Potential</b>		
<b>Source</b>	<b>RANGE IN TONS</b>	
	<b>LOW</b>	<b>HIGH</b>
Landfill, clean green	1800	3600
Landfill, wood waste	890	1779
Wood chips	0	1377
	<b>2690</b>	<b>6756</b>
<b>Commercial Sources</b>		
Fish processor	0	10
Coffee	0	10
Restaurants	400	800
Schools	10	100
Grocery	400	800
Food bank	0	5
Hotels	0	500
Paper towel collection	0	250
Other	<b>810</b>	<b>2475</b>
<b>Regional Expansion</b>		
Haines	0	149
Skagway	0	83
Hoonah	0	58
Petersburg	0	248
Ketchikan	<b>0</b>	<b>660</b>
		<b>1198</b>
<b>Curbside (YW/FW)</b>		
CBJ area	<b>0</b>	<b>2500</b>
<b>Cruise Ships (food, plants, paper towels)</b>		
	0	1000
	<b>0</b>	<b>1000</b>
High/Low Feed Stock Range	<b>3500</b>	<b>13929</b>

**LANDFILL/WOOD CHIPS:** Information derived from CBJ assessment response of what is available currently. High end may increase by 200-400% with further resource development.

**COMMERCIAL:** Information derived from CBJ assessment report and Cedar Grove historical processing and collection data for sectors listed.

**REGIONAL EXPANSION:** Information derived from CBJ assessment response related to surrounding areas.

**CURBSIDE:** High end calculated based on 15,000 residents generating 400 lbs. per year YW/FW.

**CRUISE SHIPS:** High end calculated on 1.8 lb. food waste per cruise liner (1 million per year in to Juneau) plus additional 100 tons of "other".

Feedstocks listed above are estimated on the low end as available in the short term (< 6 months). With further resources implemented to explore other potential sources, high end tonnage is also conservative. Best mix of feed stocks is a higher proportion of wood and plant waste to meet industry ideal C:N (carbon to nitrogen) ratio requirements. For instance, Cedar Grove's aerated static pile membrane laminate technology calls for a C:N ratios of 30:1. In general, industry standards will range from 20 to 30 C:N. Wood and green waste should make up 60-75% of feed stock mix, but some technologies can go to 50/50% wood and green waste to food mixes.

The table below summarizes what is favorable, unfavorable, and what needs further exploration by CBJ if considering a full scale composting program.

**Table 2**

<b>Advantages</b>	<b>Drawbacks</b>	<b>More Information Needed</b>
Governance, process	Weather	Partnerships
Demographics	Land scarcity and cost	Carbon Sources
Solid waste champion	No direct control of volumes through CBJ solid waste contract (i.e.- no “flow control” by CBJ)	Cruise line organics potential (some feedback derived from cruise line operations staff was supplied for this project)
Capital financing sources	Limited drop offs/transfer station	Regional participation
Operating cost funding		Long term land lease options
SWANA training		Local collection options
Strong outreach, education and stakeholder engagement		Hauler support for collection and diverting to composting

**Part Two: Recommendations for City and Borough of Juneau**

The potential to grow a composting program in the City and Borough of Juneau is good, but scalability, a lack of carbon sources, land scarcity and other limits on potential future feed stocks (no current commercial or curbside collection of yard trimmings, wood and food currently in place) will limit its potential growth and cost effectiveness without further market research and plan development.

If limitations can be adequately addressed, the following plan outlines the potential, in our expertise, for CBJ to initiate tangible steps toward FIRST, a small scale demo site and SECOND, a permanent facility.

CBJ is encouraged to try a pilot/demonstration program to process local and readily available green yard waste, landscaping, wood, and commercial pre and post-consumer food waste (grocery, restaurant, and hotels) to test community interest and engagement, while learning directly about the composting process. Initiating this tangible step would provide time to develop necessary information on other possibilities within the area to expand the program within an optimal costing model.

**Table 3**

<b>2 to 20 YEAR “GO” or “NO GO” RECOMMENDATION</b>	
Years 1-2	Demonstration site Stakeholder engagement Educational events Based on outcome, determine GO or NO GO <b>If GO, then...</b> RFI for permanent facility (pre-qualification, options)
Year 3	Continue with demo Evaluate land options for site <b>If land secured, then-</b> Identify regulatory requirements RFP for in-vessel technology and management Review RFP options, capital and operating budget requirements Site permitting, design, development Secure feed stock commitments for 10,000 ton goal over time Promote capacity to target feed stock generators
Years 4-10+	Facility design, build and permitting Staffing Education and outreach (community) Program implementation and site operation Continue growing feed stock inputs Compost marketing



### **Benefits of Demo/Pilot Program**

By siting a temporary program, CBJ will receive the benefit of having a site to use for educational purposes, encourage more feed stocks into a longer-range program, and utilize a small scale, high tech (recommended) composting system to learn more about the process, technology, logistics, and product quality aspects.

This will also allow for time to concurrently work on the longer range targets for a larger program. In summary, a demo site would allow CBJ to learn composting first hand, while also developing:

- Additional feed stock tonnage research and sources
- Develop complimentary technology and programs for soil blending, construction and demolition debris processing, and other related programs to leverage equipment and fixed assets at site
- Work with local institutions, industries and waste haulers (hotels, government offices, fishing industry, schools, correctional facilities, grocery stores, etc.) to develop interest and commitments in a future, full range composting program
- Explore regulatory requirements for a permanent site

### **Demonstration Site, 2 Year Minimum**

If land could be obtained for a 50' x 200' area to process up to 1500 tons/year using readily available, local feedstocks, Cedar Grove advises trying a 2 year technology pilot with an in-vessel system. This could expand to a 3000 ton/year facility if necessary, with labor and other equipment costs remaining the same and technology costs an additional investment. A 3000 ton site would need to be 100' x 200' in size. Initiating that program would fit within CBJ's capital and operational budget limitations as described in the assessment. Note that some costs provided in the SAMPLE (Table 4) are purely speculative (as a full financial assessment is outside the scope of this initial feasibility assessment). For instance, land lease options, unknown labor or supply costs, or regulatory/temporary siting expenses are estimated. Please see the list of what the estimate covers, and other elements not included as noted at the bottom of the table (see **Table 4**, page 10).

If a short term pilot is launched, CBJ will have the opportunity to explore a more robust program focused on an in-vessel, full scale permanent facility that can process diverse feed stocks that can serve the region with 5,000 to 20,000 tons of capacity over a 7 to 15 year time span (if many of the feed stocks in Table 1 and other sources not yet identified are captured). The economics for that program can be estimated more successfully once a full market feasibility study is conducted, and would also be contingent upon locating and assessing a 3 to 5 acre site centrally situated and zoned industrial.

### **Preliminary SAMPLE Costing Scenario for a Short Term Pilot, 2 Year Program (1500 to 3000 tons/year)**

In developing a pilot system for composting 1500-3000 tons/year of commingled yard, wood, and food waste, the following realistic budgeting SAMPLE is supplied (for processing ONLY). A positive aeration membrane laminate technology in-vessel system is used for this sample, as this is the technology most familiar to Cedar Grove, and has been used to process over 150,000 tons of commingled yard and commercial food wastes each year since 2004. The in-vessel systems provides the highest level of emission and odor control, has a low labor requirement (low frequency of movement required) and feed stock is fully enclosed/covered during active composting. This design provides a living "skin" over the feed stocks, breathes, is designed to provide consistent temperature ranges all year, offers vector and

bear control, and is highly controlled and consistent, remaining unaffected by heavy rain or other weather changes.

This sample provides a tangible option to explore in offering a composting demonstration site to the area. It would also, over the life of the project, pay for itself based on the economic factors CBJ supplied in the assessment (in terms of straight processing fees, not including collection or other unknown costs or factors without further study) and a high landfill rate of \$180/ton (see **Attachment 2**). It is understood that landfill rates may fluctuate with volume discounts and private contracts as well.

**TABLE 4**

<b>SAMPLE PILOT PROGRAM COSTS- FULL IN-VESSEL SYSTEM</b>			
		<b>YEAR 1</b>	<b>YEAR 2</b>
Tonnage		<b>1500</b>	<b>3000</b>
Land requirement		50' x 200'	100' x 200'
<b>Feed stocks</b>		<b>Project Tons</b>	<b>Project Tons</b>
Clean green + food		900	1800
Wood waste		600	1200
		<b>1500</b>	<b>3000</b>
<b>Annual costs, 2 year plan</b>		<b>Year 1</b>	<b>Year 2</b>
Mob/de mob tech rental		\$ 20,000	\$ 20,000
Technology rental and support		\$ 53,820	\$ 107,640
Mangement costs/year		\$ 90,000	\$ 90,000
Other equip and costs		\$ 60,000	\$ 75,000
		<b>\$ 223,820</b>	<b>\$ 292,640</b>
<b>Land Use Fees</b>		<b>Year 1</b>	<b>Year 2</b>
Estimated per month	6000	\$ 72,000	\$ 72,000
		<b>\$ 72,000</b>	<b>\$ 72,000</b>
<b>CBJ EXPENSE:</b>			
*Estimated Total Cost/Year		<b>\$ 297,320</b>	<b>\$ 367,640</b>
Cost/ton		\$ 198	\$ 123
Landfill tipping rates, Juneau		\$ 180	\$ 180
Difference		\$ (18)	\$ 57
<b>CBJ INCOME for Tonnage</b>		<b>1500</b>	<b>3000</b>
Tip fee income (X tons @ \$100/ton)		\$150,000	\$300,000
**Conversion to yardage @\$75/CY		\$ 67,500	\$ 135,000
<b>TOTAL ESTIMATED CBJ INCOME:</b>		<b>\$217,500</b>	<b>\$435,000</b>
<b>Actual Cost/Difference</b>		<b>\$ 79,820</b>	<b>\$ (67,360)</b>
		<b>\$</b>	<b>12,460</b>
*Excludes collection fees, utilities, regulatory control costs, land for storage of product, and/or other unknown expenses.			
**General conversion of tonnage to yardage is 60% of tonnage = yardage OR .60 x 1500/3000 = 900 yds @ \$75/CY= \$67,500/1800 yards @ \$75/CY = \$135,000			

Economically, if compost tip fees were charged at \$100/ton or (\$80 below the quoted landfill rate of \$180/ton), income reflected in Table 4 would pay over half of the hard costs of the pilot over time in just processing fees (barring non-confirmed factors relative to potential land rental, labor, or other expenses unknown at this time). In addition, by converting the tonnage to yardage available for sale at an average sale price of \$75/CY (based on the assessment expectation of \$65-95/CY), additional income would further defray costs over time if all compost produced is sold (as indicated in the CBJ assessment response). In summary, the net cost estimate for all elements known and listed would be \$12, 460 for a 2 year pilot once all income was captured (tip fees, compost sales).

### **Suggested Next Steps**

If the process of exploring composting warrants consideration of initiating a pilot program, then the following next steps are recommended:

1. Prepare an RFI or RFP to composting technology companies that may be available for this project in order to develop costing budget. Cedar Grove Composting can recommend qualified parties to respond to this request and can assist with development of the RFI or RFP.
2. Upon receipt and review of the RFI or RFPs, review the compatibility and feasibility of the costs for a program and various models that will cover all aspects of the initiation of a pilot program, This could include, but is not limited to:
  - Capital budgeting
  - Operational budgeting
  - Management plan
  - Regulatory plan
  - Financial management plan
  - Stakeholder, outreach and education plan
  - Community relations plan
  - Media and PR plan
3. Begin the process of speaking with regulators about the potential project to ensure all local regulatory concerns and issues are properly addressed. Since the state of Alaska has no regulations specific to composting, the Alaska Department of Environmental Conservation in Juneau, along with air and water quality authorities, should be contacted and involved in the planning discussions.
4. Pursue a CBJ owned site for the pilot and assess the relative value for each one considered.
5. Implement plan for pilot composting program and invite local stakeholders (haulers, government, local businesses, and others) to a kick off meeting to engage support and understand any issues or elements to be considered.

Additional guidance on the project can be supplied on an ongoing agreement basis by Cedar Grove Systems, LLC.

Thank you for the opportunity to be of service to you in reviewing and offering a first pass review of your potential to do a composting system in Juneau. It has and would be a privilege to continue assisting you with this evaluation and potential project.

Susan Thoman, V.P. Corporate Development  
Cedar Grove Advisory Team (CGAT)  
**Cedar Grove Systems, LLC**

## **Attachments**

**Attachment 1:**

3 to 5 acre permanent site sample design plan/process pictogram

**Attachment 2:**

Capital Disposal Landfill Rates