

Market Development Grant Proposal 2007 In-Vessel Compost Initiative, Ohio University

I. Executive Summary

The Department of Facilities Management proposes the purchase and installation of an in-vessel composting system to manage 2.5-3 tons of organic waste generated by campus eateries per day. Diverting Ohio University's biodegradable and compostable waste from the Athens-Hocking landfill will allow us to shrink our ecological footprint, reduce our waste management and landscaping costs, decrease pre- and post-consumer food waste, produce a valuable soil amendment, and create new learning and research opportunities for faculty and students. Further, the project will serve as a model for the state, region and nation, as the largest in-vessel composting initiative at any university in the country.

We believe that this initiative also fits squarely within our overall academic priorities by providing opportunities for learning and research on solid waste management, environmental engineering, sustainable agriculture and landscaping. A number of faculty members have already expressed an interest in integrating this project into their undergraduate and graduate curricula from the departments of engineering, plant biology, geography and environmental studies. Further, Ohio University would strengthen its position in the state as a hub for progressive campus sustainability and environmental efficiency programs, and would be recognized state-wide for pioneering the use of a large scale in-vessel composting system. Finally, the implementation of this project would free up additional resources at the department of refuse and recycling which could contribute to more effective overall waste management and create new employment opportunities.

Biodegradable waste, like targeted recycled materials, is a valuable resource. Properly managed, it can be converted into a rich soil amendment which can be used for campus landscaping and local agricultural purposes. Currently, Ohio University has no established system for capturing organic waste from campus eateries including our public dining areas and our residential dining halls. Food waste ends up either in our dumpsters or in our sewer system.

The new Baker University Center offers a number of opportunities as a launching pad for the program. It features biodegradable service wear (plates, clamshells, beverage cups and cutlery) at all of its dining areas. It is also a new facility, which has inspired new ways of thinking and processing on the part of its staff and customers. Ohio University would like to take advantage of this historic opportunity by offering the means for our campus to handle organic waste appropriately by using the Baker University Center as a model.

A small but growing number of universities across the country are taking steps to capitalize on their production of organic waste by establishing composting facilities on campus. A few notable examples include Cornell University, Penn State University, UMass Amherst and Youngstown State. However, only two small colleges – Allegheny College in Pennsylvania and St. Olaf's College in Minnesota – are currently using in-vessel systems to manage large scale institutional waste. Others are collecting organic waste and managing it using windrow systems, static piles or small in-vessel units. Windrow and static pile systems require a relatively large area, long composting periods, and significant ongoing staff time. Further, they can present nuisance issues which limit siting options. Smaller in-vessel units (such as the one in use at Youngstown State) would not allow us to manage the anticipated flow of organic waste from Ohio University.

The total cost of the proposed project described in this document is \$530,525. This proposal for the Market Development grant targeting organic waste requests a sum of \$250,000 from the Ohio Department of Natural Resources toward the purchase of an in-vessel composting unit, as well as the development of an appropriate site for its installation, including the construction of a heated pole barn. Matching funds will be provided through the operational budgets of two Ohio University departments: Facilities Management and Auxiliaries. We estimate that the payback period for the investment on the purchase of the in-vessel unit as well as the site preparation will be about 8.35 years. Additional costs will include maintenance of the unit, additional equipment, staff hours, utilities and contingencies.

We have initiated this composting project at the university by directing customers and dining services employees at our new Baker University Center to sort out the biodegradable waste stream from other waste by using bins labeled "Compost". Results from this initiative thus far indicate that there is widespread support for the project, as well as a willingness to comply with new sorting procedures. We are monitoring the waste from this stream in order to have a better sense of how much solid waste is generated by the dining areas at this new center, and the proportion of biodegradable service ware to food waste that we will be able to expect once the in-vessel system becomes operational.

Our timeline for the project is as follows:

Jan 2007	Creation of new waste sorting system at Baker University Center
Jan – July 2007	Monitoring of waste; education/promotion efforts
July 2007	Allocation of funds for purchase of an in-vessel unit
July 2007	Release of the RFP for the in-vessel unit
Sept – Dec 2007	Review of submitted proposals and final selection
Feb 2008	Submit application to OEPA for Class II permit
Mar 2008	Delivery of in-vessel unit
May 2008	Launch of the in-vessel composting process
June 2008	Begin application of compost to university grounds

II. Project Details

1. Need

In an average month, Ohio University produces about 400 tons of landfill waste – up to 14 tons per day – plus 30-33 tons per month of grounds waste¹. Disposal of landfill waste costs roughly \$25,000 per month. The opening of the new Baker University Center on January 2, 2007 has increased the solid waste produced by our campus significantly; the dining areas in this facility alone are serving 2,500 meals per day on average.

A waste audit performed by ODNR in 2005² revealed that as much as 25% of the landfill waste stream on a university campus (roughly 3.5 tons per day in the case of Ohio University) is composed of biodegradable organic waste including meat, fish, dairy products, fruits and vegetables, cooked foods, sewage biosolids, and non-recyclable paper products (napkins, contaminated paper goods, etc.).

¹ From July 2005 through June 2006, Ohio University produced 4,846.47 tons of landfill waste according to the Athens-Hocking Recycling Center.

² ODNR, Division of Recycling and Litter Prevention. (2005). University Waste and Recycling Program Audit: Columbus, OH.

Based on the experiences of other university campuses that have implemented composting programs, we estimate that we would be able to capture approximately 50% of the biodegradable waste stream for composting. A 2.5-ton per day in-vessel system could process all of the recoverable organic waste generated by the campus eateries at Ohio University, turning waste into soil in 15 days with no odors, no vector or pathogen control issues, and minimal staff involvement. Further, by diverting up to 1 ton of grounds waste per day into the in-vessel composting system from our grounds waste composting site, we could further reduce costs by reducing pre- and post-consumer food waste and minimizing private screener charges for our landscaping waste.

2. Project Budget and Match Commitment

Description	Quoted Cost	Funding	
		ODNR	Matching Funds
In-Vessel Composting Unit	\$428,525	\$250,000	\$178,525
Site Development			
Heated Pole Barn -- 30'x30', 10' Tall	\$65,000		\$65,000
Exterior Slab -- 30'x60'	\$10,000		\$10,000
Gravel Lot around Building -- 160'x80'	\$11,250		\$11,250
Gravel Drive From Road -- 700'x20'	\$15,750		\$15,750
TOTAL	\$530,525	\$250,000	\$280,525

Budget Item Description

In-vessel composting unit³ – 30'x60', 2.5 tons of waste per day
Heated Pole Barn – 30'x30', 10' tall pole barn; restroom; 200 amp electric; phone; unit heater
Exterior Slab -- 30'x70' slab of reinforced concrete at 3000 psi, 6" thick.
Gravel Lot around Building – 80'x160'
Gravel Drive from Road – 20'x700'

We estimate that the total cost of purchasing the in-vessel composting unit and developing the designated site will be **\$530,525**, including construction of a heated pole barn, pouring of an exterior concrete slab, preparing the gravel lot around the pole barn, and improving the gravel drive from the access road.

Ohio University submits this proposal to the Ohio Department of Natural Resources through the Market Development Grant program to cover **\$250,000** of the cost of this project. The entire sum received from ODNR will be applied to the purchase of the in-vessel composting unit.

The departments of Facilities Management and Auxiliary Services at Ohio University have committed to providing the 100% cash match to this grant, in addition to any additional costs (both initial and ongoing) associated with this project. Thus, Ohio University commits to providing **\$280,525** toward the purchase of the in-vessel unit as well as the site development costs. The two departments (Facilities Management and Auxiliary Services) will be sharing costs equally. These matching and additional funds will be derived from the operating funds allotted to each of these departments.

3. Service Area

Facts about Ohio University, Athens campus (as of January 2007):

- 16,761 students, 3,973 staff and faculty
- 7,498 students on meal plans at 5 dining halls

³ Please note that the size and cost of the in-vessel composting unit will not be determined until a final selection has been made after the required RFP process. Size and cost have been estimated based on a 2.5 ton per day HotRot 1811 in-vessel composting unit.

- 1 campus food court, serving 2,500 meals a day
- 2 campus coffee shops
- 1 campus restaurant
- 1,300 acres

We plan to begin the composting initiative with the Baker University Center facilities, progressively expanding our capacity as we bring more dining halls into this waste sorting system. If we determine that capacity for the in-vessel unit has not been reached once all dining areas have been brought into the new waste sorting procedures, we will approach the Athens municipality regarding the processing of biodegradable waste from area restaurants and other facilities. It is our hope that the Ohio U. composting system could eventually be expanded to include the municipality's organic waste stream. This will depend on determining a funding source for the expansion and any additional operational costs that would be incurred. Athens City comprised approximately 20,000 residents.

4. Diversion Rate

A waste audit performed by ODNR in 2005 revealed that as much as 25% of the landfill waste stream on a university campus (roughly 3.5 tons per day in the case of Ohio University) is composed of biodegradable organic waste including meat, fish, dairy products, fruits and vegetables, cooked foods, sewage biosolids, and non-recyclable paper products (napkins, contaminated paper goods, etc.). Data specific to six sampled buildings at Ohio University indicated that food waste comprised 42.46% of the waste stream by weight. It is unlikely that this statistic was representative of the total waste stream, as indicated from data derived from waste samples at the four other campuses that were surveyed. Further, data from campuses across the country point to a figure of about 20-25% for organic matter in the total waste stream. This figure is supported by Larry Cooper of the ODNR Recycling and Litter Prevention Programs department.

Assuming that we were ultimately able to capture 50% of the biodegradable waste stream, this would amount to 1.75 tons per day. A balance of ground waste would be added to the food waste each day in order to maintain the proper carbon to nitrogen ratio, as well as optimal moisture levels.

5. Sustainability

The funds needed to sustain the composting initiative will be derived from the operational budgets of Facilities Management and Auxiliaries. The project is also widely supported in our campus community (including faculty, staff and students), indicating that there is a high likelihood that there will be continued pressure to implement the project.

6. Performance

Goals

- To achieve a 50% rate of capture of the organic waste stream within the first year of operation;
- To educate the campus community regarding new waste sorting procedures and the need to minimize overall waste;

- To improve the health and fertility of our grounds (both on the Athens and regional campuses) through the provision and application of nearly 900 tons of compost per year as a soil amendment;
- To demonstrate tangible savings realized by the composting initiative in order to justify further expansion;
- To provide a model of in-vessel organic waste composting for other universities and large-scale institutions in Ohio and in the larger region;
- To provide an opportunity to the larger Athens community to divert organic waste.

7. Tonnage

Based on the figure of 1.75 tons of biodegradable waste diverted per day (see #4, above), we would expect to divert approximately 615 tons of waste per year from the Athens-Hocking landfill. In addition, we would process approximately 260 tons per year of grounds waste. The total waste processed by the in-vessel system operating at capacity would be equal to 875 tons per year.

8. Material Description

The feedstock for the in-vessel composting unit will consist of the following:

- Pre and Post-consumer food waste from all dining areas on campus
- Biodegradable service ware from our food court and coffee shop (including items made from sugar cane, potato starch, and corn plastic or PLA)
- Grounds waste (including leaves, branches, and grass clippings)
- Animal bedding from our research labs
- Sawdust from the carpentry shop

It is difficult to estimate specific tonnage associated with pre- versus post-consumer food waste and biodegradable service ware, as an itemized audit of our organic waste stream has not been performed to date. However, our grounds department estimates that the university generates between 300-400 tons of landscaping waste per year. Animal bedding amounts to approximately 35-40 tons of waste per year. The Carpentry shop produces about 2-4 cubic yards of sawdust every quarter, which accounts for between 2-3 tons per year.

9. Specifications

Upon determination of funding sources for this project, the Purchasing and Contracting office at Ohio University will proceed to invite proposals from compost system manufacturers. Alternatives including the Wright Environmental, HotRot and ECS composting systems have been preliminarily investigated in order to prepare an initial project proposal.

In selecting an in-vessel composting system, Ohio University will consider alternates that meet or exceed the quality and characteristics specified. The University is not bound to accept any proposals that are not in its best interest. The determination as to acceptability of the alternate offered is the responsibility of the University, and will be based on information furnished by the bidder, as well as information reasonably available to the University. Awards for goods and services will be made to the bidder(s) providing the lowest responsive and responsible proposal. The University reserves the right to reject any or all proposals and is not bound to accept the lowest-cost proposal if that proposal is not in the best interests of the University.

10. Facility Details

A new waste sorting procedure has already been established at the Baker University Center as of January 2007. Dining services employees are being directed to separate out all pre-consumer food waste, and bins have been set up in the public areas to accommodate patrons. Table tents provide information regarding the fact that all the service ware in use is biodegradable and should be placed in the bins labeled "Compost".

An in-vessel composting system is ideally suited to meet the needs of Ohio University, featuring a highly efficient contained system which has the capacity to manage all forms of organic waste (including meat, dairy, biodegradable service wear, and grounds waste), while speeding the processing of waste into usable soil, controlling odors, vectors and leachates, and minimizing staff time needed for operation.

A number of suppliers offer composting technology systems that optimize the natural composting process by controlling airflow, moisture levels and temperatures thereby accelerating the decomposition cycle of organic wastes. These composting tunnels require minimal maintenance and consume relatively small quantities of electricity and water. One or two operators per shift can staff the systems, depending on the system chosen. The vessel can be loaded every day eliminating the need to store waste, minimizing vector attraction and odors. They can be left unattended for days in the event of illness or absenteeism. Compost produced after 14 days within a composting tunnel is very similar to soil in appearance, with a dark color and similar texture. Material is reduced in volume by approximately 30% and pathogen reduction has occurred. Additional curing may be required depending on application.

The two systems we have investigated that respond to our needs are the Wright Environmental 3-ton in-vessel unit, and the HotRot modular 1811 unit which can process 2.5 tons per day. As specified in #9 above, a selection will be made based on the university's established RFP process. The budget for the unit is based on the quoted price for the HotRot 1811 system. The price of the Wright system is comparable.

The site that has been designed for use by the composting initiative is an undeveloped area of the Ridges precinct of our campus. Access to the site is off of Dairy Lane. The site is approximately 2 miles from Baker University Center. There are several acres available for development at this site; however, the final site size for this particular project has yet to be determined. An access road does exist to this site, but will require further development and surfacing in order to withstand truck traffic. Water and electricity will need to be extending to the site; most likely from Dairy Lane. The site topography is gently rolling and the cover is grass. No wetlands or trees are currently on the site.

Ohio University currently operates a Class IV composting site for our landscaping waste. If awarded the grant, we would proceed to submit an application to the OEPA for another compost site, Class II, in order to accept food waste and animal bedding.

11. Income Statement

Please see attached financial reports for Ohio University in 2004, 2005 and 2006.

12. Sales Projections & Product Distribution

We do not plan to sell the finished compost product, as this would require periodic quality testing for which we do not currently have the resources, both financial and technical. Further, there are some concerns that the university would incur liability by distributing or selling this product to outside customers. All of the finished compost generated by the in-vessel unit will be applied to the grounds of Ohio University, both on the Athens campus and also the other five regional campuses.

13. Payback Schedule

Annual savings by measure have been calculated according to the following assumptions:

- *Landfill Disposal Fees:* Assuming that 25% of our total waste stream is composed of biodegradables, and that we are able to capture and compost 50% of our biodegradable waste, we would expect a decrease of 12.5% in our annual landfill disposal fees of \$300,000
- *Chemical Fertilizer:* Currently, Ohio University purchases \$10,000 worth of chemical fertilizers per year for use on athletic fields and the golf course. The grounds department estimates that one quarter of this cost would be avoided through the use of compost.
- *Organic Fertilizer:* Approximately 570 tons of finished compost will be generated on an annual basis, recognizing that there is a one third loss in weight in the composting process. Purchasing this amount of soil amendment in bulk would cost the university \$20/ton.
- *Screener:* Every year, the grounds department incurs a charge of \$16,000 for a private screener for use at our Class IV grounds waste composting site. By diverting grounds waste such as leaves and wood chips toward the in-vessel system, we would be able to move to a bi-annual screening schedule.
- *Food Waste Reductions:* Evidence from the composting initiative at Ithaca College and UMass Amherst indicates that total food waste from the dining halls would decrease by about 3% over the first year due to feedback mechanism and better information regarding waste. This would total about 25 tons per year. At our current landfill disposal rate of \$166/ton, this would translate into \$4,000 savings per year. This figure does not take into account additional savings from the avoidance of purchasing this food on the front end, which would be even higher than the landfill disposal costs.

Savings by Measure	Annual Savings Amount \$
Landfill Disposal fees	\$37,500
Chemical Fertilizer	\$2,500
Organic Fertilizer	\$11,550
Screener	\$8,000
Food Waste Reductions	\$4,000
Total Annual Savings	\$63,550
Total Project Costs	\$530,525
Simple Payback in Years (Total Costs / Total Annual Savings)	8.35

Thus, we estimate a simple payback time for this initial investment of 8.35 years from the inception of the project.

14. Markets

See #12 above.

15. Financial Statements/Reports

See #11 above.