



ENVIRONMENTAL SOLUTIONS



OVERVIEW AND PROJECT EXPERIENCE:



IN-VESSEL TECHNOLOGY GET'S LAUNCHED 1989



The first composter was built for the Ontario Government in 1993 for the Ontario Science Centre located in Toronto, Ontario. It was used to compost the food waste from Queens Park government buildings as well as prisons located in the greater Toronto area. The Ontario Science Centre is one of Canada's premier facilities for showcasing Canadian innovation.



REDESIGNING OUR WORLD THE TEAM LEADS THE WAY

The company has been in business since 1993. It has implemented Bio-solution and composting projects in North America & Europe and other locations around the world. The first composter was built for the Ontario Government in 1993 for the Ontario Science Centre located in Toronto, Ontario. It was used to compost the food waste from Queen's Park government buildings as well as prisons located in the greater Toronto area. The Ontario Science Centre is one of Canada's premier facilities for showcasing Canadian innovation.

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JOINS EARLY 1990'S THE MARS MISSION PROJECT FOR DEVELOPING WASTE MANAGEMENT SYSTEMS.

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1. Isolate/express frequency, lysate milking
2. Define CD and D, demonstrating a link ability to manipulate air
3. Temperature control (insulated but has a heating jacket to compensate for surface volume ratio problems associated with small vessels)
4. Collection of bioactive
5. Buffers (phosphate salt) of solute and atmospheric environment

[illegible]

- The volume of the RSE is sufficient that outflowing gas sensor and is sustained by the insulation thermal of the cell.
- Carbon substrate production induces chemical metabolic activity in occurring in the RSE.
- The relative content can be estimated by manipulating the air supply.
- Ethanol usage of oxygen can be degraded in the RSE.
- Increased sensitivity affinity and enhanced anastomosis indicates stable, healthy system in the RSE.
- Changes in the cell substrate (fucose degradation of different chemical composition) corresponding to the growth.
- No measured electron transport throughout 2012 Series.

BACKGROUND

- Long-term space mission will require recycling of wastes.
- Aerobic composting of solid wastes can be used for
 - Stabilization and volume reduction
 - Enhanced nutrient recycling
 - For safely reducing levels of pathogens

Our team through a Space Act Agreement with NASA, Kennedy Space Center, has developed a unique in-vessel composter to better optimize conditions for aerobic composting of human associated solid wastes on extended space missions.

BACK ON EARTH

THE IMPACT IS BEING FELT



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COOL 2012

ADVANCING COMPOSTING, ORGANICS RECYCLING & RENEWABLE ENERGY

Composting Helps Anchor University's Climate Commitment

BioCycle May 2008, Vol. 49, No. 5, p. 28

Environmental stewardship is well-rooted at Allegheny College, where an in-vessel composting unit was installed in 2001 to process pre and postconsumer food scraps.

Robert Spencer

AS a 1976 graduate of Allegheny College's fledgling environmental studies program, I have followed with particular interest this small liberal arts college's strides in energy conservation, food scraps composting, and numerous sustainability initiatives. During my senior year I was on the college's first energy conservation committee. Over the next 30 years, its programs continued to grow in stature.

Located in Meadville, Pennsylvania, an industrial community 30 miles south of the city of Erie, Allegheny College was founded in 1815. As the home of the Talon Corporation, the town had been known as "Zipper City," and more recently as "Tool City" due to numerous tool and die machine shops. Meadville is also the Crawford County seat, and like many small college towns, has a close relationship with the college.



To advance its community outreach goals in sustainability, Allegheny College established the Center for Economic and Environmental Development (CEED) in 1997. Built by an interdisciplinary group of faculty from the Art, Economics, Political Science and English departments, the various CEED programs implement campus and community sustainability projects, giving students, faculty and staff the opportunity to live and learn practices that graduates will carry with them into their lives and future careers.

Projects have included a watershed protection programs with area



responsibility and sustainability. "This was rather rare at the time, but many other colleges are now moving in this direction," notes Cook. "When the American College and University Presidents Climate Commitment (ACUPCC) was in its early stages, Allegheny College became an early signatory. Because of the Board's commitment to environmental principles, this was a straightforward decision. The college had long been engaged in sustainability issues from forestry to local economies, and from agriculture to complex ecosystems. The Climate Commitment was an extension of our philosophy into a national movement."

COMPOSTING ON CAMPUS

In 2001, Allegheny became the first college in Pennsylvania with an in-vessel composting operation for food scraps. It purchased a Wright Environmental compost system and installed it in a new building near the athletic fields. The unit is totally enclosed except for a compost discharge conveyor that passes through the wall. A biofilter is a permanent part of the unit. A grant from the Pennsylvania Department of Environmental Protection (DEP) paid for the vessel and associated equipment required to run the compost unit, for a total cost of \$247,000.

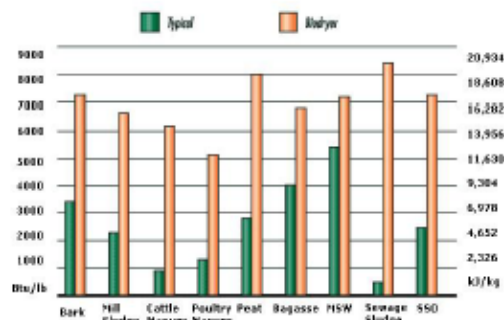
The school composts 800 to 1,000 pounds/day of kitchen preparation food waste from one dining hall, as well as one food court that collects postconsumer waste, including biodegradable plates and cutlery. Approximately 100 pounds of wood chips are mixed with each 200 pounds of food scraps prior to loading in the aerated vessel to provide porosity during the 14- to 16-day retention time. After discharge, material is mixed with hay and animal manure for further composting in outdoor windrows. The grounds crews found that compost from straight food scraps contained excessive concentrations of salt for healthy plant growth, so the compost is blended with other organic materials to reduce salt concentrations. Approximately 75 tons of compost are produced annually.



Biological Dryers Improve Performance/Economics of Biomass Projects

Greater use of biomass for power generation is often constrained by the high moisture content of these fuels. As water content increases, heating value drops, hampering the economics of the biomass utilization. Dryers can be used, but most traditional dryer designs require a large amount of energy to dry the biomass and are expensive to maintain and operate. As a result, much of the organic waste from industrial processes, agriculture, municipal solid waste and sewage sludge (i.e. biosolids), and farming typically end up as landfill or soil amendment.

"Drying the biomass or organic waste to 15 to 20 percent moisture content or less would improve the performance and economics of energy-based applications," says Russ Blades, vice president of Wright Tech Systems Inc. (www.wrighttech.ca). "Drier biomass has a greater heating value and burns hotter, more vigorously and more efficiently."

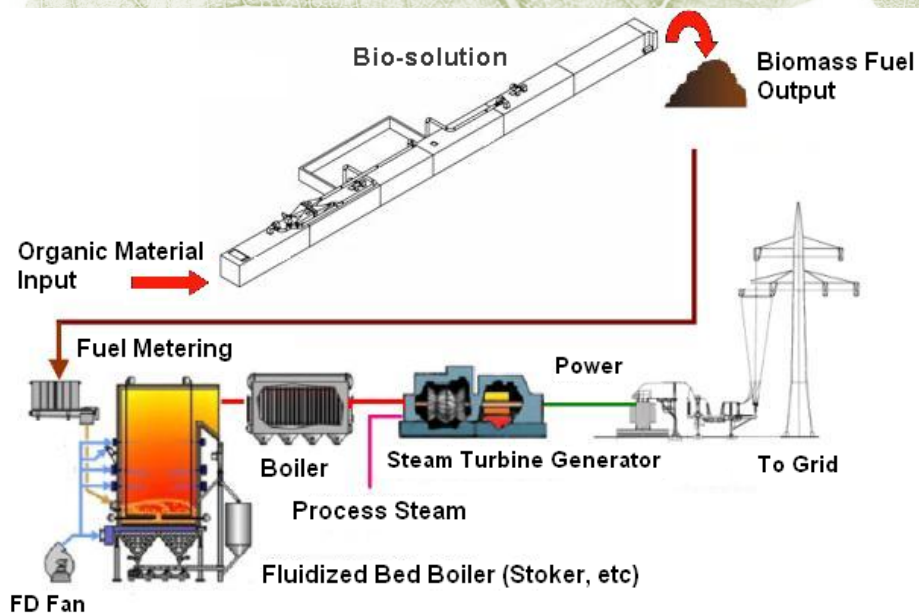


exothermic heat (7450 Btu/lb dry organic matter) produced from the aerobic decomposition process instead of fossil fuels to cost-effectively dry biomass. In other words, instead of using natural gas or other fossil fuels to dry and improve the renewable energy potential of wet organic waste or biomass, the Blodryer takes advantage of Mother Nature to effectively dry the material.

EVOLUTION ON EARTH

COMPOST IN-VESSEL TO BIO-SOLUTION BIOFUEL TO INTELLIGENT ELECTRICITY

The team continues to contribute to the world's much needed redesign.



THE TEAM



The composting system for Reedy Creek Industrial District (RCID) was commissioned in 2001 to handle all food waste and biosolids of the Disney World Amusement Park which hosts millions of visitors a year.



In 2007 the first Bio-Solution In-Vessel tunnel system was installed at RCID, capable of producing compost or biofuel from Disney's facilities.

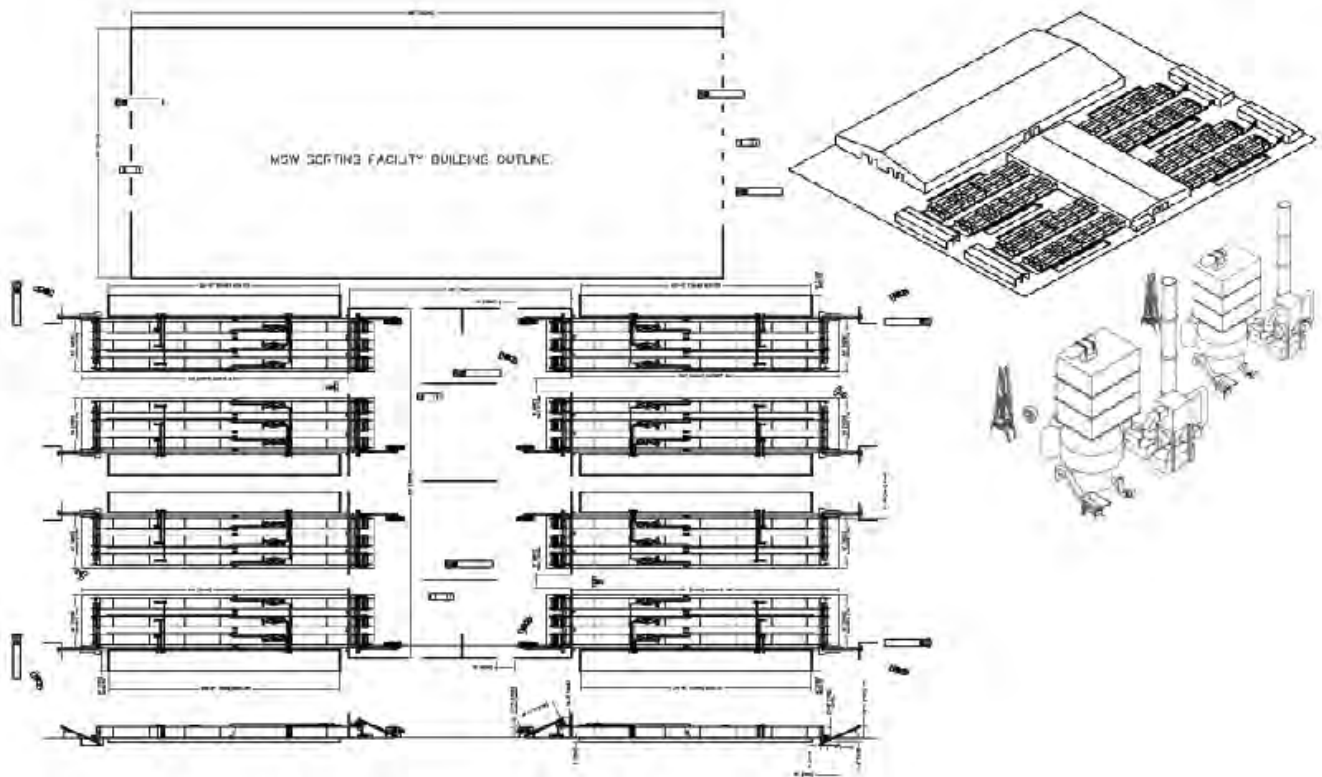
Whistler, British Columbia, Canada



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EXAMPLE 24 BIO-SOLUTION TUNNEL SYSTEM (50MWH Net)



Each installation is customized for the individual application, based on geography, composition and volume of the biowaste as well as desired end result - i.e. biowaste management, biofuel for sale/or use to create bio-energy.



[Left Image] Photo shows the Disney World Florida operation under construction. Disney is meticulous when it comes to managing the visitor experience. The Disney facility had a vast underground network where all “undesirable” but necessary operations are hidden from public view. Their priority was to eliminate and treat all organic waste. The biofuel, which is not required for their own electricity generation was sold.

BIO-SOLUTION TECHNOLOGY OVERVIEW



THE REASON WHY
THE 2010 WINTER
OLYMPICS WAS
AWARDED TO
WHISTLER,
BRITISH COLUMBIA
CANADA.



THESE BIO-SOLUTION
IN IRELAND PROCESS
200 TONS OF WASTE &
GENERATE 100 TONS
OF BIOFUEL
PER DAY.

BIO-SOLUTION TECHNOLOGY OVERVIEW



BIO-SOLUTION
in-vessel tunnels are constructed to carefully control waste movement, heat flow and oxygen content (exothermic reaction) to achieve highly efficient bio-fuel and ensures longevity of the equipment.



BIO-SOLUTION
in-vessel tunnels biomass waste feedstock is mechanically inputted to each tunnel so material is evenly loaded.

PROJECT EXPERIENCE

Client	Current Status	Year Installed	Client	Current Status	Year Installed
RCID Disney	operational	2001	James River Correctional	operational	1999
RCID Disney	operational	2007	Miami Correctional	operational	1999
Carney Waste	operational	2003	Capital Compost	operational	1999
Whistler	operational	2008	Dyes Air Force	operational	1998
Panda Waste	operational	2006	Williamshead Correctional	operational	1996
Abrdeenshire	operational	2000	Biffa Waste	operational	2000
Aberdeenshire	operational	2005	Auburn Corrections	operational	1998
A1 Waste	operational	2006	Donnacona Correctional	operational	1997
Ohio University	operational	2008	Drumhiller Correctional	operational	1997
Ohio University	operational	2011	London Psychiatric Hospital	operational	1994
Pennsylvania Corrections	operational	2005	San Francisco University	operational	1997
Ozark Corrections	operational	2004	University of Massachusetts	operational	1997
Larch corrections	operational	2004	Township of Meaford	operational	1997
University of BC	operational	2004	La Macaza Correctional	operational	1997
US Navel Andros Island	operational	2003	Ministry of Natural resources	operational	1997
Albian corrections	operational	2003	Walkworth Correction;	operational	1996
Sussex corrections	operational	2003	Canadian Gov't (CD Howie)	operational	1996
British Airport Authorities	operational	2003	Ste Anne des Plain Corrections	operational	1996
Powhatan corrections	operational	2002	Jasper National Park	operational	1996
Springhill Institution	operational	2000	Kent Institution	operational	1995
Crawford county	operational	2000	Cownsville Correctional	operational	1995
CFB Gagetown	operational	2000	Atlantic Institution	operational	1995
CFB Trenton	operational	2000	Natural Resources Canada	operational	1994
Port Carter Corrections	operational	2000			
Alachua County	operational	2000			
Allegheny College	operational	2000			
Beaver Creek Corrections	operational	1995			
Mountain Institution	operational	1995			
Ontario Science Centre	operational	1993			

US military installations are confidential. We can't provide information on this. It did also include an important secret submarine facility.

We sold 3 composters to the US military, Andros Island, Bahamas; Dyess Air Force Base, Texas; and Fort Monroe, Virginia.