

# *On-Site Composting in the Irish Prison Service*

*Craig H. Benton  
Composting & Recycling Consultants, Inc.*

*US Composting Council Conference  
Oakland, California  
February 11, 2008*

# Presentation Summary:

- Introduction to the Irish Prison Service
- Why Compost?
- Pilot Project
- Feasibility Study
- Technology Selection & Site Design
- Full-Scale Demonstration in Castlerea
- Prison Officer Training
- Expanding to Other Prisons
- Challenges & Lessons Learned

# Introduction to the Irish Prison Service

## *Mission Statement:*

“The mission of the Irish Prison Service (IPS) is to provide safe, secure and humane custody for people who are sent to prison.

The Service is committed to managing custodial sentences in a way which encourages and supports prisoners in their endeavoring to live law abiding and purposeful lives as valued members of society.”

# Introduction to the Irish Prison Service

- 10-12,000 people committed to prison in Ireland each year by the Irish Courts
- 76% serving < one year, 38% < three months
- Average of 3,200 inmates in prison at any given time
- 3,311 Prison Service staff (2004)
- 1/12<sup>th</sup> of 1% in prison in Ireland compared to 1/3 of 1% for America (a four fold difference)
- \$450m annual budget
- 14 prisons throughout Ireland, ranging in size from 49 to 485 inmates
- Real emphasis on training and rehabilitation



# Why Compost?

Main driver was the adoption of an integrated environmental management (EM) program with an emphasis on encouraging sustainable development, reducing energy consumption, conserving resources, and preventing pollution.

- Strategy led to comprehensive policy and creation of an executive environmental management team within Prison Service.
- Hiring of environmental manager who works with and trains 150 staff in implementation of EM policy and projects....
- Resulting in recent energy conservation, waste reduction, recycling and composting initiatives within the 14 prisons and HQ.

# Why Compost?

The second driver was economic:

- High disposal costs = \$180+/ton.
- High collection costs.
- Recycling working for paper, cans, bottles and plastic, add composting and the Prison Service could maximize diversion and save lots of money.

Lastly, the composting initiative provides an opportunity to train staff and inmates in environmental management systems, programs and facility operation, more specifically how to make and use compost as a waste management tool and for the Prison's horticulture program.

# Pilot Project: 2004

- Funded by Executive Environmental Management Team through an open process available to all prisons with Castlerea Prison chosen.
- Pilot lead by Environmental Manager with technical assistance from Percy Foster, a graduate student from Institute of Technology Sligo, and with prison officer Sean Coen who managed inmates in Castlerea Prison to carry out the work.
- Purpose was to determine if biodegradables from an Irish prison could be successfully composted using an on-site composting system?
- 2.6 tonnes of food, sawdust, shredded brush, and wood chips were added to the Earth Tub over a six week period.
- Temperature and moisture levels were monitored and recorded for six months.



# Pilot Project: Starts Summer 2004



# Pilot Project: 2004

## *Results and Conclusions:*

The in-vessel system was capable of reaching and sustaining pathogen killing temperatures.

The compost produced was of a very high quality and met the European standards for Class I compost for heavy metal concentration, pathogen reduction and stability.

The Earth Tub aeration and biofilter system was effective in preventing and treating odors from the composting process.

# Pilot Project: 2004

## *Results and Conclusions:*

2.6 tonnes in = 817kg of screened compost out, representing a 69% weight reduction from the composting and screening process.

The composting system requires active attention by a trained staff person.

Bottom line = food waste from the prison can be successfully composted on-site.

# Feasibility Study: 2006

Consultant hired to assist Environmental Manager with evaluating and expanding composting initiative.

## *Purpose:*

- Assess waste generation characteristics for Castlerea Prison.
- Understand waste management practices and costs.
- Evaluate commercial and custom built on-site composting systems.
- Select technology and develop conceptual site design for Castlerea as a model for others.

# Feasibility Study: 2006

## *Waste Generation Characteristics:*

- 500 people live and work at the Castlereagh Prison
- 800 people will live and work there in 2009
- Prison currently generates 4 tonnes of waste/week
- 20% is biodegradable (2/3 food, 1/3 sawdust, non-recyclable paper and landscape materials)
- 1kg of food per person per week
- 38-59 tonnes per year of organics (2007-2009)



# Feasibility Study: 2006

## *Waste Management Practices and Costs:*

- Prior to June 2006, all solid waste was collected in wheelie bins throughout the prison and picked up by a local hauler for \$8,000/month or \$96,000/year.
- In August 2006, cardboard and plastic recycling was started which reduced the monthly bill by \$1,400 to \$6,600/month..
- Since October 2006, compactor service was installed along with rigorous recycling of all paper, bottles, cans, tetra pak and cardboard, and some composting of food scraps lowering waste collection and disposal costs to \$15,000/year or \$1,250/month.

The new system requires inmates and staff to sort materials into three categories: dry recyclables, biodegradables and non-recyclable residuals





All waste bins are emptied onto this table and hand sorted by inmates to remove recyclables





All wheelie bins used to collect mixed waste and biodegradables are steam-cleaned after each use.



New compactor for solid waste collected 4x/year  
@ \$3,750/lift or \$250/tonne (holds about 15 tonnes)





Most recyclables are baled: cardboard, newspaper, office paper, tetra pak, and plastic bottles....





Other materials are collected in skips, roll-offs or containers: scrap metal, used clothing, wood and cooking oils as well as electronic items, hazardous materials and medical waste.



# Feasibility Study: 2006

## *Evaluation of On-Site Systems:*

- Six systems were evaluated; three commercial and three custom built:

Big Hanna

The Rocket

Earth Tub

Vermicomposting Systems

Aerated Bunker System

Turned Bunker System

# Big Hanna



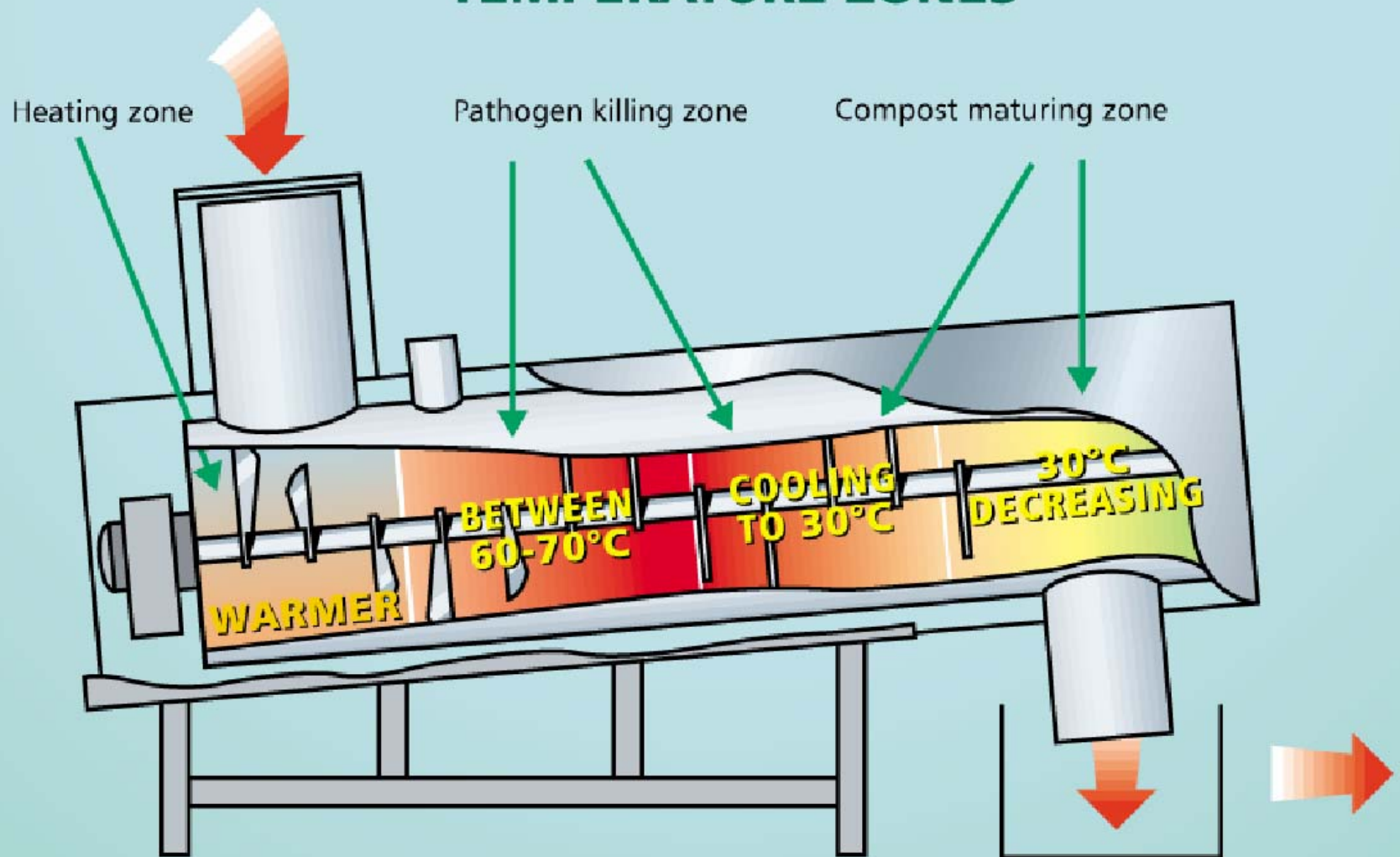


# Big Hanna

- Swedish technology utilizing rotating drum
- Stainless steel construction with blower and process control system. Biofilter optional.
- Continuous complete process: 8-10 weeks
- Fully automated
- Requires sawdust or pellets
- 1,400kg/week unit = \$80,000

# The Rocket

## TEMPERATURE ZONES





# The Rocket

- British technology with paddles on spinning rotor
- Stainless steel unit with blower/heater and process monitoring system.
- No odor treatment system except for additives to feedstock blend.
- Fully automated 14 day continuous process, but materials exiting unit require further curing.
- Requires sawdust, wood pellets and/or shredded paper or cardboard
- 1,300kg/week unit = \$60,000

# Earth Tub



# Earth Tub

- US technology utilizing forced aeration, biofilter, mixing auger and process monitoring system.
- Batch system so units work best in tandem with one or more other units.
- Units can be used for complete composting cycle or be used for 2-4 weeks of intensive composting followed by outside curing
- Insulated made of durable plastic
- 500-650kg/week system = \$13,350

# Vermicomposting Systems



# Vermicomposting Systems

- Wide range of systems available
- Produces great high-value product
- Well suited for food scraps
- Takes up a lot of space
- Fussy process, labor intensive and requires high degree of skill and training
- To handle 500kg of food/ week, costs estimated:
  - Bed system = \$10,000
  - Tray system = \$35,000
  - Continuous flow reactor = \$45,000



# Aerated Bunker System



# Aerated Bunker System

- Batch system utilizing forced aeration and biofilter for odor control
- Piles turned every three weeks, 3x for 12 week composting cycle
- Requires wood chip for composting of food
- Labor needed to turn piles and manage process
- Feedstock mixer critical for system success
- Cost for 1,500kg/week system = \$60,000 (includes mixer for \$18,000)

# Turned Bunker System

- Batch system that relies on passive aeration between turnings
- Six bunkers turned by small tractor every two weeks for a 12 week composting cycle
- Requires lots of wood chip to compost food and promote passive aeration
- Potential for odor in early stages
- Cost for 1,500kg/week system = \$40,000  
(includes \$18,000 for mixer)



# Feasibility Study: 2006

## *Criteria used to pick system/technology:*

- Cost: capital and operating
- Ease of operation and skill level required
- Ability to produce high-quality product
- Reliability, support service and references
- Familiarity with design and operation
- Space requirement

# Feasibility Study: 2006

## *Recommended Conceptual Design for Castlerea:*

Two Earth Tubs for initial intensive phases of composting for 2-4 weeks followed by 6-8 weeks of turned bunker composting and curing.

Cost estimate is \$50,000 for one Earth Tub, swivel for fork lift, concrete slab and bunker walls, drainage system, tarps and a simple screen.

# Feasibility Study: 2006

## *Recommended Conceptual Design: Why?*

- Earth Tub is a batch system with mixer and composter all in one.
- System works best when more than one unit is used.
- Initial in-vessel processing prevents and controls odors when they are most problematic and allows for outdoor curing to produce a high-quality product.
- Staff is familiar with system and has operated it successfully for over two years.
- Both systems are simple and robust.

# Full-Scale Demonstration in Castlerea: 2007

## Initiative led by Prison Officer Sean Coen

*Collection:*





# Full-Scale Demonstration in Castlerea: 2007

## *Composting:*





# Full-Scale Demonstration in Castlerea

*Use:*



# Full-Scale Demonstration Results

- 84% reduction in Castlerea waste collection and disposal costs from \$96,000/year to \$15,000/year
- Waste diversion now 70% and growing
- Everything that can be reused, recycled and composted are being recovered.
- Staff and inmates have become accustomed to the new program.
- Castlerea Prison now serves as the center of excellence for waste management within the Prison Service and provides an example for other prisons and a location for the training of other prison officers.

# Prison Officer Training

- Provided by Cré Composting Association of Ireland and HETAC certified for higher education credits by the Institute of Technology Sligo.
- Purpose is to establish skill base within Prison Service to expand Castlerea composting program and to train inmates in composting.
- 10 officers from a variety of prisons participated.
- One week of classroom learning and field trips.





# Prison Officer Training

Site tours to Castlerea  
Prison and centralized  
composting facility



# Expanding to Other Prisons: 2008

- Loughan House: one Earth Tub to be set up
- Shelton Abbey: one Earth Tub to be set up
- Mountjoy (Dochas Centre): holding bins for garden materials plus several worm bins for food waste to be set up for this small prison.
- More systems in 2008/9 possible
- Possibility of inmates making home composting bins for sale to public as a job training opportunity.

# Challenges & Lessons Learned

- Take a look at purchasing and what is being bought into the system to prevent waste.
- Need champions in central office and on the ground at each prison to make things happen.
- Things take time, change happens slowly so take little steps and show how it can work.
- Training is fundamental to program success at all levels: within HQ, prison officers and inmates
- Recycling takes time and a concerted effort, but it also saves a lot of money which can be used to further the mission of the Prison Service.
- Initiatives such as composting raises environmental awareness within the Prison Service and encourages participation by both prison officers and inmates.

*Thank You!*

*Craig H. Benton*

*Composting & Recycling Consultants, Inc.*

*E-mail: [doctorcompost@earthlink.net](mailto:doctorcompost@earthlink.net)*