MUNICIPAL WASTE INTEGRATION NETWORK
mwin
The voice and resource for municipal waste minimization and management

Recycling Council of Alberta

MSW Options Workshop: Integrating Organics and Residual Treatment/Disposal

February 2, 2006

Calgary, Alberta

Workshop supported by

Natural Resources Canada | Ressources naturelles Canada

Environment Canada | Environnement Canada

Introduction

- How it works
- Types
- Issues and variables
- Current situation
- Future situation
- Evaluation

Recycling maximized ✔

Composting maximized ✔

Residuals ?

How it works

- Composting is a managed aerobic decomposition process carried out by naturally occurring bacteria and fungi
- Waste materials are stabilized through the decomposition of the most easy to decompose constituents of that waste stream

Recycling maximized ✔

Composting maximized ✔

Residuals ?

How it works

- Inputs include organic matter, oxygen, minerals, water and microorganisms
- Outputs include organic matter, carbon dioxide, heat, water vapour, microorganisms and compost

Recycling maximized ✔

Composting maximized ✔

Residuals ?

How it works

- **Pathogen Reduction**
- The composting process is characterized by a high temperature (> 55°C) phase
- These high temperatures if properly managed can result in the inactivation of pathogens that may be present in the incoming wastes

Recycling maximized ✔

Composting maximized ✔

Residuals ?

How it works

- **Compost Production**
- The process results in a mass reduction of up to 50%
- Compost is a source of organic matter
- It can be beneficially used as a soil conditioner
- It enhances soil quality and can provide fertilizing plant nutrients

Recycling maximized ✔

Composting maximized ✔

Residuals ?

How it works

- The composting process as it is presently managed is about developing an appropriate environment for general microbial growth rather than using specific microorganisms
- Developing an appropriate environment means focusing on nutrients, aeration, moisture, pH, porosity and volume

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Types

- There are many different types of composting technologies
- All technologies provide air (i.e. oxygen) to a composting system
- Some technologies collect composting off-gases, which can be odourous, and treat them
- Composting technologies can be split into two main categories: Non-reactor and reactor

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Types

- **Non-Reactor**
- These include compost technologies that do not contain the composting organic waste
- They include windrow and aerated static pile
- They typically occur outdoors

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Types

- **Non-Reactor**
- The key advantage is that it is relatively inexpensive and can produce a good quality compost
- The key disadvantage is that potential nuisances, particularly odour, are not contained and can create an off-site nuisance
- Success is in the hands of the operator

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Types

- **Reactor**
- These include compost technologies that contain the composting organic waste
- They include enclosed channel and container/tunnel. Often referred to as in-vessel
- They are typically fully enclosed and may occur indoors

Recycling maximized ✔

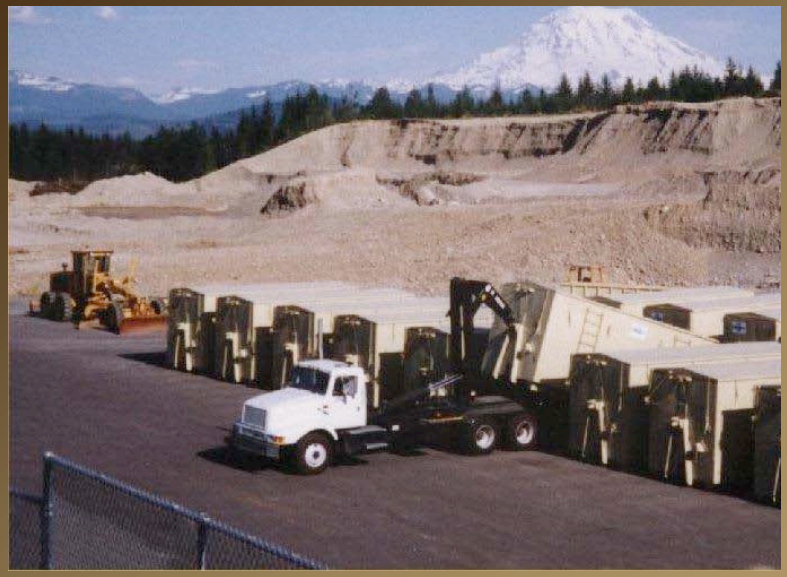
Composting maximized ✔

Residuals ?

Recycling maximized ✔

Composting maximized ✔

Residuals ?



Recycling maximized ✔

Composting maximized ✔

Residuals ?

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Types

- **Reactor**
- The key advantages are that it can produce compost relatively quickly and that it can contain and treat odourous off-gases
- The key disadvantage is that it is costly
- Success is in the hands of the operator

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Current Situation

- SSO and Mixed Waste
- Use of Non-reactor technologies
- Use of Reactor based technologies

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Current Situation

- Composting is a product manufacturing process
- A high quality compost can be made from SSO
- It is challenging to make a high quality compost from mixed waste
- Mixed waste compost may have positive impact in a landfill or as a fuel
- This does not appear to be a current trend

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Current Situation - Non-reactor

- Use of Non-reactor technologies is very common, particularly windrow composting
- Probably 70-75% of composting facilities in Canada are windrow
- For SSO composting there are examples of windrow composting facilities

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Current Situation - Non-reactor

- It is more challenging to compost SSO than leaf and yard waste
- The opportunity for odour generation is much greater and since this odour is not contained the risk for off-site nuisance generation is increased
- For smaller quantities of waste this can be managed

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Current Situation - Reactor

- Use of Reactor (i.e. in-vessel) technologies is becoming more common
- They are used for more challenging feedstocks such as SSO and mixed waste
- Small and larger municipalities have used this type of technology

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Future Situation

- It is likely that composting programs will continue to focus on SSO
- There is some interest in mixed waste composting which may or may not result in future infrastructure development.

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Evaluation- SSO

SUMMARY OF EVALUATION CRITERIA FOR SSO COMPOSTING TECHNOLOGY			
Criteria	Population		
	20,000	80,000	200,000
Facility Throughput (Tonnes) * includes amendment	3,083	12,167	30,833
Major Design Features	Non-reactor-outdoors, turning with loader or specialized turner Reactor – enclosed, possible specialized turning equipment, air handling and odourous off gas treatment	Non-reactor-outdoors, turning with loader or specialized turner Reactor – enclosed, possible specialized turning equipment, air handling and odourous off gas treatment	Non-reactor-outdoors, turning with loader or specialized turner Reactor – enclosed, possible specialized turning equipment, air handling and odourous off gas treatment
Commercial Status in Canada and elsewhere	Non-reactor-Well established Reactor-Established	Non-reactor-Well established Reactor-Established, increasing	Non-reactor-Well established Reactor-Established, increasing
Total Capital Cost ($1,000s)	231-1,695	912-6,691	2,312-16,958
Total Operating Cost ($1,000s)	101-148	400-585	1,015-1,482
Cost/Tonne Annualized ($)	40-100	40-100	40-100

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Evaluation- SSO

Footprint Size (ha)	**>0.23**	**0.91**	**2.3**
Zoning Requirements	**Varies**	**Varies**	**Varies**
Approvals Required	**Varies**	**Varies**	**Varies**

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Evaluation- SSO

GHG Emissions	**Low**	**Low**	**Low**
Energy Recovery Potential	**NA**	**NA**	**NA**
Potential Environmental Impacts	**Lower than Landfill**	**Lower than Landfill**	**Lower than Landfill**
Quality of Processed Organics (if applicable)	**High**	**High**	**High**
Public Acceptability	**Medium**	**Medium**	**Medium**
Potential Social Impacts	**Positive: Employment Negative: Odour followed by leachate, dust, traffic litter and noise**	**Positive: Employment Negative: Odour followed by leachate, dust, traffic litter and noise**	**Positive: Employment Negative: Odour followed by leachate, dust, traffic litter and noise**

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Evaluation- Mixed Waste

SUMMARY OF EVALUATION CRITERIA FOR MIXED WASTE COMPOSTING TECHNOLOGY			
Criteria	Population		
	20,000	80,000	200,000
Facility Throughput (Tonnes)	6,000	24,000	60,000
Major Design Features	Non-reactor-outdoors, turning with loader or specialized turner Reactor – enclosed, possible specialized turning equipment, air handling and odourous off gas treatment	Non-reactor-outdoors, turning with loader or specialized turner Reactor – enclosed, possible specialized turning equipment, air handling and odourous off gas treatment	Non-reactor-outdoors, turning with loader or specialized turner Reactor – enclosed, possible specialized turning equipment, air handling and odourous off gas treatment
Commercial Status in Canada and elsewhere	Non-reactor-Not established Reactor-Not established	Non-reactor-Not established Reactor-Not established	Non-reactor-Not established Reactor-Limited establishment
Total Capital Cost ($1,000s)	540-3,960	2,160-15,840	5,400-39,600
Total Operating Cost ($1,000s)	249-346	996-1,385	2,490-3,462
Cost/Tonne Annualized ($)	50-120	50-120	50-120

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Evaluation- Mixed Waste

Footprint Size (ha)	**>0.45**	**1.8**	**4.5**
Zoning Requirements	**Varies**	**Varies**	**Varies**
Approvals Required	**Varies**	**Varies**	**Varies**

Recycling maximized ✔

Composting maximized ✔

Residuals ?

Evaluation- Mixed Waste

GHG Emissions	**Low**	**Low**	**Low**
Energy Recovery Potential	**NA**	**NA**	**NA**
Potential Environmental Impacts	**Lower than Landfill**	**Lower than Landfill**	**Lower than Landfill**
Quality of Processed Organics (if applicable)	**Low**	**Low**	**Low**
Public Acceptability	**Low-Medium**	**Low-Medium**	**Low-Medium**
Potential Social Impacts	**Positive: Employment Negative: Odour followed by leachate, dust, traffic litter and noise**	**Positive: Employment Negative: Odour followed by leachate, dust, traffic litter and noise**	**Positive: Employment Negative: Odour followed by leachate, dust, traffic litter and noise**

Recycling maximized ✔

Composting maximized ✔

Residuals ?