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ORGANICS MANAGEMENT: ANAEROBIC DIGESTION, AN OVERVIEW

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PRESENTATION CONTENTS

- ❖ Evolution of Organics Management
- ❖ Basics of Anaerobic Digestion
- ❖ Anaerobic Digestion Technologies
- ❖ Management of End Products
- ❖ Anaerobic Digestion in Ontario
- ❖ Environmental Benefits
- ❖ Conclusion



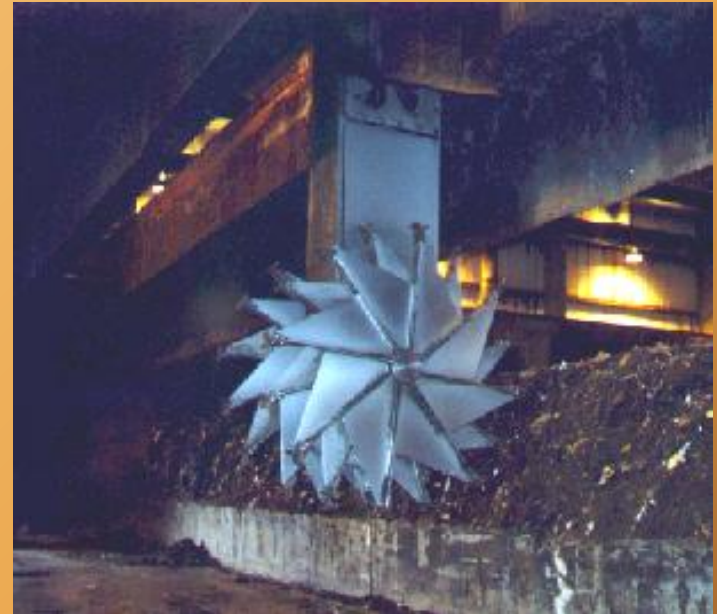
EVOLUTION OF ORGANICS DIVERSION

❖ Outdoor Windrow Composting



EVOLUTION OF ORGANICS DIVERSION

❖ In-vessel Composting



EVOLUTION OF ORGANICS DIVERSION

❖ Anaerobic Digestion



FEEDSTOCK CHARACTERISTICS

Feedstock for
Windrow
Aerobic
Composting



Feedstock for
In-vessel
Aerobic
Composting

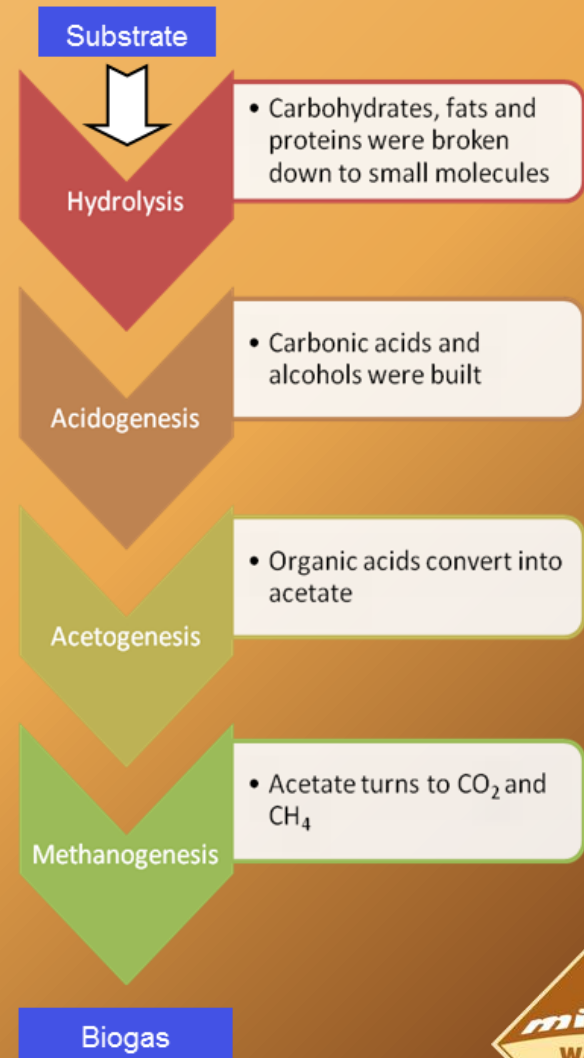


Feedstock for
Anaerobic
Digestion



ANAEROBIC DIGESTION AT A GLANCE

- ❖ Digestion of organic matter in the absence of oxygen.
- ❖ Completely enclosed – Odour potential substantially less than aerobic composting.
- ❖ Reaction pathways are more complex than those of aerobic composting.



TYPES OF ANAEROBIC DIGESTION

- ❖ Thermophilic Digestion:
 - 50-60°C
- ❖ Mesophilic Digestion:
 - 30-40°C

ANAEROBIC DIGESTION TECHNOLOGIES

❖ Wet AD (low solids)



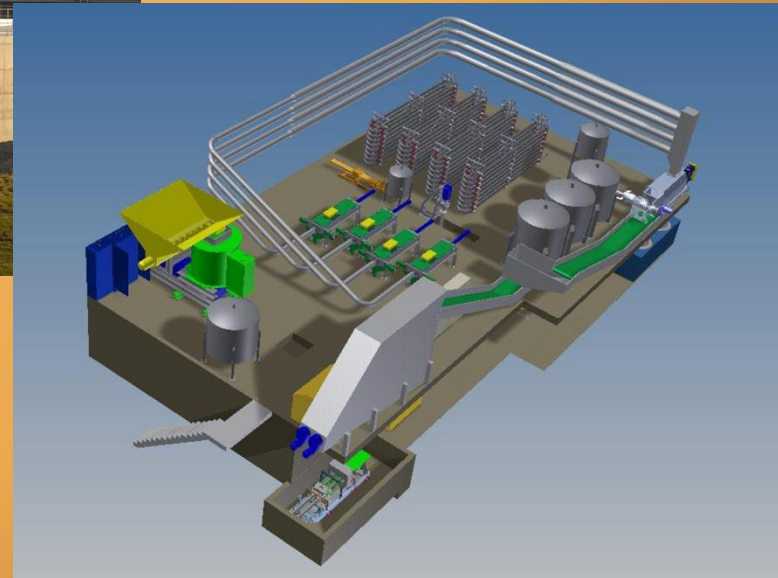
ANAEROBIC DIGESTION TECHNOLOGIES

❖ Dry AD (high solids)



ANAEROBIC DIGESTION TECHNOLOGIES

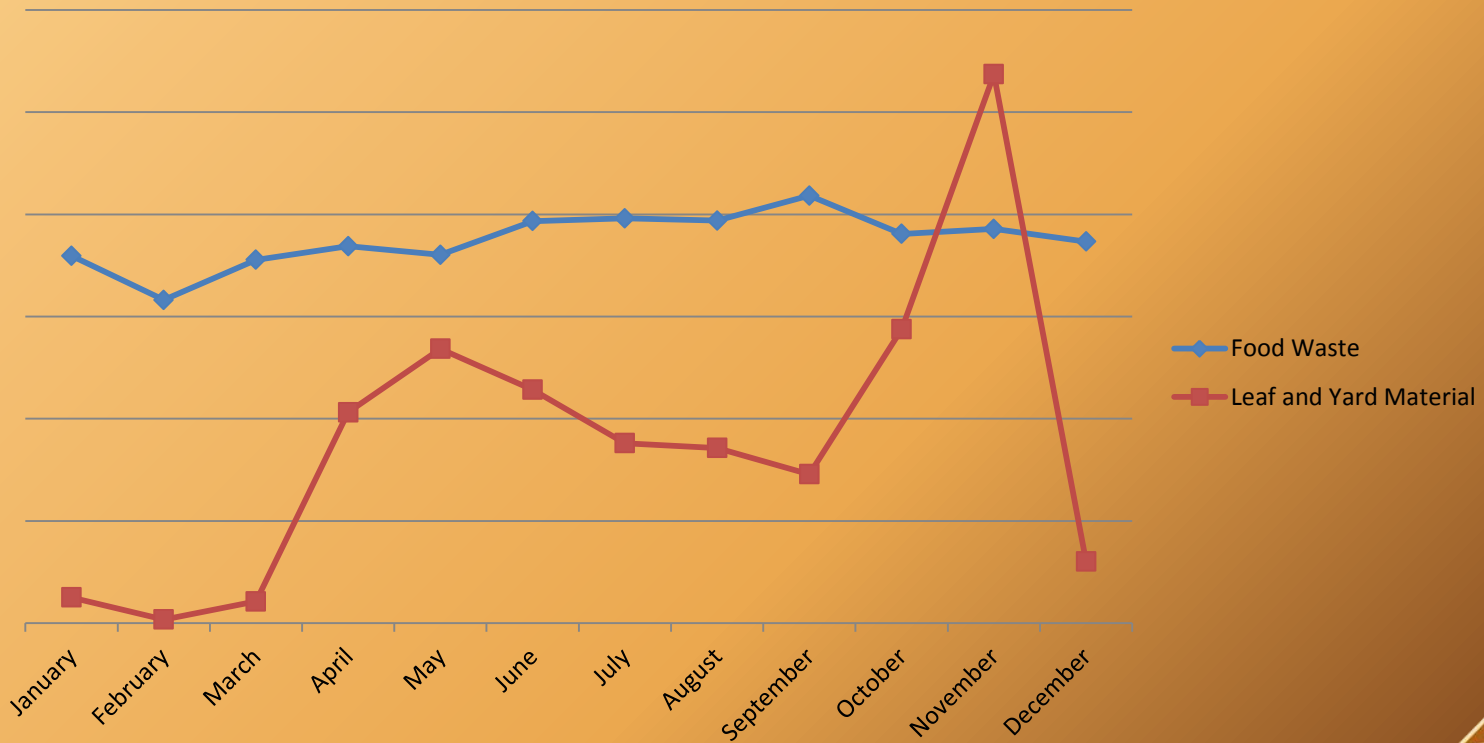
❖ Slurry AD (medium solids) - FITEC



DESIGN CRITERIA/KEYS TO SUCCESS

- ❖ Understanding feedstock and market conditions

Organics Trend - Ontario Municipality



DESIGN CRITERIA/KEYS TO SUCCESS

- ❖ Digester size
- ❖ Pre-treatment techniques
- ❖ Material selection
- ❖ Water addition
- ❖ Temperature control
- ❖ pH control
- ❖ Micronutrient balance
- ❖ Hydrogen sulfide production



MANAGEMENT OF SYSTEM OUTPUTS

- ❖ Outputs often greatly influence the economics and viability of a project
- ❖ Biogas:
 - 60% CH₄
 - 40% CO₂
- ❖ Digestate:
 - Nutrient rich digester effluent



USAGE OF BIOGAS – OPTION 1

- ❖ High efficiency (~40%) renewable electricity generation.
- ❖ Capture and integration of waste heat into process.



USAGE OF BIOGAS – OPTION 2



- ❖ Production of Renewable Natural Gas (RNG).
- ❖ After biogas treatment, high purity RNG can be injected into NG grid.
- ❖ RNG can be used as fuel for transit, waste collection & municipal vehicles.



DIGESTATE UTILIZATION

- ❖ Digestate can be taken directly from the digester and applied to agricultural lands as a organic fertilizer substitute.
- ❖ Alternatively, the digestate can be dewatered, extracting the solids for marketing as a compost product and treating the wastewater for discharge.



ANAEROBIC DIGESTION IN ONTARIO

- ❖ Primarily agricultural systems



- ❖ Some commercial systems, interest building
- ❖ Biogas Association



ENVIRONMENTAL AND MUNICIPAL BENEFITS

- ❖ Generation of renewable electricity
- ❖ Production of a pathogen free, organic, and nutrient rich fertilizer
- ❖ Diversion of organics from landfill
- ❖ Reduced greenhouse gas emissions



IN SUMMARY

- ❖ Anaerobic digestion is the next step for organics management in Ontario
- ❖ Understanding the process and the market is so important at the onset
- ❖ Choose the right technology and learn from industry leaders
- ❖ Ensure the production of a consistent and high quality end product.



QUESTIONS?

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