

TURNING FOOD WASTE TO ENERGY

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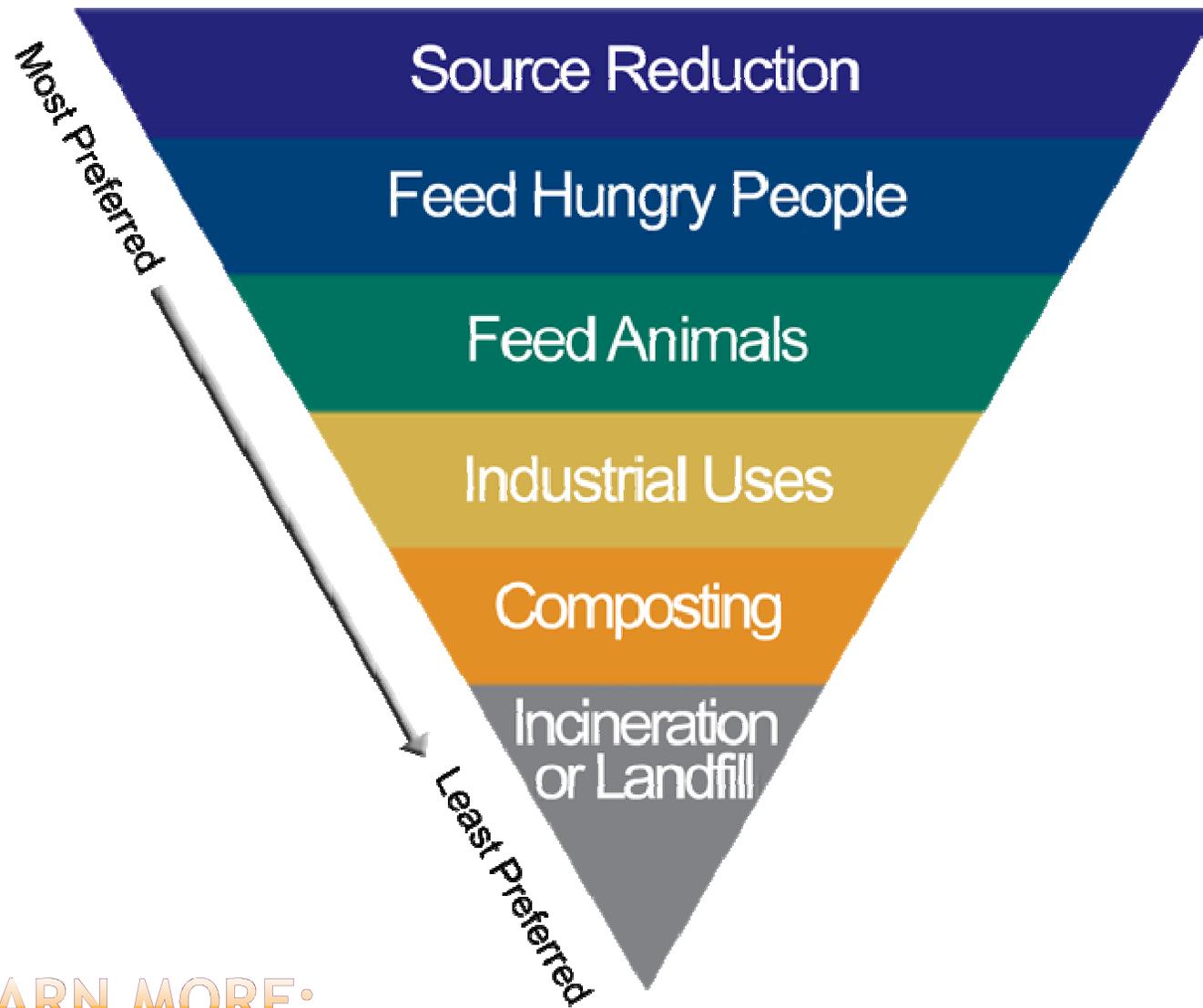


OUTLINE

- Anaerobic Digestion of Food Overview
 - Feedstocks (FOOD!)
 - Types
 - Renewable Energy
 - Example
- EPA Resources and Tools



Food Recovery Hierarchy



LEARN MORE:

WWW.EPA.GOV/FOODRECOVERYCHALLENGE



ANAEROBIC DIGESTION

- Breakdown of organic material
 - Absence of oxygen
 - Presence of appropriate bacteria
- Not an “new” technology
 - Wastewater treatment plants
 - European experience
- Generate renewable energy (biogas) plus solid residual (should be used as soil amendment)



SOURCES OF ORGANICS



TYPES OF DIGESTION

- “Wet” / Low Solids
 - i.e. wastewater treatment plant digesters and dairy digesters
 - Less than 15% solids
 - Common in U.S.
- “Dry” / High Solids
 - i.e. many European digesters for organic portion of municipal solid waste
 - Greater than 15% solids
 - Not as common in U.S. yet



BIOGAS AS A RENEWABLE ENERGY SOURCE...

- Many options for using biogas
 - Electricity
 - IC Engine
 - Turbine
 - Microturbine
 - Fuel Cell
 - Natural Gas
 - Pipeline Injection
 - Vehicle Fueling (CNG or LNG)

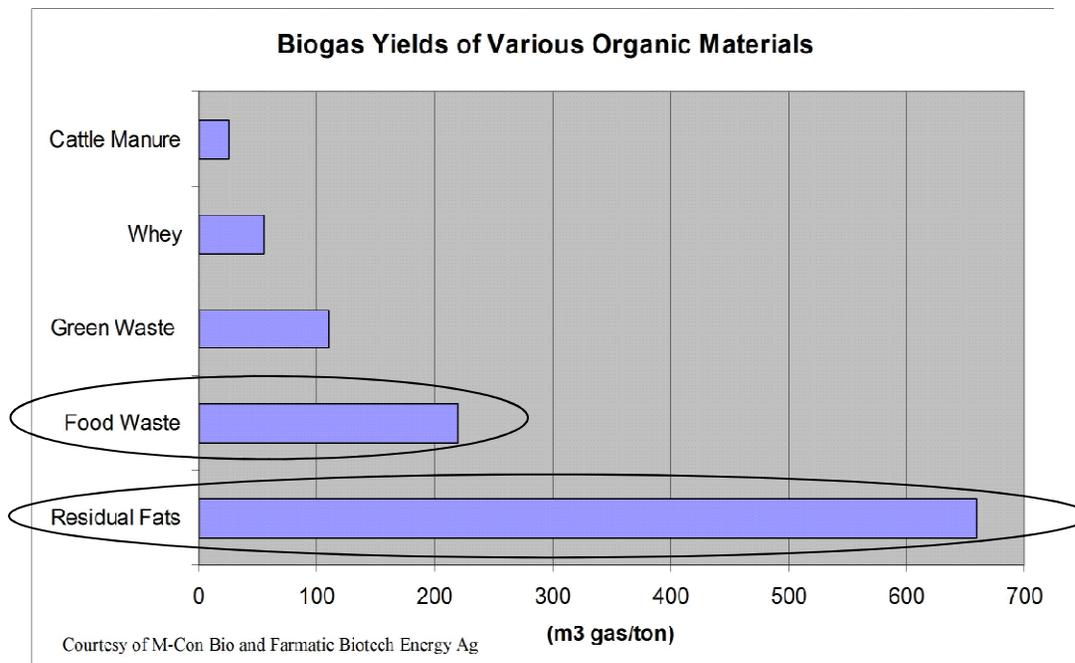


Note: Must condition biogas to remove H₂S, siloxanes, moisture, CO₂, and/or other contaminants to varying degrees based on use



WHY FOOD?

- Lots of it!
 - Largest component of municipal solid waste stream reaching landfills (33 million tons/year)
- High methane production potential



WHY WASTEWATER TREATMENT PLANTS FOR FOOD WASTE?

- ◉ Many have excess capacity
- ◉ Existing expertise
- ◉ Located near population centers
- ◉ Need on-site electricity/natural gas



WHY MANURE DIGESTERS FOR FOOD WASTE?

- ◉ Can help economics of digester
 - Tipping Fees
 - Increased biogas production
- ◉ Existing infrastructure
- ◉ Sometimes need on-site electricity/natural gas



DEDICATED DIGESTERS FOR ORGANIC PORTION OF MSW

- ◉ Mostly “Dry” digestion or fermentation
 - Less pre-processing needed
- ◉ Many planned in the U.S.
 - Common in Europe
- ◉ EPA Region 9 grantee developing permitting tool-kit for dedicated digesters



EPA TOOLS AND RESOURCES

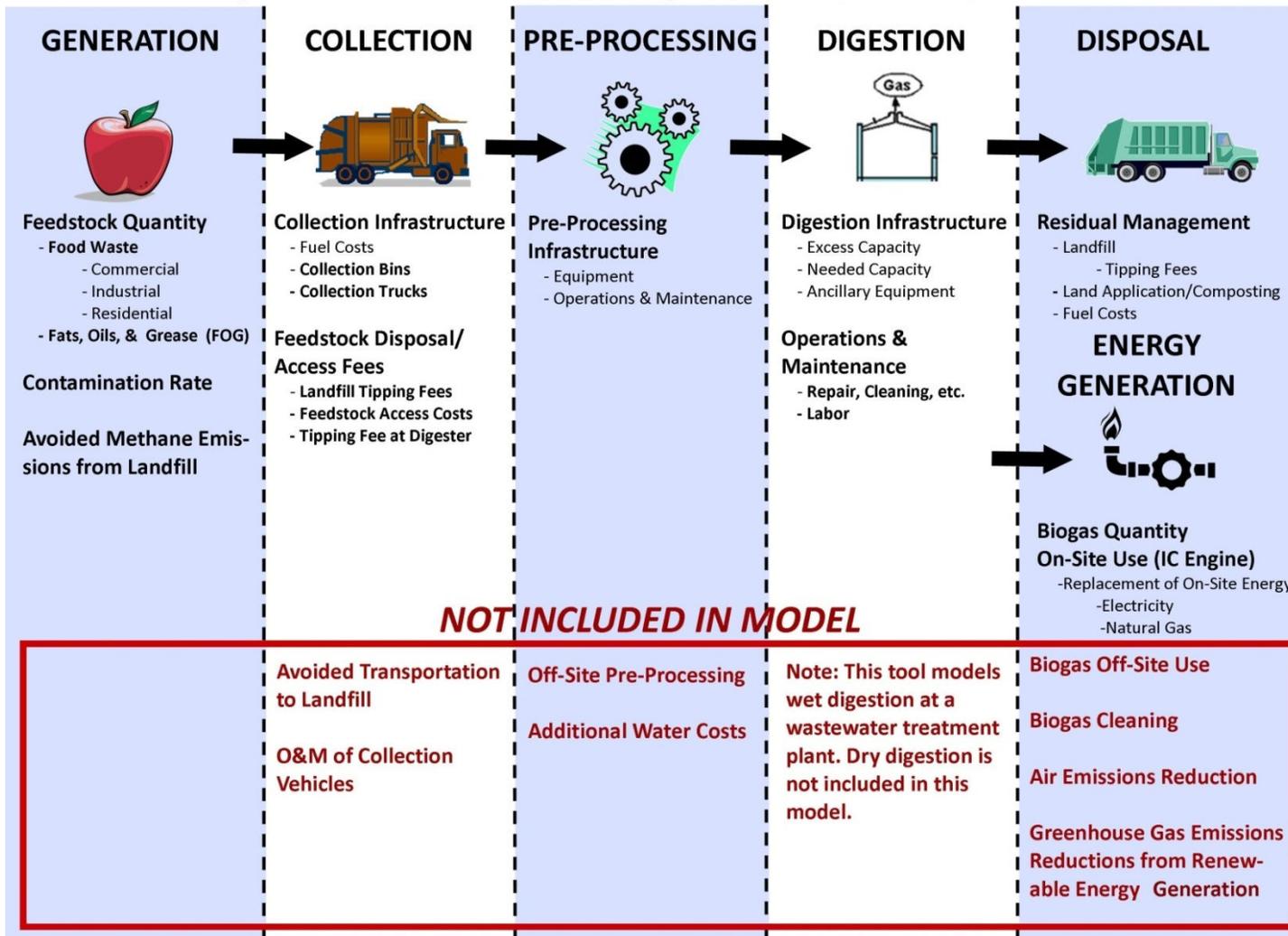
- ◉ EPA Anaerobic Digestion Website
 - <http://www.epa.gov/region9/waste/features/foodtoenergy/index.html>
 - <http://www.epa.gov/region9/organics/ad/>
- ◉ Co-Digestion Economic Analysis Tool (CoEAT)
 - <http://www.epa.gov/region9/coeat>
- ◉ Waste to Biogas Mapping Tool
 - <http://www.epa.gov/region9/biogas>
- ◉ EPA AgStar Program
 - <http://www.epa.gov/agstar>



CO-DIGESTION ECONOMIC ANALYSIS TOOL (COEAT)

- ◉ Initial economic feasibility of co-digesting of food waste and FOG at wastewater treatment plants
- ◉ Model intended for WWTFs with excess capacity, BUT pre-existing digesters are not required
- ◉ Designed for decision-makers with significant technical expertise





<http://www.epa.gov/region9/coeat>



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