# Food Waste – An Opportunity Feedstock

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# Florida's food waste problems

- 1.7 million tons of food waste in 2008
- ~5% of total municipal solid waste
- <1% recycled

# Sources of food waste

- Grocery stores/supermarkets
- Restaurants
- Schools
- Prisons
- Households
- Food banks

# Problems with current disposal

**Landfilling**

- Receives most of our food waste
- Heavy weight for hauling (mostly water)
- Generates methane emissions
- Leachate and groundwater problems
- Odor and vermin problems
- Loss of energy and nutrients

# Problems with current disposal

**Sewage treatment**

- Additional burden on treatment plant
- Requires aeration energy
- Hauling and disposal of biosolids
- Loss of energy and nutrients

# One solution: Anaerobic digestion

- Microbial degradation of organic material under anaerobic conditions
- Occurs in ponds, hydric soils, and ruminants
- Produces methane-rich biogas
- By-product used as fertilizer
- Used (infrequently) to treat manure, sewage sludge, and industrial wastewaters

# Biogas: natural gas from waste

- Biogas composed of methane (65-80%) and carbon dioxide (20-35%)
- Readily combustible
- Clean burning
- Generated continuously from digester
- Carbon dioxide can be removed to produce biomethane

# Natural Gas vs. Biogas

**Natural Gas**

- Fossil fuel
- Requires drilling
- Transport/pipeline infrastucture
- Atmospheric carbon accumulation

**Biogas**

- Renewable
- Produced from any organic material
- Made throughout the community
- Carbon neutral

# Landfill gas vs. biogas

## Landfill gas

- Slow, passive process
- Gas contaminated with many pollutants
- Transportation of waste to landfill
- Good solution for existing landfill

## Biogas

- Fast, active process
- Gas significantly cleaner
- Energy and nutrients
- Can be produced throughout community
- Saves space in landfill

# Uses of biogas

- Cooking
- Heating (water/air)
- Electricity
- Gas lighting
- Vehicle fuel
- Hydrogen fuel cells

# Anaerobic Digesters

- Reactors that harness power of anaerobic microbes
- Many different shapes and sizes
- Run at different temperatures
- Wet or dry digestion

# On-site application vs. centralized location

**On-site**

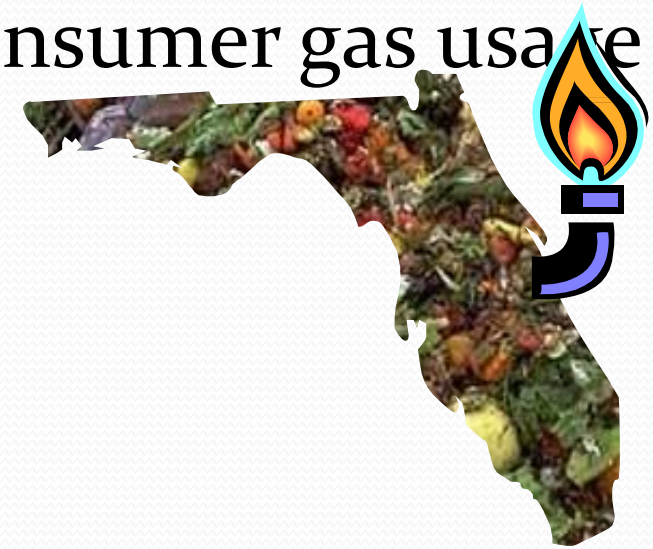
- Small scale
- No hauling
- Gas used on-site
- Facility gets full benefits from digester

**Centralized**

- Municipal scale
- Requires hauling
- Gas used for pipeline or grid
- Economy of scale
- Reduced maintenance

# Biogas potential of Florida's food waste

- 1.7 million tons of food waste annually
- 8.5 billion cubic feet of biomethane per year
- ~8.5 trillion BTU per year
- 4 times the consumer gas usage in Alachua County



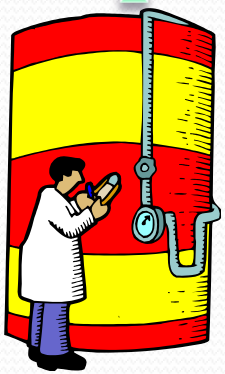
# Benefits of food waste digestion

- Sustainable energy
- Sustainable nutrients
- Scalable and local
- Reduces pathogens
- Diverts waste from landfills and sewage treatment plants

Energy

Florida Society

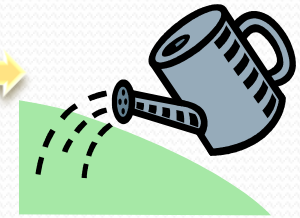
Food Waste



Biodigestion

Biogas

Biofertilizer



Nutrients

# Where the research is now?

- Determining the “low-hanging fruit” for food waste collection
- Optimizing pre-treatment and digester configuration
- Spreading public awareness
- Pilot scale projects

# Which oil spill do you prefer?

# Questions?

**http://biogas.ifas.ufl.edu**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