



# **Food Scraps into Renewable Energy Anaerobic Digestion**

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**CIFT**

**September 19, 2007**



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# Biomass Energy Today

- **Food scraps are biomass**
- **C neutral, environmental benefits**
- **E2, reduced waste disposal impacts**
- **Energy grants DOE, USDA, Ohio**
- **Growing market interest in carbon credits, green energy & GHG (Chicago Climate Exchange, CCX)**

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# Biomass

- ***DRY* biomass vs *WET* biomass**
- ***Dry* is typically more easily handled, transported & stored**
- ***Wet* often produces odors, has limited or no “shelf life” making storage & transport difficult, \$**
- **Most food scraps - *WET* biomass (Kitchen, processing, mixed MSW)**



# Dry Biomass to Energy

- **Dry woody material is largest source of biomass - trees, branches, chips, scrap / demolition lumber, sawdust...**
- **Field dry corn, beans, grains, grasses and dry food scraps**
- **Processing to ethanol, biodiesel**
- **Direct burning to produce heat**
- **Gasification technology to produce gas/liquid fuels, feedstocks, etc.**

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# Wet Biomass to Energy

- **WET biomass is very significant source of energy - food processing solids & wastewater, scraps, dairy wastes, slaughterhouse, manure**
- **Some are separated, accessible**
- **Wet biomass is often pollutant so improved handling is a benefit**
- **Handling, disposal often costly**

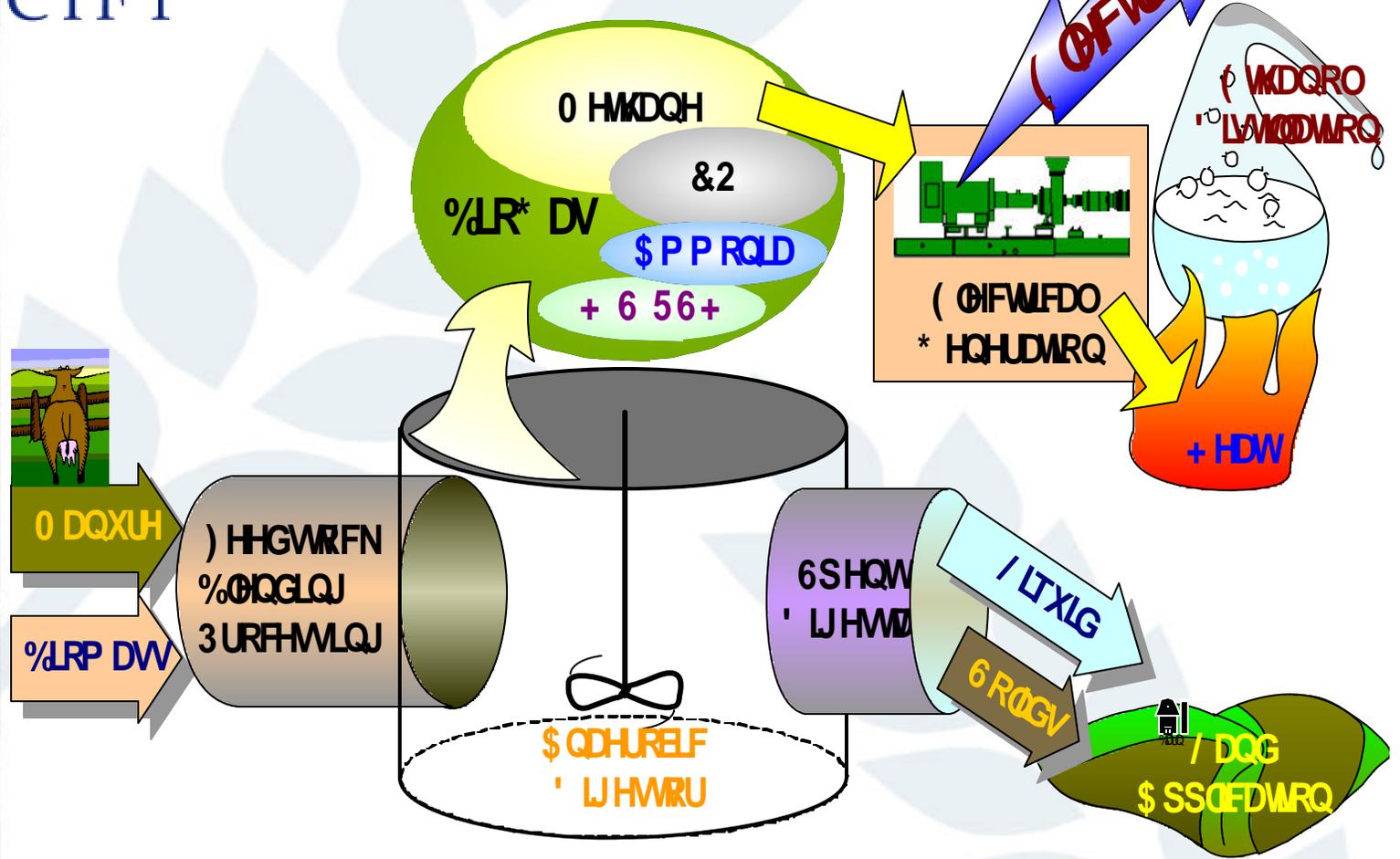


# Anaerobic Digestion

- **Natural process in tanks/ lagoons**
- **Wet wastes in tanks => biogas**
- **Mixed feedstocks work best e.g. manure+oily food wastes+food processing scraps + sorted MSW**
- **Reduces odors vs. compost**
- **AD sludge => compost, bedding...**
- **Wastewater effluent for irrigation**



per Dr. Floyd Schanbacher  
OSU OARDC



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## Food Scraps - AD Benefits

- **Energy generation using biogas as fuel for electric, heat, etc.**
- **Reduce odors from wastes**
- **Tipping fees for food wastes – value, environmental impacts**
- **Potential value of AD sludge to fertilizers (& compost) completing the Carbon cycle**



## Common Types of Anaerobic Digesters

- **Lagoon – open or covered**
- **Plug flow - flow in a large pipe or channel with inlet & outlet**
- **Complete mix – controlled & optimized mixture of materials in a covered tank**
- **Landfill MSW+H<sub>2</sub>O => biogas**



# The AD Process

- **Under right conditions, AD begins NOW so waste storage very important**
- **AD suitable mixtures of 3-8% solids**
- **Inject amendments in tanks to maintain optimum AD conditions**
- **Numerous process variations, bio-system have inherent peculiarities**



## AD at Snack Food Co.

- **Large scale feasibility- technology & concept demonstration trial**
- **Complete mix 8,000 gallon anaerobic digester – New Bio Inc.**
- **Demonstrated impact almost \$0.5M/yr with electric generation, reduced ww surcharge, CHP, etc.**







# DAIRY FARM ANAEROBIC DIGESTER W/ FOOD SCRAPS/WASTES





# Installation of AD

## **Factors in AD implementation:**

- 1. Productive biogas usage / CHP**
- 2. Close to AD feedstock sources**
- 3. Close to irrigation water needs**
- 4. Close to operation to process AD sludge to bedding, fertilizer, soil...**
- 5. Water quality / environmental / odor**
- 6. Likely rural, could be urban**
- 7. USA market potential: 1,000s AD**



## CIFT AD Work

- **Ongoing AD development with OSU OARDC Wooster + suppliers**
- **Pilot scale, 50 gallon, AD tank with Allen Bradley intelligent controls**
- **Develop improved mixing & process controls for concentrated wastes:**  
**smaller tanks = less capital**



# Contact

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