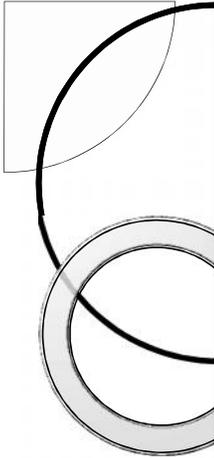


Disclaimer

This presentation has been provided as part of EPA's Sustainable Food Management Webinar Series. This document does not constitute EPA policy. Mention of trade names or commercial products does not constitute endorsement or recommendation of use. Links to non-EPA websites do not imply any official EPA endorsement of or a responsibility for the opinions, ideas, data, or products presented at those locations or guarantee the validity of the information provided. Links to non-EPA servers are provided solely as a pointer to information that might be useful to EPA staff and public.



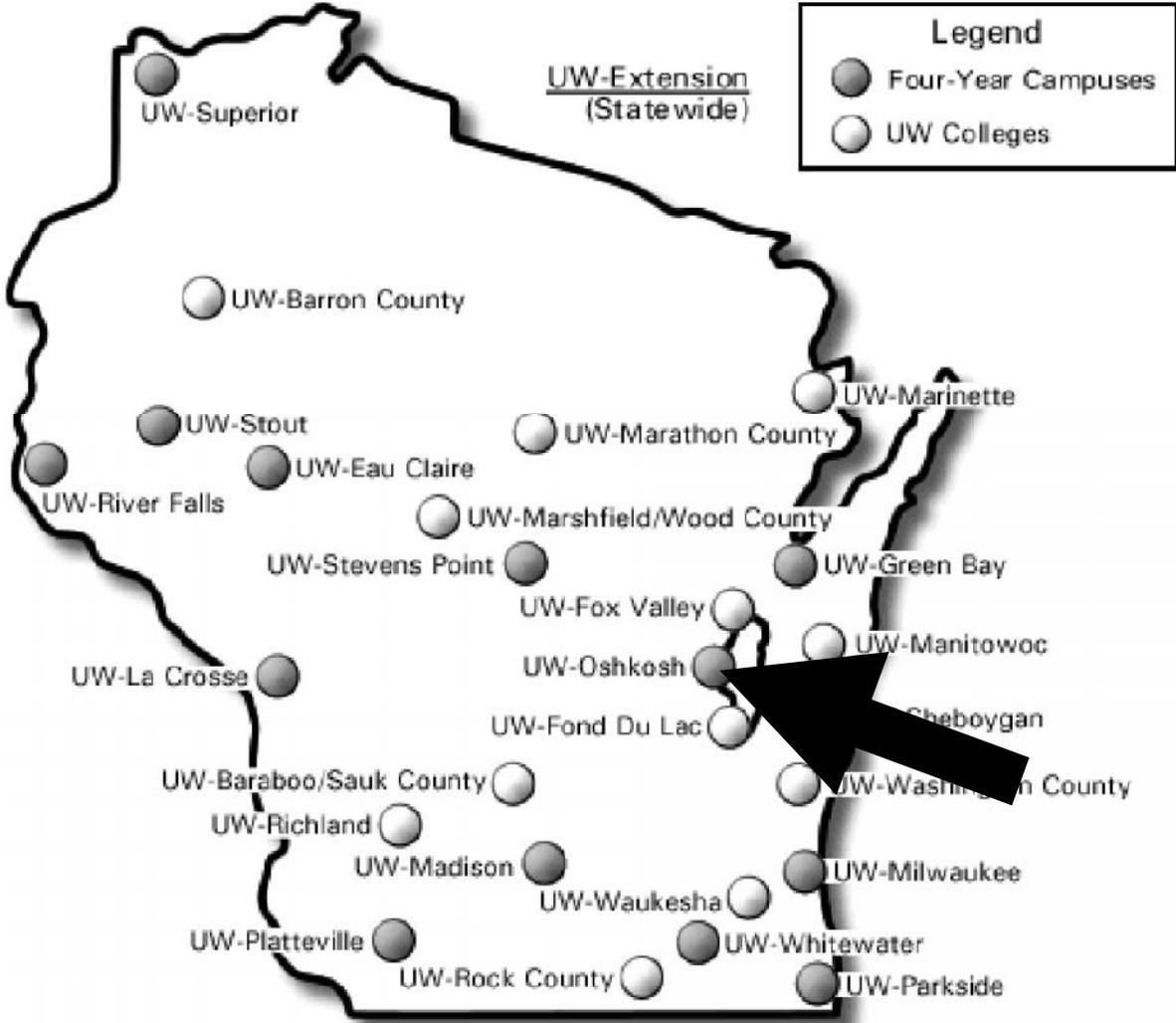
Dream. Achieve. Celebrate.
UW Oshkosh. Located at the intersection of excellence and opportunity.

Biodigester Enterprises at UW Oshkosh



Greg Kleinheinz, R.S., Ph.D.
University of Wisconsin Oshkosh
920-424-3302
kleinhei@uwosh.edu

University of Wisconsin System



THE BIOFERM™ PLANT AT THE UWO CAMPUS

The First Commercial Scale Dry Fermentation System in the Nation!

UWO to construct nation's first-of-its-kind biodigester >>

Oshkosh
Northwestern
2010 www.thenorthwestern.com 50¢

DEBATES
FREE & OPEN TO THE PUBLIC
Oshkosh Seniors Center, 200 N. Campbell Road, south building
MARCH 9: 6:00 p.m. - 8:00 p.m. - admission: 7:15 to 8:30 a.m. MARCH 10: Oshkosh Common Council, 6 to 8 p.m.
If you can't be there in person, watch live! www.thenorthwestern.com

ELECTION 2010

UWO plant 1st in nation
Biodigester will turn food waste to energy

BY JEFF BOLLER
of The Northwestern

The University of Wisconsin-Oshkosh plans to turn grass clippings and food scraps into heat and electricity in a new plant behind the university's Campus Service Center. It will be able to convert 4,000 tons of yard and food waste into energy each year, according to a report from a long-term laboratory for students, faculty staff, the community and others, UWO Vice Chan- The biodigester uses dry materials instead of mostly sludge or sewage to generate gas that can be used to heat or cool the building or converted to electricity to power university buildings. Food scraps will be collected from UWO students and faculty while grass clippings and yard waste will be transported from the city's drop-off site near the central garage at Wisco Commons. The material will be placed in the building and dewatered of oxygen. Microorganisms will then break down the material through a series of processes that produce

8/10/2010 10:50 AM
BIOFERM, Page 47

THE BADGER HERALD
Updated Tuesday, September 14, 2010, at 10:50 a.m.
Madison, Wis.: A Few Clouds and 68.0° F

Home News Opinion ArtsEtc. Sports Comics Blogs Shout-outs Classifieds About Advertising More

News

UW-Oshkosh to be 1st in nation to use energy from food
One-of-a-kind biodigester will be constructed beginning in fall 2010, will use left-over campus waste, expired groceries, yard waste to power 5 percent of campus

UW Oshkosh Biodigester II Renewable Energy Facility

[About UW Oshkosh](#) | [Academics](#) | [Athletics](#) | [Admissions](#) | [Administration](#) | [Resources](#) | [Calendars](#) | [Titan Services](#)



UNIVERSITY OF
WISCONSIN
OSHKOSH

uw oshkosh
today

[ABOUT US](#) | [PUBLIC EVENTS CALENDAR](#) | [SUBMIT AN ANNOUNCEMENT](#)



Search the archive...



[Home](#) » [Featured](#), [Sustainability](#)

UWO partners in second dynamic biodigester project

BY ALEX HUMMEL

29 AUGUST 2011

NO COMMENT



PRINT THIS STORY

UNIVERSITY OF
WISCONSIN
OSHKOSH

Wisconsin's largest dairy farm will be home to one of Wisconsin's most dynamic research, renewable energy production and public education facilities as part of an initiative involving the University of Wisconsin Oshkosh's College of Letters and Science and UW Oshkosh Foundation.

On Aug. 24, the UW Oshkosh Foundation Board of Directors unanimously endorsed a proposal to

pursue an innovative partnership with Milk Source's Rosendale Dairy and renewable energy companies Viessmann Group and BIOFerm Energy Systems of Madison.

Categories

- [-] Campus News
 - [-] New Academic Building
- [-] Snapshots
- [-] Announcements
- [-] Personalities
- [-] Research
- [-] Sustainability
- [-] Alumni News
 - [-] Alumni Newsmakers
 - [-] Class Notes and Obits
 - [-] Alumni Events
- [-] Featured
- [-] UW Oshkosh in the News

Weather

Oshkosh, WI

Get the 10 day forecast



44°F

Small Farm Applications

ABOUT UW OSHKOSH

ACADEMICS

ADMISSIONS

ATHLETICS

ADMINISTRATION

RESOURCES

CALENDARS

TITAN SERVICES

UNIVERSITY OF
WISCONSIN
OSHKOSH

uw oshkosh
today

Campus News

Announcements

Research

Alumni News

Powering Community

Athletics

#UWOSocial

State, UW Foundation, partners rally around small-farm biodigester project

06 Mar 2012 by News Bureau

Biodigesters already come in dry, wet, big and bigger varieties as envisioned and built by the University of Wisconsin Oshkosh Foundation, its College of Letters and Science and engineering partners Viessmann Group and BIOFerm Energy Systems.

However, the latest incarnation of this sustainable energy generation technology is getting smaller – family-farm sized. And that is prompting the state of Wisconsin to get behind the technology in a new way.

On March 6, Wisconsin Department of Administration (DOA) Secretary Mike Huebsch announced support through the DOA and State Energy Program for a feasibility study to install anaerobic digestion units on family farms with fewer than 500 head of dairy cattle. The "EUCOline" (OY-co-lino) project conducted by BIOFerm™ Energy Systems and the University of Wisconsin Oshkosh, through the UW Oshkosh Foundation, involves the first small-scale biodigester unit in Wisconsin. The feasibility study and test project will be located on the Allen Farm, about six miles northwest of Oshkosh.

"Wisconsin is the national leader for installed anaerobic digestion, and we have the leading minds in the nation working to advance on-farm energy solutions," Huebsch said. "Under the Walker Administration's leadership, the collaborative relationship built by the Allen's, BIOFerm, the University of Wisconsin Oshkosh

Search...

@UWOshkosh Twitter

Twitter feed loading

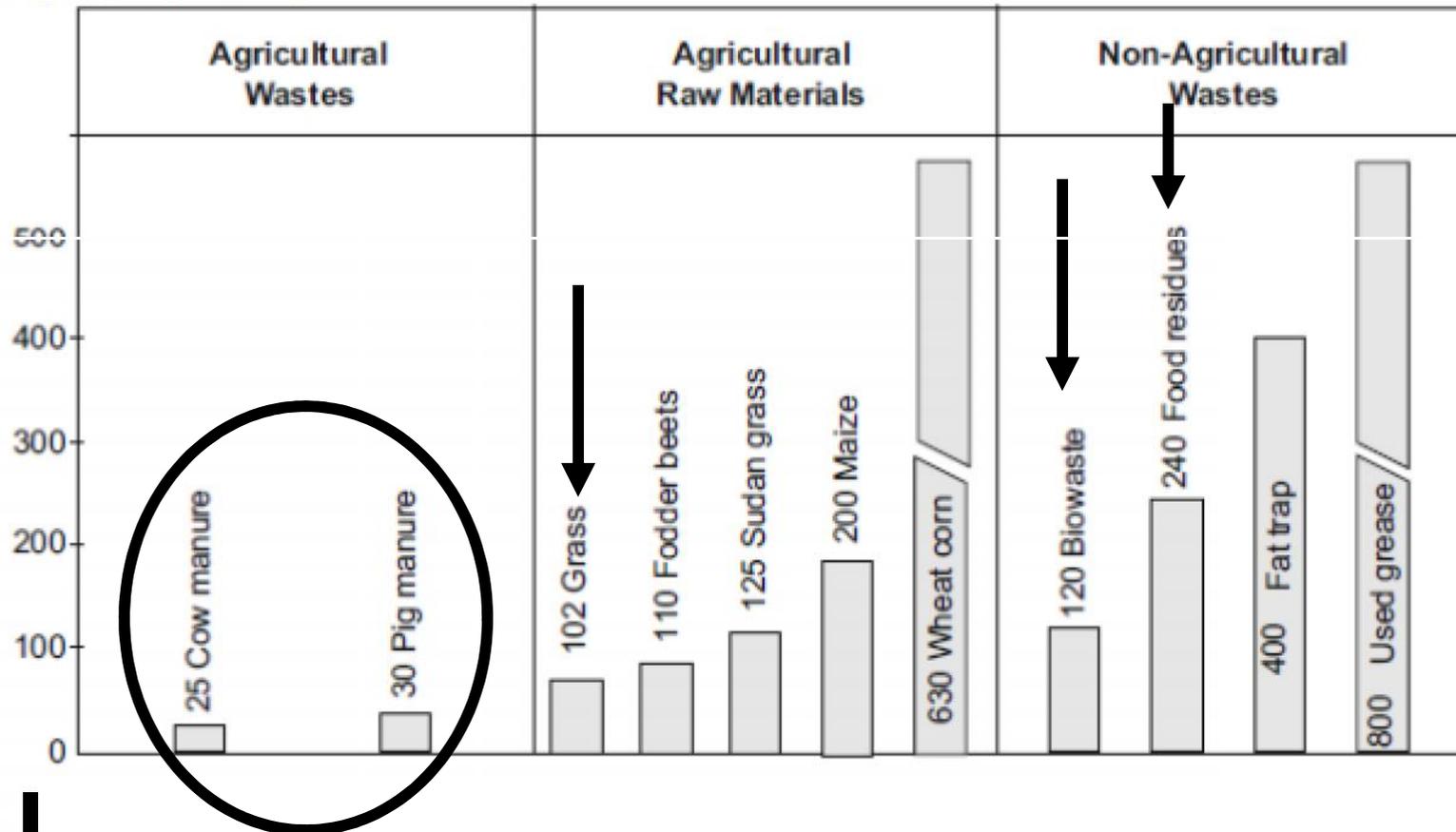
Flickr



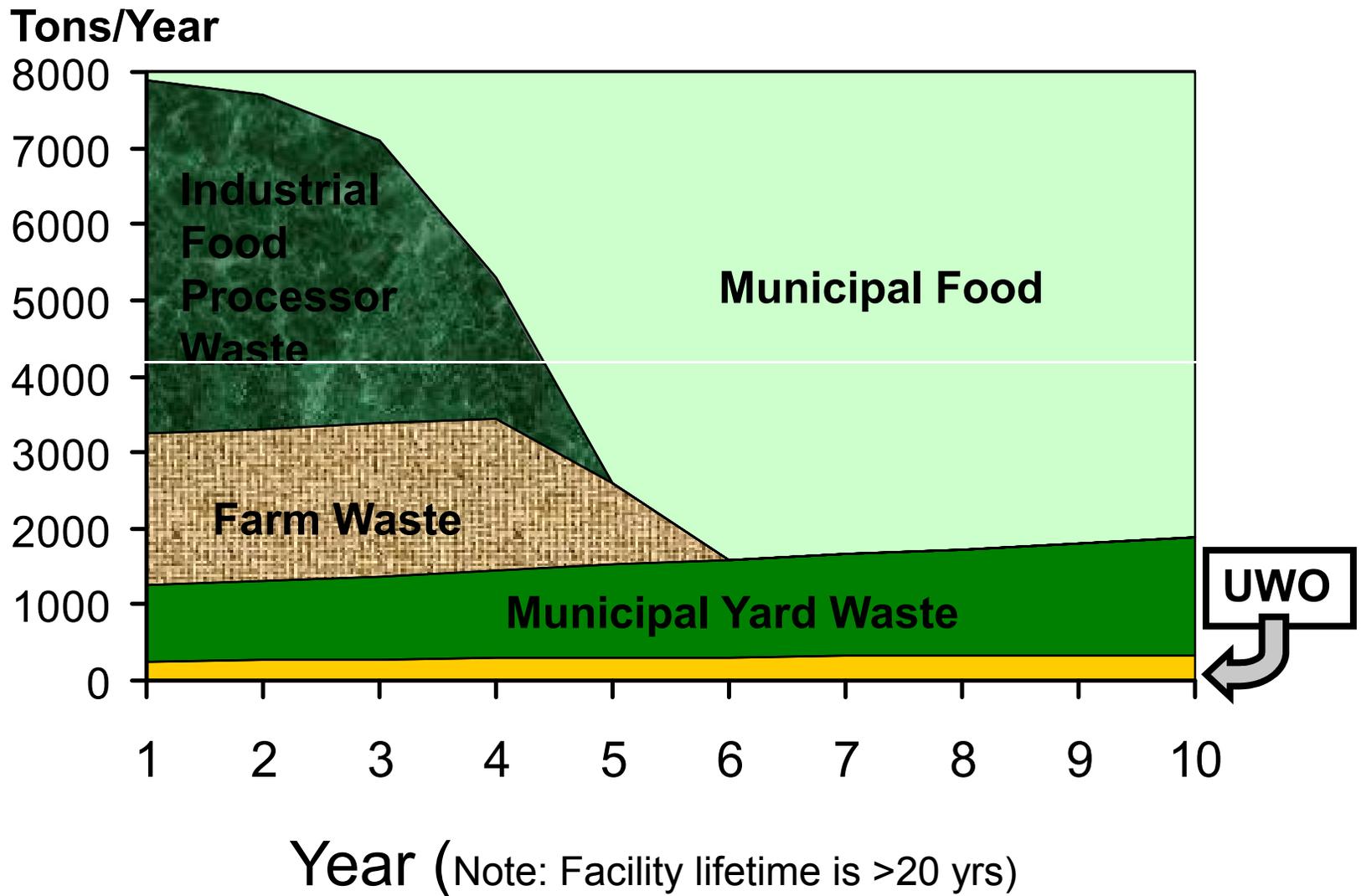


Supply of Biomass

Biogas yield [m^3 / t FM]



Hypothetical Feedstock Source Profile



Community Involvement

ABOUT UW OSHKOSH

ACADEMICS

ADMISSIONS

ATHLETICS

ADMINISTRATION

RESOURCES

CALENDARS

TITAN SERVICES

UNIVERSITY OF
WISCONSIN
OSHKOSH

uw oshkosh
today

Campus News

Announcements

Research

Alumni News

Powering Community

Athletics

#UWOSocial

Can't clean your plate? No problem: UW O, Sanimax help community feed the Biodigester

10 Sep 2012 by News Bureau



A front-end loader delivers compostable material into one of the chambers of the UW Oshkosh Biodigester, first of its kind in the western hemisphere.

There's a new opportunity for regional businesses, schools, nonprofits and other organizations to help produce renewable energy at the University of Wisconsin Oshkosh's groundbreaking "Biodigester" facility.

Dozens of restaurants, grocers, K-12 schools, hospitals and senior living communities are being recruited as partners in a new, community-based, food-waste-to-energy collaboration led by UW Oshkosh and Sanimax, a North American recycling pioneer since 1881 with 15 locations in Canada, the U.S. and Mexico, specializing in byproduct

Search...

@UWOshkosh Twitter

Twitter feed loading

Flickr



2 Main Substrates used at UW-O



Ultimate Goal for Dry Digesters

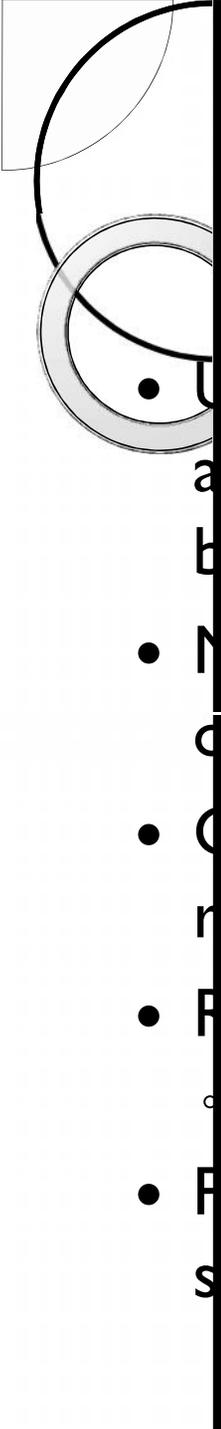
Waste to Energy

Organic Waste + Microorganisms

=

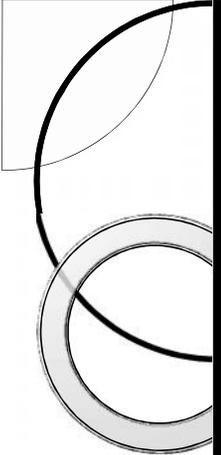
Biogas + Digestate → Energy





Dry Fermentation Overview

- Uses moisture from organic input to facilitate AD, additional required liquid is the percolate housing bacteria
- Microbes within percolate are sprayed to inoculate the organic material and stimulate decomposition
- Generated biogas is collected above the fermentors and routed to utilization room (CHP)
- Residual organic material up to level 4 compost
 - Can be used as fertilizer for soil enrichment or further composting
- Percolate is recycled and used again in a closed loop system eliminating risk of groundwater contamination



Dry Fermentation Process

- **Batch Approach**

- At 28 days – portion of digested material is extracted and mixed with new material and mixed
- Mixed batch reloaded into chamber for new cycle
 - Composition = 50% fresh
= 50% partially digested material
- Why mix?
 - Neutralization of pH of the fresh inputs and inoculates fresh material
- In floor heating system maintains temperature at 38°C

Dry Fermentation

- Dry Fermentation eliminates waste water
- Dry Fermentation does not require pre-treatment of organic material because it is stationary
- Dry Fermentation has reduced energy load due to reduced electrical/mechanical needs and mesophilic working range
- Biomass input remains stationary in dry fermentation while bacteria flows through the biomass, resulting in significant cost and energy savings

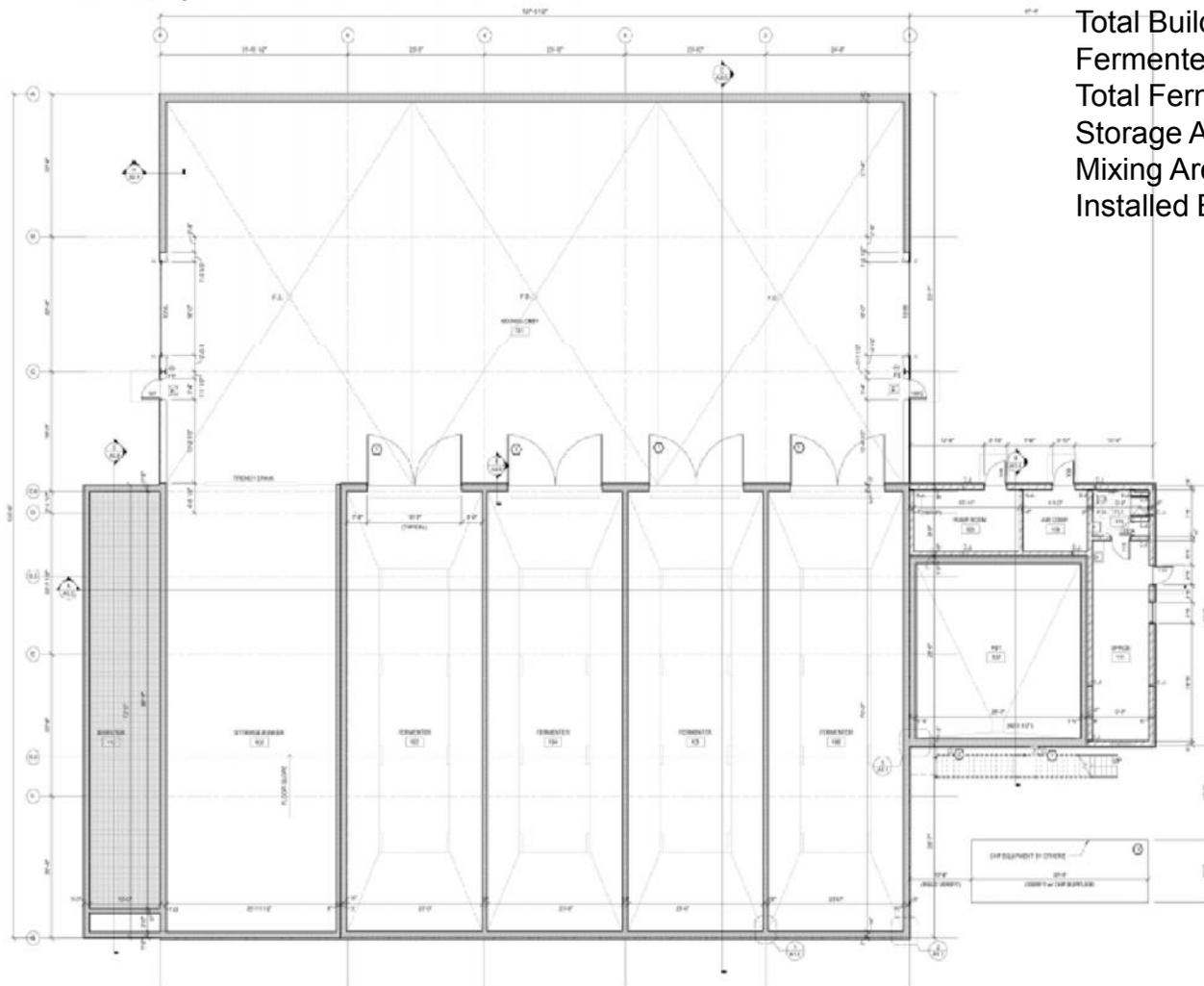
Wet Fermentation

- Wet Fermentation increases waste water
- Requires pre-treatment of organic material due to pulping
- Needs more energy because of mechanical inputs for stirring of sludge
- Requires continual biomass input increasing cost and energy

Advantages of Dry Fermentation

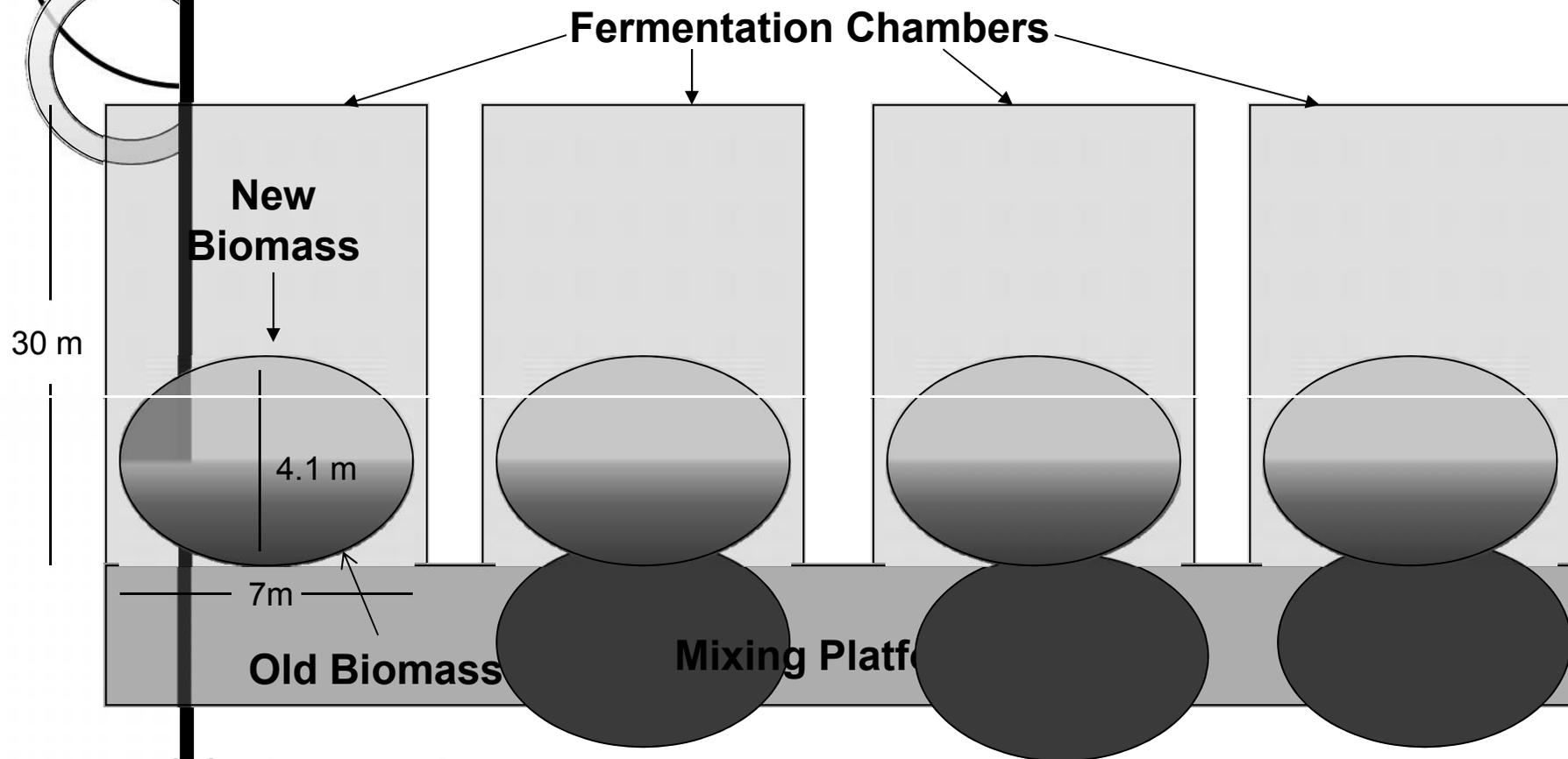
The BIOFerm™ plant at the UWO campus

A 4-fermenter plant with additional biomass storage capacity.



Total Building Footprint:	19,000 ft ²
Fermenter:	70 ft x 23 ft x 16.7 ft
Total Fermenter Volume:	26,887 ft ³
Storage Area:	2,000 ft ²
Mixing Area:	7,800 ft ²
Installed Electric Capacity:	350 kW

Storage of Biomass



- 28 day cycle
- Partially digested material is extracted and mixed in 1:1 ratio with new material



Photo taken by Kevin
Crawford Dec 2009



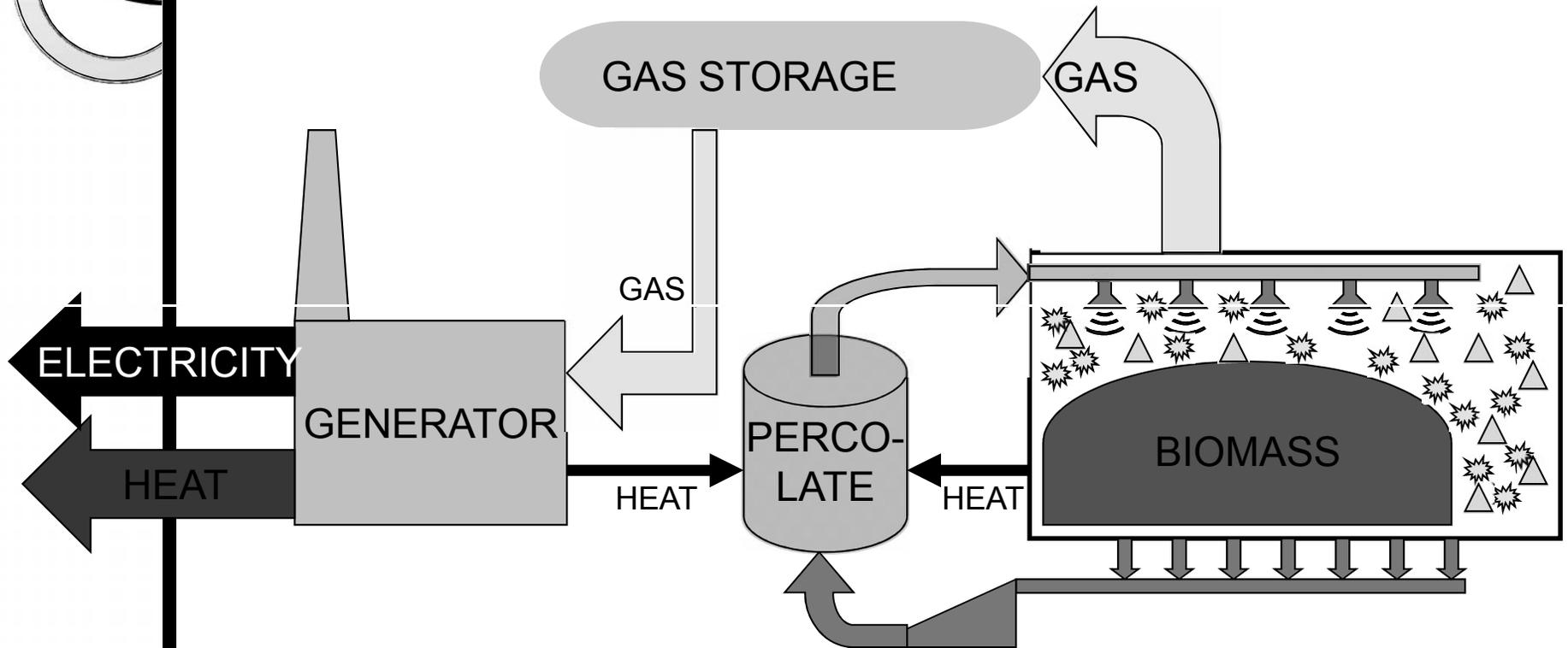
Loading of Biomass







Electricity and Heat are generated...



Solid “digestate” → aerobic composting site
(can be custom batched – e.g. organic)

UW Oshkosh Renewable Energy Facility

CHP Generator: 370 kW

Annual Electric: 3,000 MWh (ca. 10% of UWO)

Annual Heat: 3,400 MWh (ca. 10% of UWO)

Oshkosh Wastewater Treatment Plant

WPS

Oshkosh Senior Center

Fox Valley Technical College

UWO CSC

DIGESTATE SOLIDS

Commercial Composter

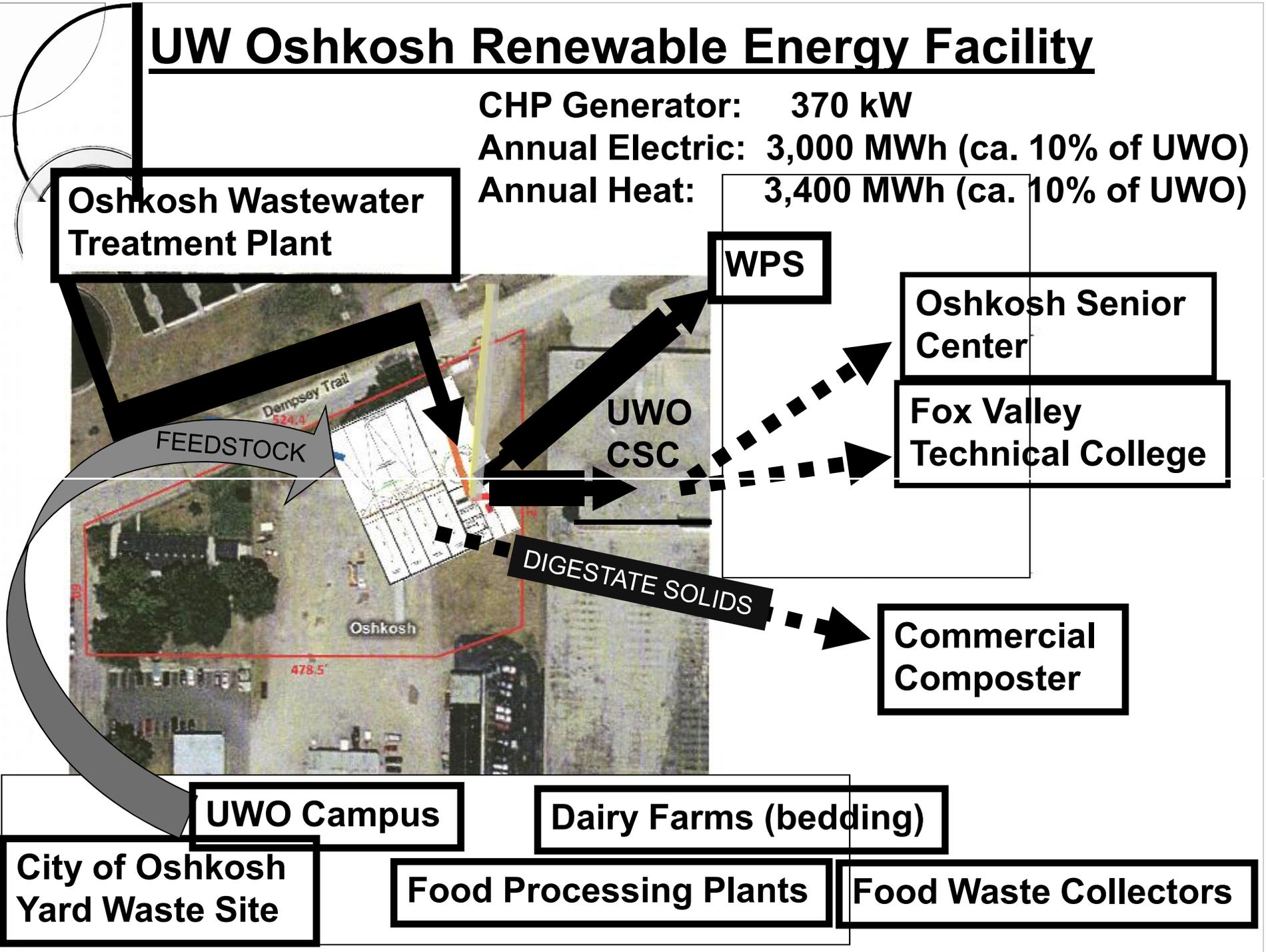
UWO Campus

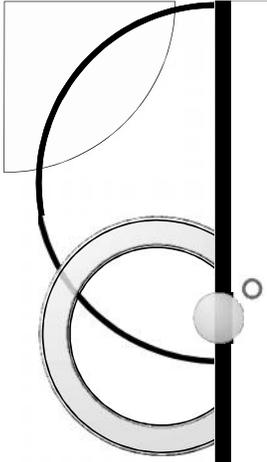
Dairy Farms (bedding)

City of Oshkosh Yard Waste Site

Food Processing Plants

Food Waste Collectors





Laboratory Testing

Need for Laboratory and Pilot Testing

- As consumer of feedstock one needs to know the composition and biogas potential of each feedstock (and digestate).
- Dry fermentation and wet are different – lack of information.
- Must also know the limitations of each feedstock and microbial biochemistry can often be limited by micronutrients.



Need for Laboratory and Pilot Testing

- Ability to blend feedstock to achieve optimal performance is key to maximizing biogas potential.
- Maximizing biogas potential is key to rapid payback of facilities.
- Odor mitigation studies



Need for Laboratory, Pilot, and Full-Scale Testing

- UW Oshkosh has noticed a significant difference in biogas potential from a wide-array of feedstocks that are locally available.
- Ability to blend feedstock
- Ability to build upon for simple lab data and test in pilot-scale units to demonstrate efficacy.
- Ability to place feedstock in full-scale application for proof of concept in industrial-scale unit.
- Cradle to grave approach to simple testing through proof of concepts.
- Development of additives and microbial augmentations to maximize biogas generation in customized feedstock blends.





Questions!

