

**University of Wisconsin Oshkosh – Sustainability Accelerator:
Integrating methane digesters with energy efficiency for a smarter
campus**

Thomas G. Sonnleitner
Vice Chancellor for Administrative Services
University of Wisconsin Oshkosh

Nadeem Afghan
President and CEO
BIOFerm Energy Systems



Representing Sustainability on Higher Education Campuses

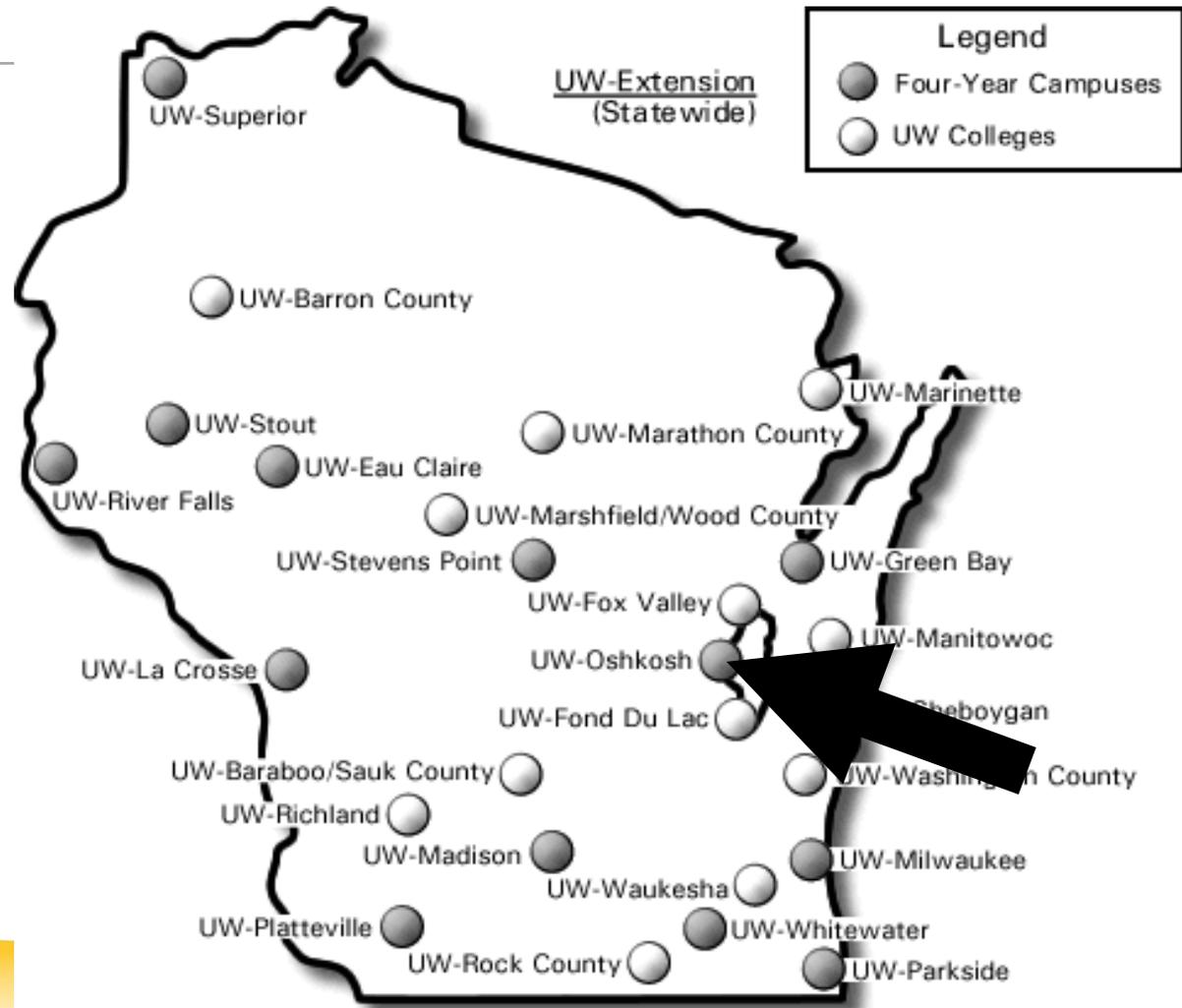


Universities and colleges are, and must continue to be, national leaders in the sustainability and renewable energy movements

Representing Sustainability on Higher Education Campuses

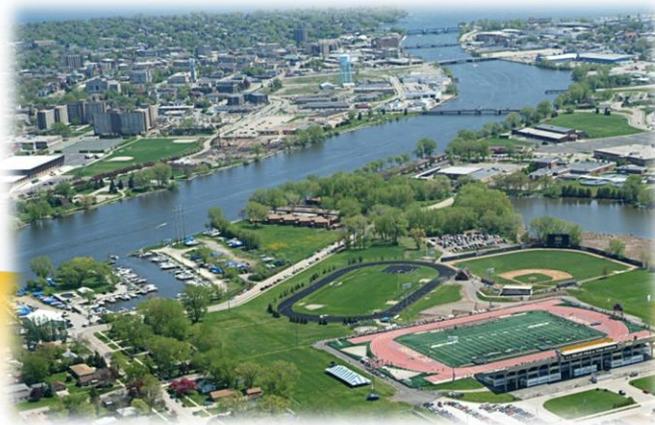
- **American Colleges and Universities
President's Climate Commitment**
 - **Assessments and Footprint Inventories**
 - **Sustainability Councils and Directors**
 - **Student Groups and Research**
- 

University of Wisconsin System



UWO Interesting Facts

- Third largest university in Wisconsin
- Comprehensive campus
- Founded in 1871
- 14,000 Students, 1,700 faculty and staff
- 74 associate, baccalaureate, master's and doctoral programs



Leading by Example: *University of Wisconsin Oshkosh*

- **UW Oshkosh was ranked #3 in Sierra Magazine’s “Cool Schools” rating.**
- **BestColleges.com ranked UW Oshkosh #5 in the nation in its green school rating system.**
- In 2013, UW Oshkosh was one of only 21 schools listed in Princeton Review’s “Green Honor Roll” and also earned Gold in the AASHE STARS program
- In 2011, the University installed a dry fermentation anaerobic biodigester, the first of its kind in the country, and earned the 2011 Silver Waste-to-Energy Excellence Award from the Solid Waste Association of North America.
- UWO’s three biodigesters are rated to generate nearly half of the university’s electricity needs
- UWO purchases 16% of its electricity from green energy
- As the first designated Fair Trade Campus in the country, UWO offers an increasing variety of socially and environmentally responsible products including coffee, tea, chocolate, clothing, and household and decorative items
- UW Oshkosh has been designated a “Tree Campus USA” school every year since 2011, by the National Arbor Day Foundation for its tree canopy, diversity, and educational programming
- In 2015, campus was designated a Monarch Butterfly Waystation for its monarch-friendly landscaping

UWO History of Environmental Attention

- Environmental curriculum
- Early adopter of statewide lighting retrofits
- Performance contracts for energy and water efficiency
- Renewable energy purchases
- Environmental Audit
- Green Building Goals
- Governor's Energy Independence campus
- Campus Sustainability Plan
- Presidents Climate Commitment
- Public/private partnerships



2008 Campus Sustainability Plan

Sustainable Energy: independent of fossil fuels for electricity, heating and cooling

Electricity: Reduce consumption 20% from 2005 to 2012

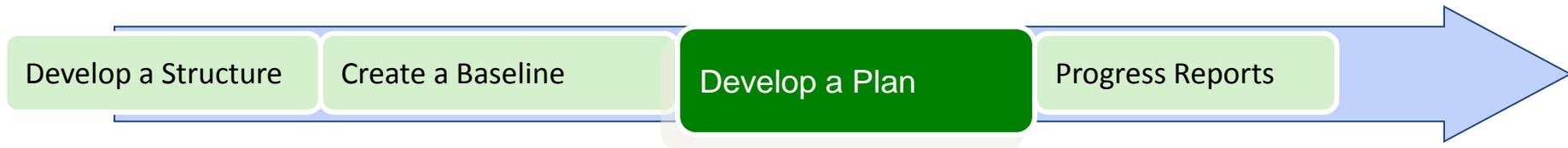
Heating: Reduce fossil fuel use 50% from 2000 to 2012

Facilities Planning, Renovation and Construction: Energy efficient and sustainable design standards on all new construction and renovation projects ... meet or exceed a LEED “Silver”

Transportation: Reduce automobile trips to campus 20% by 2012

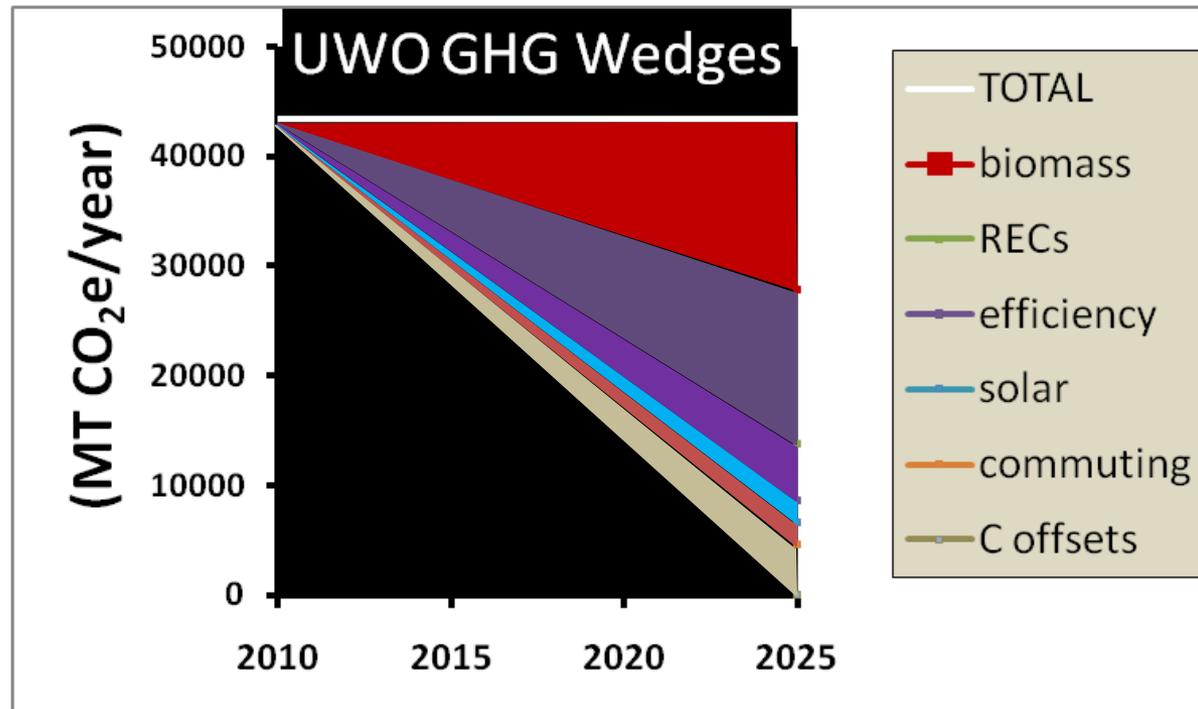
Assessment: Establish the means to assess campus sustainability and provide information to students, staff and community.

A Roadmap to Carbon Neutrality: Develop a Plan



What's Needed?

- Emissions today and a forecast into the future
- Management plan and tools that allow for updating, tracking and auditing
- Strategies for dealing with supply side and demand side for energy



Reducing Our Carbon Footprint

The University of Wisconsin Oshkosh is committed to cultivating a more just and durable world. To that end, we are embedding sustainable building and learning into our daily living and producing the equivalent of > 50% of campus electrical consumption through renewable energy.



2000- 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015

- 2000-** Student requested environmental audits completed
- 2003** Earth Charter "respect and care for the community of life" signed
EPA Leadership Award received
- 2004** National Wildlife Federation Award
- 2005** Taylor Hall renovated, inspired by LEED
Energy Star Award for energy efficiency
- 2006** Green Power purchases increased from 4 to 11%
- 2007** Oshkosh Sports Complex partnership created with water saving turf
"Green" Student Recreation Center opens, funded by and designed for students
Sustainability director hired
1st Campus Sustainability Plan Approved
- 2008** First designated Fair Trade campus in U.S.
Student Success Center (LEED Silver) renovation begins, includes geothermal
- 2009** Campus facilities repurposes large grocery store for headquarters
- 2010** EPA Green Power Partner Award
Horizon Village Residence Hall work begins (LEED Gold)
Tree Campus USA (2010-2014)
- 2011** Sage Hall (LEED Gold) dedication
Urban dry digester (BD1) dedication
Winnebago Project - teaching sustainability workshops
- 2012** Partnership reinvigorates ailing waterfront hotel
"Feed the Beast" food waste diversion research project
AASHE STARS "Gold" Rating received
Sustainability embedded into general education curriculum
- 2013** Collaborative Sustainable Management master's program begins
Princeton Review's "Green Honor Roll"
Sierra's Top "Coolest Schools"
- 2014** Environmental Engineering Technology students accepted
Alumni Welcome and Conference Center (LEED Gold) dedication
Sierra's Top "Coolest Schools"
Mixed small farm digester prototype begins production
Large Farm Digester kWh production equals ~35% of campus consumption
- 2015** National - Top 10 in RecycleMania Food Waste Diversion
Sierra's Top 10 "Coolest Schools"
Contract to sell methane destruction credits signed
Titan Gold compost closes loop in organic waste recycling
Student managed Green Fund launched

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Construction begins at UW Oshkosh



September 15, 2010

University
goal:

***Increase the
use of energy
from
renewable
sources.***

UW Oshkosh Biogas Systems

City – Dry Fermentation



Small Farm – Plug Flow



Large Farm – Complete Mix



Facility Type

	BD1	BD2	BD3
Location	City of Oshkosh	Rosendale Dairy	Allen Farm
Size/animal type	NA	9000 Cattle Dairy Farm	130 Cattle Dairy Farm
Feedstock	Bedding – 55% Food Waste - 32% Yard Waste – 12% Curbside MSW – 1%	Manure	Solid Manure – 56% Wash Water – 24% Bedding – 13% Co-Substrates – 7%
Pre treatment	Mixing via Loader	Sand Separation	Mixing via direct feed and/or Loader

Digester System

	BD1	BD2	BD3
Technology	BIOFerm - Dry	Schmack - COCCUS	Schmack - EUCOIno
System Type	Dry Batch	Complete Mix	Plug Flow
Target Temp	Mesophilic (38°C or 100°F)	Mesophilic (38°C or 100°F)	Mesophilic (38°C or 100°F)
Target Internal Solids Content	25 – 35%	10 – 12%	10 – 15%
Target HRT	28 days	21 days	30 days
Tons per Year	10,000	110,000	4,000

Biogas Use / Digestate Management

	BD1	BD2	BD3
CHP Size	370 kW	1426 kW	64 kW
Electric Use	Export – PPA (WPS)	Export – PPA (Alliant)	Export – PPA (WPS)
Revenue Blended Rate (\$/kWh)	\$0.08	\$0.09	\$0.08
Digestate End Use	Composted	Current – Separated Fiber Future – Further Processing	Sent to Manure Pit
Digestate Vale	Organic Compost or Soil Amendment	Current – Farm Use Future – Bedding, Bagged Fertilizer, compost product, etc.	Fertilizer – On-Site Farm Use

BDI: The First Commercial Scale Dry Fermentation System in the Nation!



THE BADGER HERALD

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

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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

BD1: The First Commercial Scale Dry Fermentation System in the Nation!



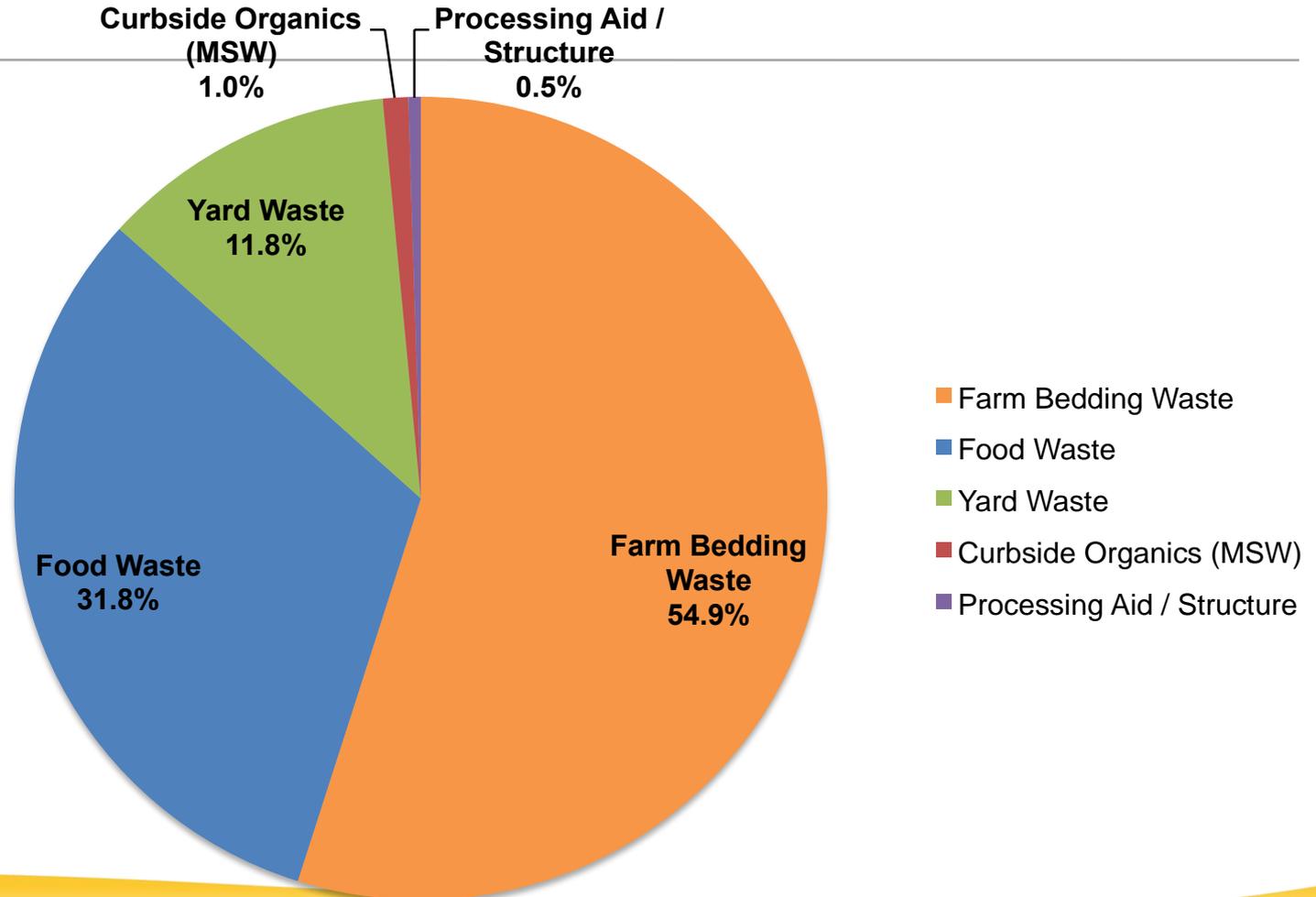
University of Wisconsin–Oshkosh Case Study: Biodigester 1

Dry Digester

- Processes 10,000 tons of organic waste
- Produces up to 370 kW of continuous electrical power and 495 kW of continuous thermal energy
- Waste water treatment plant collaboration
- Private/public collaboration



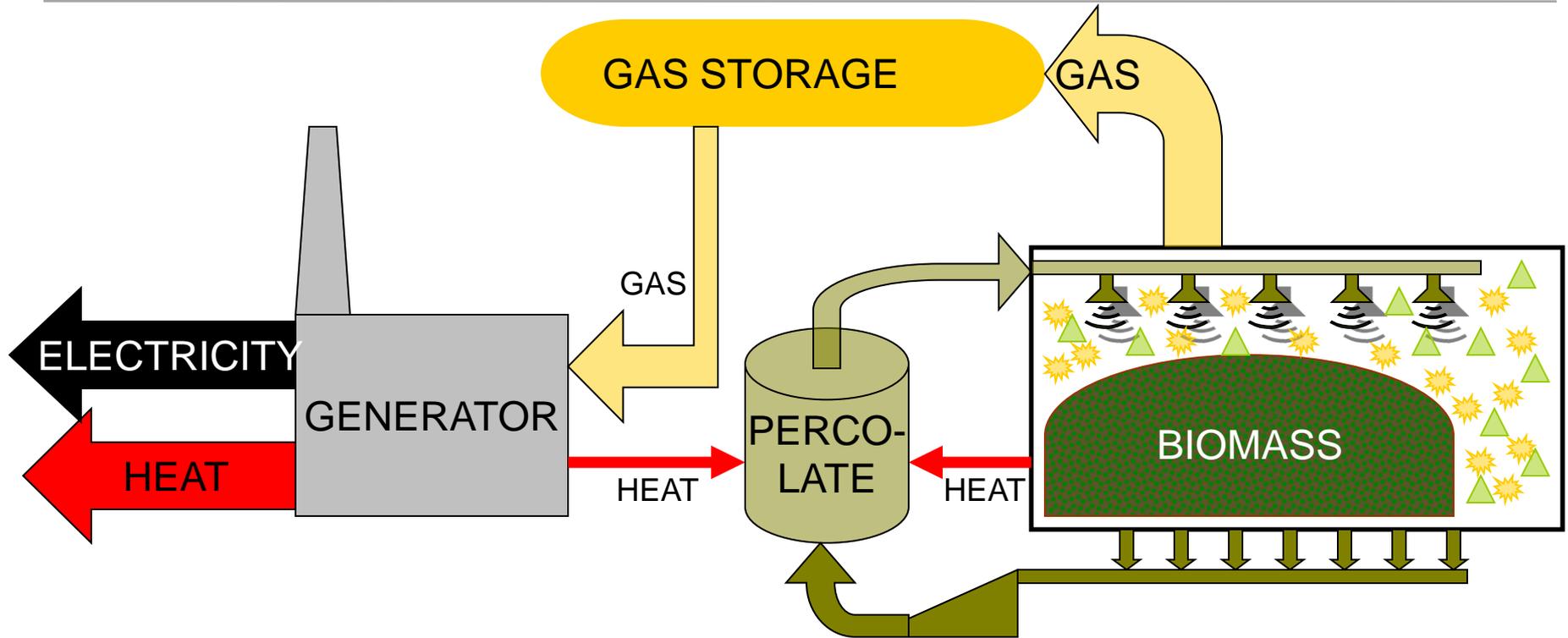
BD1 – Average Feedstock Totals



Annual Organic Material Processed = 10,000 tons per year



Electricity and Heat are generated...



Solid “digestate” → aerobic composting site

UW Oshkosh Biodigester II Renewable Energy Facility

The screenshot shows the UW Oshkosh website with a yellow and white color scheme. At the top, there is a navigation bar with links for 'About UW Oshkosh', 'Academics', 'Athletics', 'Admissions', 'Administration', 'Resources', 'Calendars', and 'Titan Services'. Below this is a large banner with the 'uw oshkosh today' logo. A secondary navigation bar contains 'ABOUT US', 'PUBLIC EVENTS CALENDAR', 'SUBMIT AN ANNOUNCEMENT', a Twitter icon, and a search box labeled 'Search the archive...'. The main content area features a breadcrumb trail 'Home » Featured, Sustainability' and a headline 'UWO partners in second dynamic biodigester project'. The article is by Alex Hummel, dated August 29, 2011, and has no comments. A large image of the UW Oshkosh logo is on the left, and the article text is on the right. A sidebar on the right lists various categories like 'Campus News', 'New Academic Building', 'Snapshots', etc. At the bottom right, there is a weather widget for Oshkosh, WI, showing a 10-day forecast and a current temperature of 44°F.

About UW Oshkosh | Academics | Athletics | Admissions | Administration | Resources | Calendars | Titan Services

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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



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

University of Wisconsin–Oshkosh Rosendale Digester (BD2)

- Wet digester – Complete Mix
 - Largest dairy farm in WI
 - 9,000 cows
 - Provides manure management
 - Construction began June 3rd, 2013
 - 110,000 tons annually
 - 1426 kW electrical





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Small Farm Applications

[ABOUT UW OSHKOSH](#)[ACADEMICS](#)[ADMISSIONS](#)[ATHLETICS](#)[ADMINISTRATION](#)[RESOURCES](#)[CALENDARS](#)[TITAN SERVICES](#)

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uw oshkosh
today

[Campus News](#)[Announcements](#)[Research](#)[Alumni News](#)[Powering Community](#)[Athletics](#)[#UWOSocial](#)

State, UW Foundation, partners rally around small-farm biodigester project 0

🕒 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 “EUColino” (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

@UWOshkosh Twitter 

Twitter feed loading

Flickr 



University of Wisconsin–Oshkosh Case Study: Allen Farm

- Small scale prototype, plug flow digester
 - Small scale digester installation
 - Designed for limited waste steam
 - Processes up to 4,000 tons of cattle manure and bedding from ~130 cows
 - Produces 64 kW continuous electrical power and 101 kW of continuous thermal energy





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BIOFERM
Energy Systems
VIETNAM Group

Titan Gold

- Titan Gold™
- Available from regional retailers and UW Oshkosh at:
 - <http://www.uwosh.edu/eric/titangold/purchase-titan-gold>
- Value-added product from digester 'waste'

TITAN GOLD®
PREMIUM ORGANIC COMPOST
1 CUBIC FT.

TITAN GOLD®

PREMIUM ORGANIC COMPOST

Made from 100% sustainable sources and specially formulated to allow maximum plant growth.

Organic wastes can account for more than 25% of landfill space. This waste produces greenhouse gases. This is a waste of a valuable resource that can be used for both renewable energy generation and soil amendment. Titan Gold is a premium soil amendment/compost made from vegetable, fruit, food, and yard wastes. Titan Gold is the byproduct of natural organic wastes that are diverted from landfills, used for biogas and electricity generation and

converted to a usable soil product. Titan Gold® is produced from the byproducts of North America's first dry anaerobic digester and closes the loop on organic waste by generating a high quality product from waste organic compounds. Titan Gold provides a premium product that increases the quality of soil and can be used in a number of applications from lawn and garden to landscaping, bushes and shrubs.

Directions for use:

Mix 1-3" of Titan Gold into the top 4-6" of existing soil. Plant and water thoroughly. When using with potted plants, mix Titan Gold and conventional top soil at a ratio of 1:3.

Ingredients: This product is specially formulated from all natural ingredients including biological digested and composted fruits, vegetables, yard wastes and food products.

May be harmful if swallowed. Wash hands after use.

Information regarding this product can be obtained by calling 1-920-424-3148 or at uwosh.edu/eric/titangold

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1 CUBIC FT.

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PREMIUM ORGANIC COMPOST
1 CUBIC FT.



MADE FROM LOCALLY COMPOSTED FRUITS AND VEGGIES AND OTHER NATURAL INGREDIENTS

1 CUBIC FT. (28.3L)

TITAN GOLD®
PREMIUM ORGANIC COMPOST
1 CUBIC FT.

Community Collaborations for a Sustainable World

The University of Wisconsin Oshkosh is committed to cultivating a more just and durable world. One of three signature questions in our core curriculum asks students: "How do people understand and create a more sustainable world?"

Wet Anaerobic Biodigester (2014) –

A rural, renewable energy biogas facility is created through a partnership with Wisconsin's largest dairy farm, international experts and area communities.

Removes harmful methane gas and kills pathogens in 110,000 tons of manure each year



Great Lakes Beach Restoration Projects (2003-today) –

UW Oshkosh's Environmental Research and Innovation Center redesigns 20 Wisconsin beaches.

Creates healthier water resources

Restores natural areas along shorelines



Oshkosh Sports Complex (2007) –

Titan Football Field is updated and re-imagined to be a city-wide football, soccer, baseball and track facility.

Eliminates the need for four separate facilities

Includes new turf that saves 850,000 gallons of water per year



Hotel Partnership (2012) –

An ailing waterfront hotel in Oshkosh is revitalized by pooling municipal, foundation and community resources.

Revitalizes a seven-story city riverfront building

Supports the city's and UW Oshkosh's conference and tourism needs

"Top Coolest School"
— Sierra Magazine

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First U.S. Fair Trade Campus

What is the advantage to a comprehensive campus?

- **Responsiveness**
- **Ability to directly connect with top administrators and faculty at the same time.**
- **Ability to utilize campus for ‘community-scale’ demonstrations of efficiencies and technologies.**
- **Increased time for faculty and staff to work on targeted projects.**
- **Better integration between facilities, operations, and academics.**

Next steps in energy and sustainability?

- JCI/UWO Collaboration
 - Battery Storage
 - Development of nutrient extraction technology
 - Next generation digesters
 - Training next generation of workers
- 



Questions

