

2008-2009
Building Communities Educational Series
Focus on Sustainability:
REWABLE ENERGY

Brought to you by the Center for Community & Economic Development
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University of Wisconsin-Extension



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Today's Presenters



Don Wichert
Focus on Energy
Renewable Energy Program



Maria Redmond
Wisconsin Dept. of Administration
Office of Energy Independence
Biofuels Sector

Don Wichert

Don Wichert directs the administration of Wisconsin's Renewable Energy Public Benefits Program at Focus on Energy, which encourages customer applications of renewable energy by providing information, education, training, assessments, project facilitation, feasibility and business development grants, project financing and barrier-reduction services. Don brings to WECC more than 25 years of experience in the environmental and energy fields, most of it with the Wisconsin Division of Energy as chief of the Energy Resources Section. Don earned a bachelor's degree in geography, a bachelor's in thermal and environmental engineering, and a master's degree in energy policy and analysis. He serves on the boards of the Solar Rating and Certification Corporation, Biomass Energy Resource Center and Wisconsin's Citizens' Utility Board. He is also a licensed professional engineer in Wisconsin.

Maria Redmond

Maria Redmond has worked with the State of Wisconsin's Alternative Fuels Program since February 2001. Mrs. Redmond manages the operations of the Wisconsin Biofuels & Alternative Fuels Program in the Office of Energy Independence in the Dept. of Administration. Major work activities include facilitating the growth of the biofuels industry, including production, distribution and use. Redmond is also actively involved in securing federal funding, grants distribution, contract administration, grant development, preparing/submitting of state/federal reports, acting as its liaison with other state agencies, granting agencies, contractors and the public. She also plans and executes research activities regarding alternative transportation fuels for the State of Wisconsin as well as monitors and analyzes pending alternative fuels legislation.

Focus on Energy Renewable Energy Program

Focus on Sustainability Renewable Energy

Don Wichert, Director
donw@weccusa.org
December 16, 2008

Don Wichert's presentation is funded in whole by Focus on Energy

Technologies to be covered

- Solar
 - Electric (photovoltaic)
 - Water heating
 - Space heating
- Community wind
- Biomass heating
- Anaerobic digestion

Solar Systems

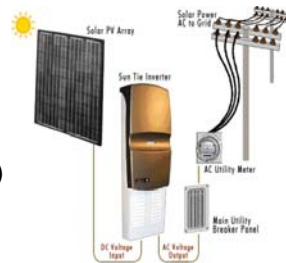
- Highly visible green building element
- Good renewable energy compatibility with cities
- Economics are improving rapidly
- Incentives typically cover 30% to 70% of cost
- Once purchased the power is free



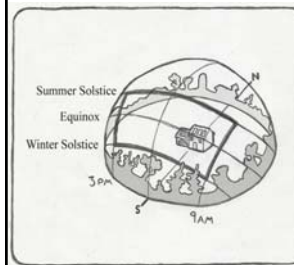
Urban Ecology Center
Milwaukee

Solar Electric System

- Roof mounted
- Grid connected
- 1 kW (85 ft² of module)
- 1,200 kWh/year
- \$7-9,000/installed kW



Solar Siting in Wisconsin



- Minimize shading
- Panels should:
 - Face within 30° of south
 - Tilt between 30° and 60°
- But very flexible
- Great on roofs – less shading and under utilized area
 - Can also be ground mounted

Solar Electric Systems Fully Commercialized

- No moving parts no maintenance
- Major components have 10 & 20 year warranties
- 30 qualified installation firms



Shoreland Lutheran High School
Racine

Many Applications for Communities



Dominican Eco-Justice Center
Racine



Aldo Leopold Legacy Center
Baraboo



Cooper School
Racine



Dr. Wesley L. Scott Senior Living Community
Milwaukee



How Solar Hot Water Systems Work

- Heat production
- When sun is out, anti-freeze solution pumped through piping and panels
- Heat transferred to water in a storage tank
- Water moves from storage to a standard water heater
- Acts as a pre-heater
- Works all year

Community Solar Hot Water

- Fire stations
- Nursing Homes
- Hospitals
- Schools
- Swimming pools
- Community Centers
- Jails

Transpired solar collectors

- Used on un-shaded south walls
- Solar space preheating
- Simple and low cost
- High outside air applications or low grade heating
 - Inside pools
 - Athletic
 - Health care
 - Automotive
 - Warehouses

Community Wind

Wind Resource of Wisconsin Mean Annual Wind Speed at 100 Meters

Wind Speed (m/s)	Power Potential (W/m²)
0 - 1.5	0
1.5 - 3.0	0
3.0 - 4.5	0
4.5 - 6.0	0
6.0 - 7.5	0
7.5 - 9.0	0
9.0 - 10.5	0
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Doing Wind Energy Right

Need a good wind resource

- Increasing wind speed by 20% from 10 to 12 mph average annual wind speed
- Power production increases 60%

- Towers typically over 100 feet tall
- Blades sweep zone should be 30' above anything within 500'

Doing Wind Energy Right

Best sites

- More than five miles away from an airport
- Outside of bird and bat migration pathways
- Turbine fall zone on your land

Limited opportunities in cities



Wind Energy Options

- Small: 1-10 kW (\$20K-\$70K)
 - Don't recommend turbines mounted on buildings
- Medium: 20 kW-100 kW (\$80K-\$300K)
- Large: 600 kW -1500 kW (\$1.7M-\$4M)
 - Should monitor for a year
 - No Focus installation incentives



Wind Economics

- Wind systems have significant economies of scale
 - Larger systems are less expensive per kWh
- Small systems should be considered as community symbols of sustainability
- Medium and large systems can be cost effective under the proper conditions



Community Biomass Heating

- Use of local biomass resources to heat buildings using modern, clean technologies
- Biomass can be pellets made from ag waste or clean wood chips
- Focus has launched a Community Biomass Heating initiative this month (schools emphasis)
 - 8 to 10 new biomass heated buildings by 2010



Benefits of Using Local Forest Biomass

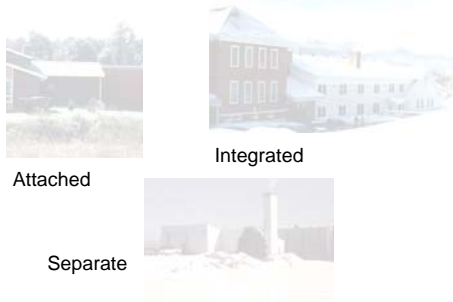


- Sustainable renewable fuel source
- Relatively low cost fuel
- Local and regional economic development
- Positive action on climate change

Desired Characteristics

- Heating bills over \$ 75,000 per year
- Existing hot water system
- Rural
- A number of local supplies of biomass
- A plan for consistent fuel

Building Space for Community Biomass Systems



Automated Systems



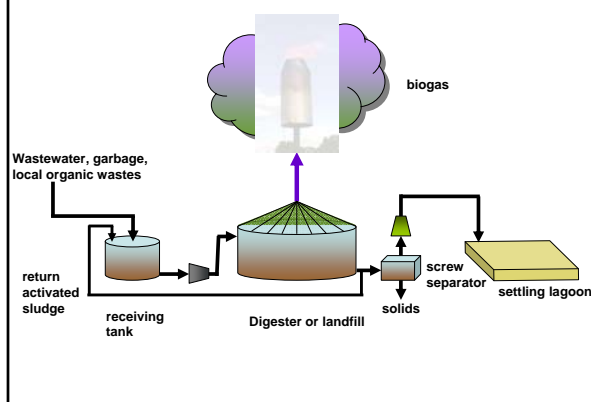
Community Biomass Heat Summary

- Local biomass heats buildings
- Saves money
- Keeps fuel dollars in local community
- New systems are modern: clean, efficient, automated, computerized
- Focus will offer pre-feasibility studies, feasibility studies and grants

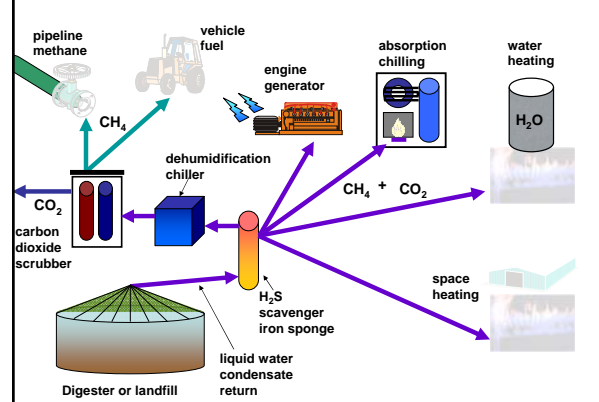
Anaerobic Digestion

- Converting community organic wastes to energy
- Bacteria breaks down organic wastes to methane and carbon dioxide
- Wastewater treatment facilities
- Landfills

Flows in an Anaerobic Digester System



Uses for Biogas



Summary of Renewable Energy

- Large number of community applications
- Need to consider renewables in all community energy decisions
- Communities can assist or hinder adoption through zoning and permitting
- Focus on Energy has a variety of technical and financial services to assist

Expanding Transportation Vehicles and Fuel Options in Wisconsin

Building Communities: Focus on Sustainability
Webinar – December 16, 2008



Outline

- Current Perspective
- Fuels & Vehicles
- Resources



WI Dependence on Fossil Fuels

- 95% of WI's total energy use comes from coal, natural gas, petroleum and imported electricity
- 5% of our energy use is renewable based
 - i.e. biofuels, wind, solar, geothermal, hydropower



Why Alternative Fuels?


- Most derived from resources other than petroleum – addressing peak oil
- Most are domestically produced – reducing dependence on foreign oil
- Often, produce less pollution than gasoline/diesel – improving health & air quality



Alternative Fuels



- Ethanol (E85)
- Wisconsin Ranks 9th in Ethanol Production – 473 million gallon annual capacity
- E85 Only for use in a Flexible Fuel Vehicle (FFV)
- Benefits – Lower Emissions, High Performance Fuel, Market Development
- Challenges - Mileage, Availability, Consumer Awareness






Alternative Fuels

- Biodiesel (BXX)
- WI Biodiesel Production Capacity – 58 million gallons
- Benefits - Use in all diesel vehicles, Superior Lubricity, lower emissions
- Challenges – availability, quality, consistent production
- Markets for use - School buses, Farm operations, Construction, Long-haul Trucking




Alternative Fuels

- Compressed Natural Gas (CNG)/Propane (LPG) – fossil fuel substitutes
 - Benefits – Lower Emissions, Cost, Domestically produced
 - Challenges – limited availability (both fuel & vehicles), mileage




Electric Vehicle Technology

- Hybrid Electric Vehicles (HEV)
 - Benefits - Improved fuel economy, increased power, or additional auxiliary power for electronic devices and power tools
- Neighborhood Electric Vehicles (NEV)
 - Benefits - Energy efficient, reduce energy dependence, environmentally friendly
 - Challenges – only small vehicles, Driving range, Recharge time, Battery cost, Bulk & weight




Current Vehicle Stats

- Gasoline: 5,535,918
- Diesel: 292,348
- E85 Flexible Fuel Vehicles: 141,236
- Hybrid Electric – 10,208
- LPG – 269
- CNG – 152
- Electric – 13




Future Vehicle Technology


- Plug-In Hybrids
 - Benefits – Fuel economy, petroleum displacement, range anxiety, lower emissions, fuel cost
 - Challenges – batteries, charge location/time, energy source, vehicle cost
- Hydrogen/Fuel Cell Vehicles (FCV)
 - Benefits – Produced domestically, little or no emissions
 - Challenges – Vehicle & Fuel Cost/Availability, Onboard fuel storage

Biomass Derived Fuels



- Cellulosic Ethanol - corn stover, woody biomass, switchgrass
- Green Diesel – Virent
- Biobutanol
- Biogas to Transportation Biofuels







Fuel Reduction & Efficiency Efforts

- **Eco-Driving**
 - Employee Education
 - Modified Driver Behavior
 - Vehicle Maintenance
- **Idle Reduction**
 - Installed Technologies
 - Modified Driver behavior
- **Efficiency in Travel**
 - GIS Routing
 - Shared Ride Options
 - Telecommuting, Etc.



Examples

- City of Madison –
 - Fleet vehicle & public transit study to increase fuel efficiency/use of biofuels
 - Integrated hybrid transit vehicles into fleet
- City of Milwaukee -
 - Progressive Biodiesel Use
 - Idle Reduction
 - Eco-Driving



Resources

- **Federal:**
 - DOE (new in Energy bill) - \$2 billion community development block grant
 - USDA (new in Farm bill) – potential Additional Competitive Funding
- **Foundation:**
 - Community & Utility Foundations
 - Leverage Challenge grants by others
- **Existing:**
 - OEI Federal funds
 - FOE Energy Audits
 - Municipalities
 - Rural Electric Cooperatives


Resources

- **BioCabinet**
 - Advising several agencies & Governors Office
- **State Agencies & UW System – existing programs**
 - OEI coordinates to match with community needs
 - ID barriers to overcome
 - Shape programs for future

Outcomes


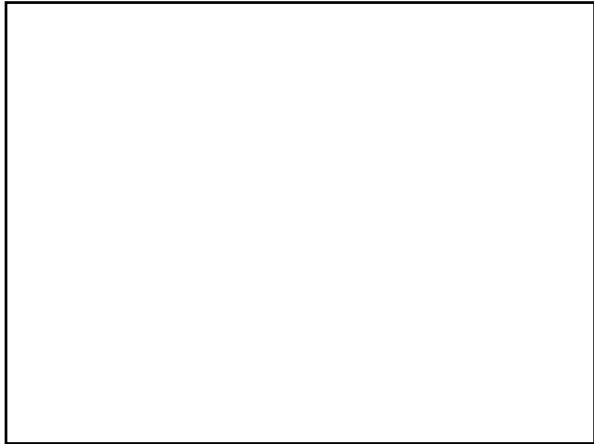
- **\$\$ Savings for operating budgets**
- **Energy savings**
- **Technical assistance**
- **Creation of a statewide community**



Questions?



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Next session


January 20, 2009, 11:30 A.M. - 12:30 P.M., C.T.

Sustainability and Comprehensive Planning

Presenters: Anna Haines, Director, Center for Land Use Education, UW-Stevens Point

This webinar will focus on infusing sustainability concepts (the three E's of Economy, Environment and Equity and The Natural Step principles) into the elements of the comprehensive plan. How to create goals, objectives and policies that reflect sustainability will be discussed along with resources to assist with sustainability planning efforts.


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- Click the ICON for either Microsoft Office Live Meeting High Fidelity Presentation OR Microsoft Office Live Meeting Replay
- This archive will remain for two weeks on the web



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