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Agricultural Outlook Forum Presented: February 16, 2006

MANURE TO ELECTRICITY: A SUCCESS STORY

John M. McWilliams
Resource Planner
Dairyland Power Cooperative

USDA 2006 Agricultural Outlook Forum

Thursday, Feb. 16, 2006

Washington, DC

DAIRYLAND POWER COOPERATIVE

A Touchstone Energy® Cooperative

A Model for Transforming Successful Anaerobic Digestion to Electric Power Development

John M. McWilliams, MBA, PE

Resource Planner

DAIRYLAND POWER COOPERATIVE

A Touchstone Energy® Cooperative

Dairyland Power Cooperative

- Provides wholesale electricity for 25 member cooperatives and 20 municipals, who in turn provide the energy needs of over a half-million people
- Service area covers 62 counties in four states – Wisconsin, Minnesota, Iowa and Illinois

DAIRYLAND POWER
COOPERATIVE

Quick Facts

- Based in La Crosse
- Formed Dec. 1941
- 1,102 MW Generation
- 3,128 Miles of Transmission Lines
- 250 Substations
- 570 Employees

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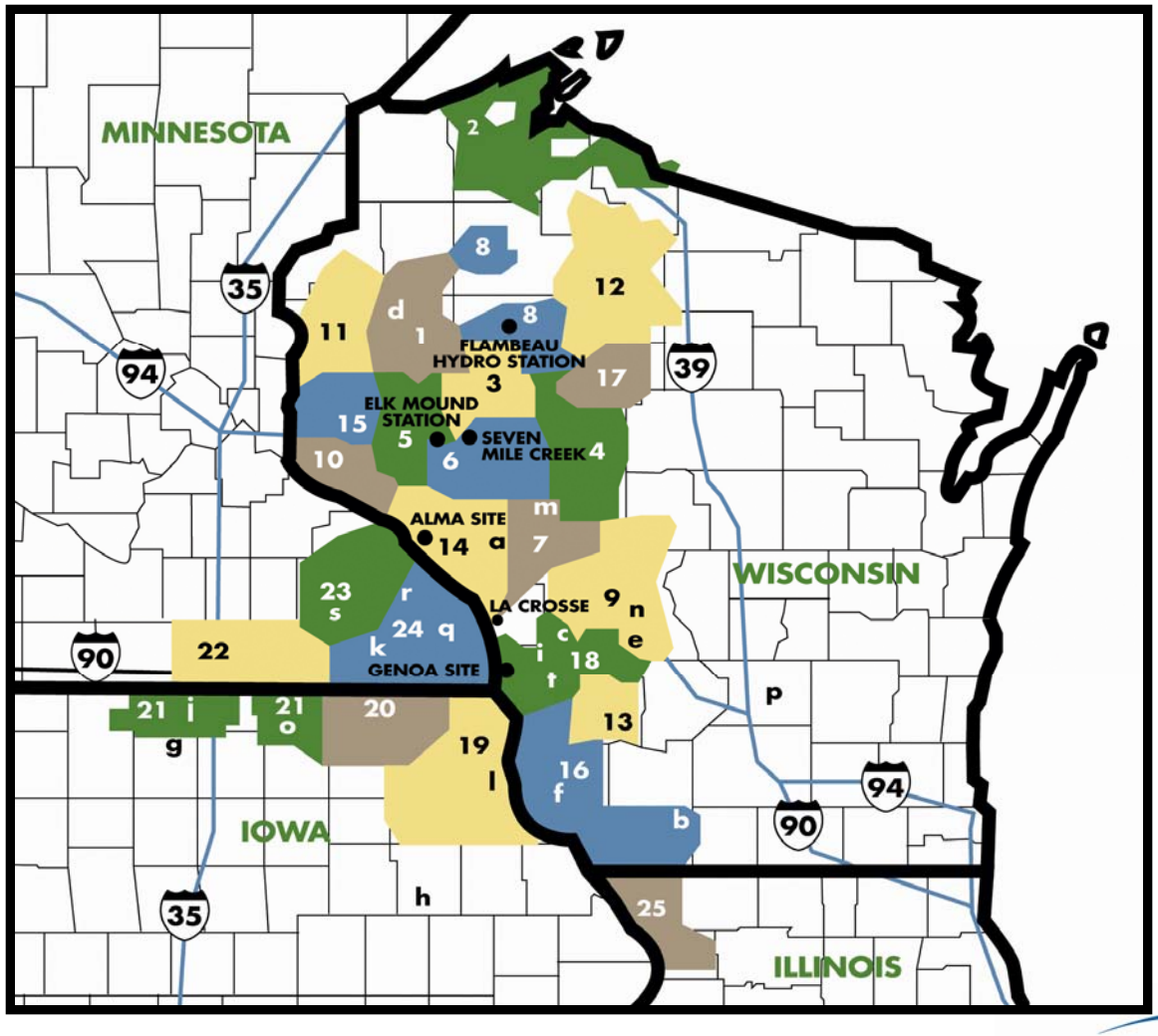
Dairyland Power Cooperative System



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Renewable Energy

Standards, Objectives, Options and Goals

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Wisconsin

- Wisconsin's renewable portfolio standard (RPS) became effective October 27, 1999, making Wisconsin the first state to have a RPS in advance of retail competition. The schedule of the percentage of renewables required and compliance dates are as follows:

  0.50% by 12/31/2001
  0.85% by 12/31/2003
  1.20% by 12/31/2005
  1.55% by 12/31/2007
  1.90% by 12/31/2009
  2.20% by 12/31/2011

  Qualifying renewables include fuel cells that use renewable fuels, tidal or wave action, solar thermal electric and photovoltaic energy, wind power, geothermal electric, biomass, and hydro power (less than 60 MW).

http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=WI05R&state=WI&CurrentPageID=1

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Wisconsin Task Force Recommends Increasing Efficiency, Renewable Energy

- At a press conference at the capitol on July 20, Wisconsin Governor Jim Doyle accepted the unanimous recommendations of his Task Force on Energy Efficiency and Renewables.
- The most important recommendations include:
  - Increase the statewide use of renewable energy by all customers to 10% by 2015.
  - Create rural energy initiatives like increased use of locally developed anaerobic digesters and wind generators.

http://www.eere.energy.gov/state_energy_program/news_detail.cfm/news_id=9305

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Minnesota

- Beginning in 2005, at least 1% of the electric energy provided to retail customers should be generated by eligible energy technologies. This amount will be increased by 1% each year until 2015, at which time 10% of electricity should be generated by eligible renewables. At least 0.5% of Minnesota's commercial electricity should be generated by biomass energy technologies by 2010, and 1% by biomass by 2015.

http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=MN07R&state=MN&CurrentPageID=1

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Mndaily.com – January 26, 2005

- "Governor Pawlenty expressed his support for renewable energy in last week's State of the State address when he said, "Let's make Minnesota the Saudi Arabia of renewable fuels".

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Iowa

- Beginning January 1, 2004, all electric utilities operating in Iowa, including those not rate-regulated by the Iowa Utilities Board (IUB), are required to offer green power options to their customers. The resulting green power programs will allow customers to make contributions to support the development of renewable energy sources in Iowa. The IUB will adopt rules to implement the statute. Utilities must then file program plans and tariff schedules with the IUB.

http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=IA03R&state=IA&CurrentPageID=1

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DesMoinesRegister.com
January 27, 2005

- "Iowa law requires utilities to get 2 percent of their electricity from renewable sources. Governor Vilsack has a goal of 1,000 megawatts of renewable energy in Iowa by 2010."

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Illinois

- In June 2001, Illinois enacted legislation creating the Illinois Resource Development and Energy Security Act. The legislation adopted a statewide renewable energy goal of at least 5% of total energy by 2010, and at least 15% by 2020. However, the legislation does not include an implementation schedule, compliance verification, or credit trading provisions.

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The Times-Press
February 11,2005

- "By 2012, Governor Blagojevich wants renewable energy to make up 8 percent of the electricity sold in the state and he wants the bulk of it to come from wind power. It would be enough to power 1 million homes and that will be important as electric consumption grows, he said."

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Renewable Energy Targets

- Wisconsin
  - Renewable Portfolio Standard
- Minnesota
  - Non-mandated Renewable Energy Objective
- Iowa
  - Mandatory Utility Green Power Option
- Illinois
  - Renewables Portfolio Goal

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Renewable Energy Resources

Wind Projects

Waste-to-Energy Systems (Manure Digesters)

Landfill Gas-to-Energy Projects

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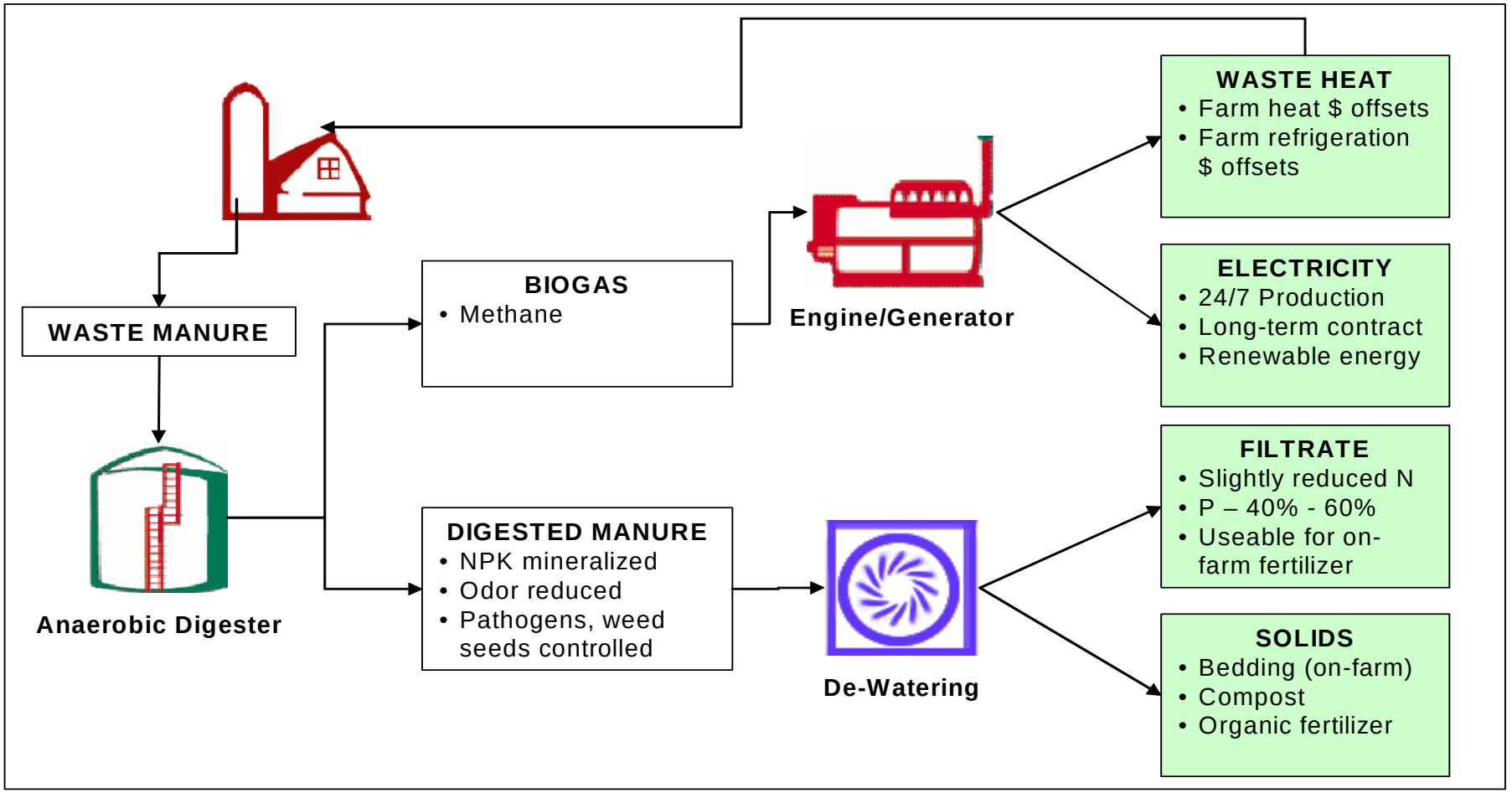
Manure-to-Energy System



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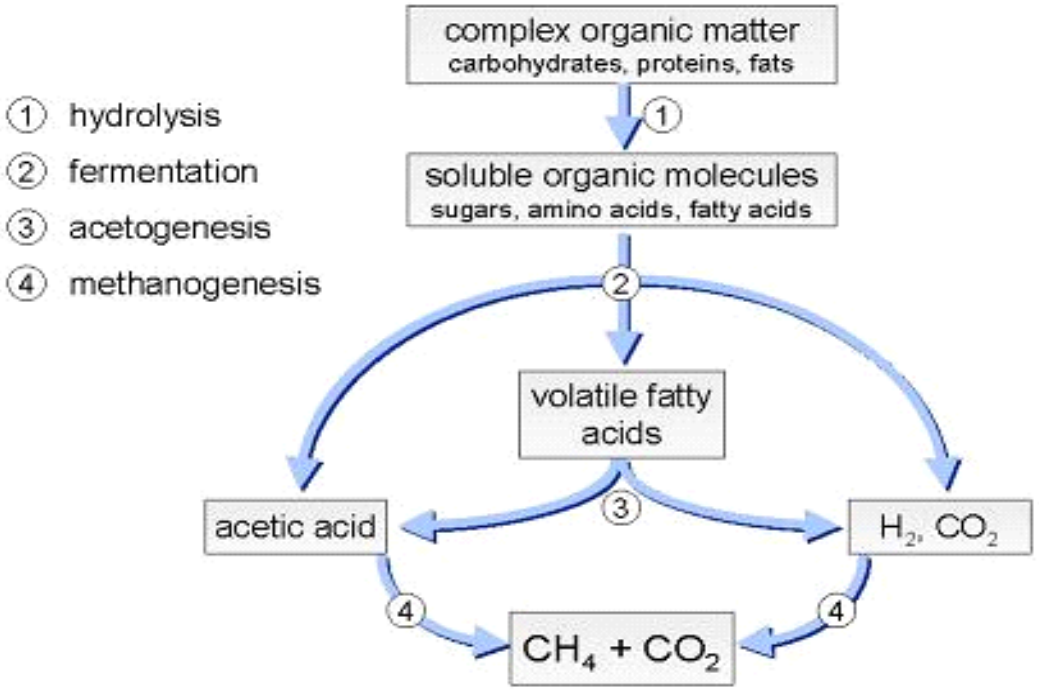
Anaerobic Digestion 101



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Methane Digester Projects

- Manure Digesters
  - Five Star Dairy - Elk Mound, WI
  - Wild Rose - LaFarge, WI
  - Daley Dairy – Pine Island, MN
  - Bach Farms - Dorchester, WI
  - Norswiss Farms - Rice Lake, WI
- 0.775 MW each
- 6,000 MWh each annually

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September 20, 2004

Digester tank and substrate tank

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December 1, 2004

Completed structural work

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February 22, 2005

Successful production of digester gas

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February 22, 2005

Arrival of engine / generator set

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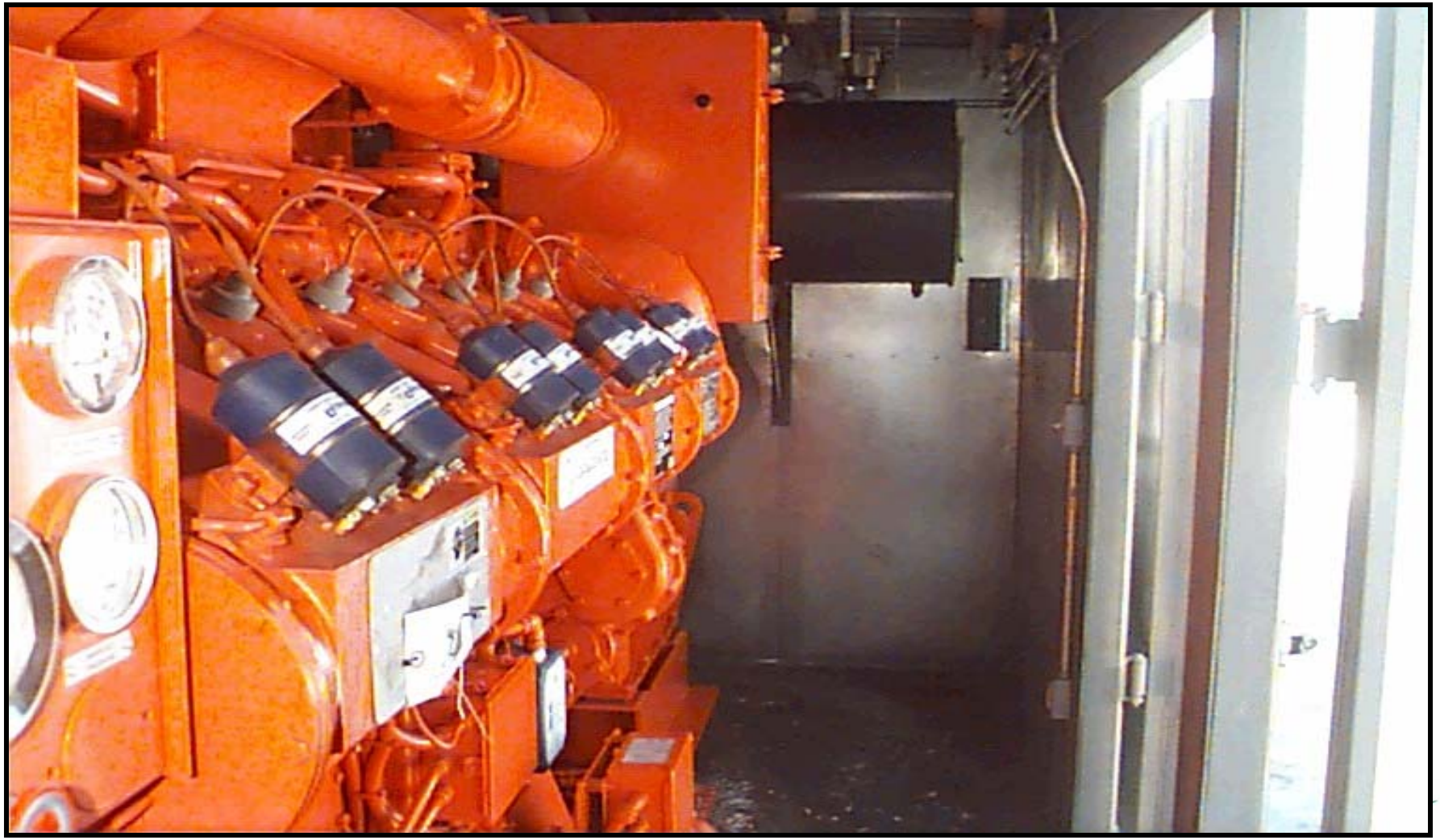
February 22, 2005



775 kW Waukesha engine

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June 6, 2005

Arrival of substrate tanker

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Five Star Dairy, Elk Mound, Wisconsin

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Five Star Dairy, Elk Mound, Wisconsin

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Wild Rose Dairy, La Farge, Wisconsin

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Wild Rose Dairy, La Farge, Wisconsin

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Norswiss Dairy, Rice Lake, Wisconsin

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Wind Energy

- Chandler Wind Farm
  - 1/3 of the output of the 2 MW farm
  - Approx. 2,200 MWh annually
  - Chandler, Minnesota
- McNeilus Wind Farm
  - 17.4 MW
  - Approx. 48,000 MWh annually
  - Adams, Minnesota
- Tjaden Wind Turbine
  - 0.45 MW
  - Approx. 700 MWh annually
  - Charles City, Iowa

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Landfill Gas to Energy Projects

- 7 Mile Creek Landfill Gas to Energy Project
  - Located near Eau Claire, Wisconsin
  - Three Waukesha engine generators
  - 3 MW
  - 18,180 MWh generated in 2005 at 70% capacity factor
  - Fourth engine to be added in 2006
  - 31,000 MWh annually by 2007

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7 Mile Creek Landfill Gas to Energy Project

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Waste Management Landfill Projects

- Central Disposal Landfill, Lake Mills, Iowa
  - 4.8 MW consisting of six 800 kW Caterpillar engine/generatiors
  - 38,000 MWh annually
  - On-line in early 2006
- Timberline Trail Landfill, Bruce, Wisconsin
  - 3.2 MW consisting of four 800 kW Caterpillar engine generators
  - 25,000 MWh annually
  - On-line in early 2006

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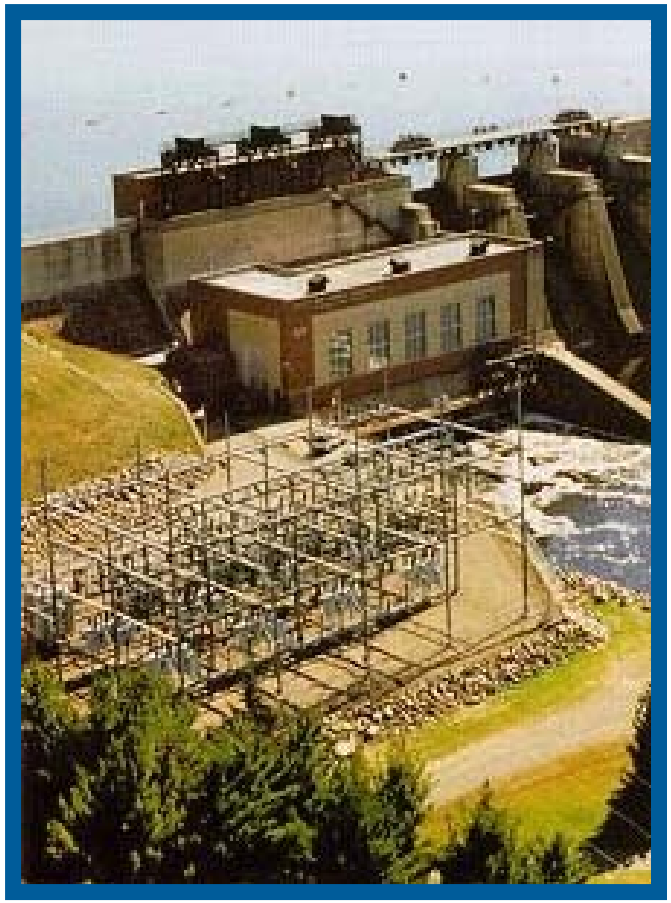
Flambeau Hydro Station

- 22 MW
- 60,000 MWh annually
- Online 1950
- Relicensed in 2004 by FERC until 2037
- Ladysmith, Wisconsin



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Questions?

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