What is Koda Energy, LLC?

- Koda is a partnership between Rahr Malting and the SMSC that creates “green energy” from burning **dry** biomass fuels.
- Koda’s combined heat and power biomass plant is located on property owned by Rahr Malting in Shakopee MN.
Rahr Malting Company

- The Rahr family has made malt for 167 years.
- Operational in Shakopee since 1936.
- The Shakopee plant currently employs over 110 skilled workers.
- It is the 2nd largest malting facility in one location in the world.
Shakopee Mdewakanton Sioux Community (SMSC)

- A federally recognized Indian Tribe.
- The largest employer in Scott County.
- Nearly $700 million in annual revenues in Minnesota attributed to the SMSC.
What Does Koda Produce?

• Koda’s has two products.
  – 16.5 MW of net electrical energy. (average)
  – 125 MM BTU’s/hr of thermal energy. (average)

• Rahr purchases all of the heat generated from this system to replace its natural gas usage in 7 large industrial kilns.
  – ~ 75 million cubic feet/month of reduced NG usage.

• The electricity generated from this system is:
  – Purchased by Rahr to power the malting plant.
  – Sold to outside power purchasers in need of base load and/or biomass renewable energy. (Xcel Energy)
Biomass Fuels

• Biomass fuels supplied by Rahr, local agri-businesses, city entities, wood recyclers, and farmers in a 50 mile radius.
• Fuel - 175,000 tons/year required.
  – Agri Business co-products.
    • Rahr’s by-products.
    • Oat hulls from General Mills.
    • Chaff and seed screening material from other agricultural processes.
  – Wood
    • Municipal tree trimmings. (dried)
    • Recycled dimensional lumber.
    – Other dry agricultural residues such as: chopped corn cobs and stover, beet pulp, sunflower shells, grass seed, old seed corn, and many others.
• Most of these products had no reliable market before Koda, many were sent to landfills when a viable outlet could not be found.
Plant Design

• Boiler Options
  – Fluidized bed system
    • Better suited for higher moisture – lower quality fuels
  – Stoker system
    • Not ideal for burning “dust”
    • Gasifier design not efficient
  – Suspension burning system chosen for Koda
    • Flame stability
      – Self sustaining combustion w/o natural gas – 100% Biomass fired
    • Lower emissions & higher efficiency than stoker
    • Low unburned carbon
    • Rapid response & 50% turn down capability
Koda CHP plant from the street
Where fuel enters the process
Point and area dust collection
The various fuels are segregated into four blending bins.
A specific blend of fuels is milled to a coarse flour in these four hammermills.
Biomass Burners
Six total (2 per floor)
Urea Injection for NOX Control
ESP for Particulate emission control
Steam turbine
Plate & Frame Heat Exchanger to Heat glycol to 260 F
Environmental Benefits

• Renewable base load energy production.
• CO$_2$ emission reduction from avoided natural gas use for heat.
  – 70,000 tons/year.
• CO$_2$ emission reduction from electrical generation.
  – 190,000 tons/year compared to coal emission for electrical generation.
• Mercury emissions extremely low.
• All of Koda’s ash is land applied to improve soils.
• Dedicated energy crops.
  – Reduced soil erosion.
  – improved water quality.
  – Sequestering carbon.
Project planning considerations

- Identify the feedstocks that are readily available, by volume and type.
- Perform proximate and ultimate analysis on all fuels.
- Select the most proper conversion technology for your type of feedstock.
- Calculate the expected energy production.
- Create a mutually beneficial relationship between your business unit and a large volume user of power and/or thermal energy.
- Add a person to your team with broad process/power plant experience to provide input before construction begins.