Koda Energy, LLC
CHP Biomass to Energy
What is Koda Energy, LLC.?

- Koda is a partnership between Rahr Malting Company and Shakopee Mdewakanton Sioux Community (SMSC) that creates “green energy” from burning dry biomass fuels.
- Koda’s combined heat and power plant is located on Rahr property in Shakopee, MN.
- The CHP plant was designed to service Rahr’s thermal load.
Rahr Malting Company

- The Rahr family has made malt for 168 years.
- Operational in Shakopee since 1936.
- Shakopee plant is the 2nd largest malting facility in the world, and the largest producer from a single site.
- Shakopee plant employs over 100 highly skilled workers.
Shakopee Mdewakanton Sioux Community (SMSC)

- A federally recognized Indian Tribe.
- The largest employer in Scott County.
100% Biomass Fuels

• First multi-fuel biomass suspension power boiler – flexibility & efficiency.
• Biomass fuels supplied by Rahr, local food & agri-businesses, municipalities and farmers in a 75 mile radius.
• Annual fuel requirement ~ 175,000 tons.
  – Rahr by-products account for ~ 20%.
  – Dry wood chips are ~ 40%.
  – Oat Hulls and other agribusiness residues ~ 40%.
Rahr byproduct
Dust, chaff, and screenings weigh and convey from Rahr.
Rahr byproduct into the Koda facility.
This is how we control the transfer of byproduct from Rahr.
Dried wood chips, \( \frac{3}{4}'' \)- in size, and \(<14\%\) moisture.
Ft. Snelling wood tipping and re-sizing site.
Wood chip drying, storage, and transfer.
Ground oat hulls, the majority are currently from General Mills.
Biomass Fuel Specs.

- Moisture Content <14% (<10% Preferred).
- Max of 10/64th thickness.
- Must not contain any man-made products.
  • Particle board/cardboard.
  • Paint.
  • Paper.
  • Any other “foreign” materials.

-Elevator Dust has shown to be an acceptable fuel due to:
  • Low moisture content.
  • Consistency is good for hammer mills.
  • Does not contain prohibited materials.
4 Bliss 4440 Hammermills, @ 350 HP each.
Biomass flour @ 7/64”-, this fuels our combustion process.
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 as 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.
What Does Koda Produce?

- Koda produces both heat and power.
  - ~ 17 MWH net average, of base load renewable energy
  - ~ 125 MM BTU’s/hr of thermal energy, on average.
- Rahr purchases all of the heat generated from this system to replace its natural gas usage.
  - > 1.1 million mcfs of natural gas/year.
  - > 80 million cubic feet/month.
- The electricity generated from this system is:
  - Purchased by the partners at avoided energy costs.
  - Sold to outside power purchasers in need of base load and/or biomass renewable energy “Green Power”.
KODA ENERGY GreCon Zones and Extinguishments along with the Fire Suppression Zones

SYSTEM #2

SYSTEM #1

CROSS FEED CONVEYOR Contd.

LEGEND:
- SPARK DETECTOR FM
- EXTINGUISHING DEVICE
- EXTINGUISHING DEVICE Ultra High Speed
- FIRE SUPPRESSION ZONE WITH ZONE NUMBER
- THERMIST DETECTOR
- DLD - DAY LIGHT DETECTOR
*9# GreCon SPARK DETECTION ZONE NUMBER
- PNEUMATICS
Truck unload building
Wood and Hull reclaim bins
Suppression, extinguishment, and deluge
From unload to blending bins
Dust duct protections
Dust collection / blending bins
Koda fuel preparation
4 – 350 hp hammer mills
Milling to Day/Surge bin
Day bin discharge
Biomass flour to the burners
Two of the six biomass dust burners
Initial light off, 9 MMBTU/hr NG pilot
Urea Injection for NOX Control
ESP for Particulate emission control
Boiler facts

- Boiler rated output is 220,000#/hour of steam production.
- Steam is produced at 900 psi, and 900 degrees F.
- Boiler efficiency is ~ 80%.
- ~ 21 tons/hour of biomass flour is consumed in the combustion process.
- A balanced draft design.
- The entire boiler hangs from the ceiling structure of the building.
- Our boiler “grows” ~ 9.5” from a cold start, to hot and operating.
- Natural gas is the start up and secondary fuel source, we can fire at 70% output on natural gas alone when necessary.
Glycol circulation between Koda Energy and Rahr
Main control room
Ground has been broken for Rahr’s new Malt house. Scheduled completion April 2017
RAHR MALTING CO.
MALTHOUSE EXPANSION #6
Shakopee, Minnesota

- Slated for completion Spring 2017
- Capacity: 70,000 metric tons annually
- Malthouse #6 will make Rahr Malting Co’s Shakopee MN location the largest single-site malting facility in the world
RAHR CORPORATION GROWTH PLANS
Shakopee, Minnesota

• **Malt Production Facility**: Malthouse # 6 at Shakopee, 70,000 MT annual capacity, full steeping, germination and kilning functions.

• **BSG Warehousing and Packaging Facility**: 80,000+ ft² warehouse with fully automated packaging capability.

• **New Rahr Technical Center**: 20,000 ft² two story building with full research brewery, pilot and micro malting systems and expanded laboratory.

• **Maintenance Warehouse**: 14,500 ft² parts and equipment storage for Shakopee, Minnesota operations.