Pheasant Run Farm is a diversified farm that includes vegetables, fruits, conventional corn and soybeans, and a finish hog operation for a local producer. Herbs are a major part of the business. Franzenburgs started raising medicinal herbs 15 years ago and have sold 5-20 varieties to Frontier Natural Products, Norway, IA. The bulk of the medicinal herb produce is sold to markets in the US, Europe, and Japan. Vegetable crops include: asparagus, pumpkins, sweet corn, cucumbers, tomatoes, fall greens. Fruits are blueberries and strawberries. They have 14,000 sq. ft. of greenhouse and farm 120 acres of herbs, vegetables, fruits and flowers.

**Biomass Renewable Energy:** Two corn boiler systems that both burn kernels from farm grown corn. Both purchased from Year-A-Round Corp., Mankato, MN.

a. 900,000 BTU Corn furnace for a hydronic (water-based) heating system to heat 6,000 square feet of soil under three high tunnels (greenhouses) to raise cut flowers and tomatoes. Soil was removed from the greenhouse floors, tubes were buried 18' deep to carry water to heat the sub-soil, and then the soil was replaced.

b. 900,000 BTU Forced air corn boiler system used to heat other greenhouses.

**Reasons for installing biomass energy system:** Pheasant Run Farm previously operated on propane. Franzenburgs looked at the future use and cost of propane and decided the price of corn versus LP was a cost advantage. They also wanted to use a renewable heating source – corn kernels.

**Cost:** Boiler for hydronic system $6,000

Forced air corn boiler bought used for $8,000 (new is $18,000)

Energy cost comparison between corn, propane, electricity, natural gas, and fuel oil at [www.year-a-round.com/corn950.htm](http://www.year-a-round.com/corn950.htm)

**Financing:** None.
**Project Benefits:** The price of LP has changed over the years from $.60/gallon to over 4 times that cost, making it almost cost prohibitive, Eric Franzenburg said. Corn prices have also gone up from about $2/bushel three years ago to $3.30/bushel. However Franzenburgs grow their own corn, making the cost feasible for their farm. Both boiler types are readily available. Heating the greenhouses extends the growing season in the spring and fall. The greenhouses are heated from mid-February until early April to give the flowers and tomatoes an early start. In the fall they heat the greenhouses for another 6-8 weeks to extend the season.

**Project Roadblocks:** It can be expensive to put in the hydronic system, Eric said, because installing the underground tubes is somewhat technical. He relied on help from a plumbing company because he didn't find much information on how to install the system. Having done the installation once, he feels he could add more tubes without help. The corn furnace needs to be monitored and requires daily maintenance upkeep to clean out the ashes and attend to a few other details.

**Percentage of heat from biomass corn kernel furnaces:** The systems are new and Franzenburg continues to monitor them to answer this question.

**Additional energy efficiency/renewable energy plans:** Franzenburgs hope to install additional hydronic heating tubes for sub-soil heating. They also want to experiment with heating with other renewable sources like pelletized switchgrass.

**Technical Specifications:**

Year-a-round Corn Furnace Model 950 1B - Hot Water System
Year-a-round Corn Furnace Model 950 –FA Forced Air System
1500° F. Glow Plug manually operated from solid state control panel.

- **BTU Output/HR.** 140,000 to 950,000
- **Heat Area (approximate).** 12,000 to 50,000 Sq. Ft.
- **Heat transfer (variable speed fan).** 4,800-6,500 CFM
- **Height.** 97”
- **Width.** 43”
- **Length.** 98”

**Unit weight**
- Hot water est. 2,800 lbs.
- Forced Air est. 2,000 lbs.

**Installation Date:** 2008

**Project Cost:** $6,000 / hot water furnace;
$8,000 used - forced air system