KANDIYOHI COUNTY AND CITY OF WILLMAR ECONOMIC DEVELOPMENT COMMISSION (EDC)
AGRICULTURE AND RENEWABLE ENERGY DEVELOPMENT (AG) COMMITTEE

MINUTES

November 16, 2017
Christianson PLLP, Willmar

Present: Rollie Boll, Ian Graue, Kevin Halvorson, Dustin Kotrba, Kim Larson and Dan Tepfer

Excused: Jon Folkedahl, Kevin Konsterlie, Dan Lippert and Keith Poier

Absent: Bruce Reuss

Guest: Fritz Ebinger, J.D., clean Energy Resource Teams

Staff: Connie Schmoll, Business Development Specialist

Chairperson Dan Tepfer called the meeting to order at approximately 7:30 a.m.

AGENDA—The agenda was approved as emailed with one addition of 5c under Reports, PROCESS EXPO.

MINUTES—

> IT WAS MOVED BY Rollie Boll, SECONDED BY Kim Larson, to approve the minutes of the August 17, 2017 meeting as emailed. MOTION CARRIED.
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> IT WAS MOVED BY Rollie Boll, SECONDED BY Dustin Kotrba, to approve the minutes of the September 21, 2017 meeting as emailed. MOTION CARRIED.

PRESENTATION—Fritz Ebinger of Clean Energy Resource Teams (CERTs) was introduced and gave a presentation on Biomass for Poultry (see attached). Ebinger's presentation included information on CERTs and The Viking Project, a wood biomass energy project conducted on a chicken broiler growing farm by Albany, Minnesota. The project used two barns, one as a control barn and one for the project, which has so far, proved effective in fuel savings and cost savings compared to the control barn that uses LP gas. Ebinger also reported on grants available for energy saving projects, including USDA Renewable Energy for America (REAP) grants, Minnesota Livestock Investment Program for lighting and ventilation on livestock farms, and Property Assessed Clean Energy (PACE) loan program that frees up capital for projects and allows payback with property tax payments. Ebinger is a resource for assistance with the REAP grants, which can be a lengthy application process.

REPORTS

West Central Angel Fund I. Connie Schmoll reported that the West Central Angel Fund I has secured two additional members. Deal flow has been abundant. They are currently vetting 9 different companies out of nearly 30 that applied for investment. The Fund has reported it will only consider companies that have some funding in place and still have an investment need of at least $100K.

Ag Marketing Subcommittee. Kotrba reported that the Marketing Subcommittee has met two times since the last full committee meeting. The group has concentrated their efforts on planning an event or events in 2018 in response to the 2017 Ag Producers BRE Survey. Angelica Hopp of Anez Consulting joined in the discussion at yesterday's meeting. Three sessions are being considered, one on workforce, specifically targeting producers to support their workforce needs. A second would focus on technology in crop production with the target audience being both producers for new technology information and the general public to hear more about technology being used in agriculture and how technology can benefit food production. A third event will be geared toward consumer education, inviting discussion about food. Schmoll has been told about a movie that college campuses can secure around this issue. Schmoll will contact Kim Lippert at Ridgewater College and inquire about the Food Evolution movie and possibly collaborating on an event. Committee members also suggested asking Kim Lippert if the Ag Committee could partner with the next Ridgewater Ag Program's Soil Social. The first Soil Social was held in August 2017 and was well attended.

***IMPACT* Publication.** Schmoll reported the publication has been well received with many people commenting on the value of the data and articles. The publication certainly told the story of agriculture and renewable energy in the County and was instrumental in spreading the word about today's production to the non-ag public. The EDC has distributed over 100 copies of the publication, with more than 20 going to Ridgewater College.

Process Expo. Schmoll reported on the food processors expo she attended on September 19-22, 2017, at McCormick Place, Chicago, Illinois. She distributed the Agriculture and Renewable Energy flyer, MinnWest Technology flyer and the Ag Survey Summary to some of the vendors and other participants of the expo. There were over 500 exhibitors who were production equipment manufacturers and related industries. The target audience of the vendors was food processors. Logistics companies that Schmoll visited included Ryan Companies, Food Tech, LFM Corporate Location Solutions and Lawrence Moretti (Site Selector), with whom she discussed the need for dairy processing in Kandiyohi County.

Minnesota vendors she visited included: 1) DCI of St. Cloud, a manufacturer of stainless tanks, dairy equipment and other food processing equipment. They are competitors of and work collaboratively with RELCO; 2) Razors Edge of Ely. They deal in blades and sharpening for any type blade—many used in food processing; and 3) FOSS of Eden Prairie, which deal in analytic solutions for food processors and X-ray technology.

China companies were together in a separate section. They did not display equipment, but featured pamphlets and books showing their processing equipment. Yangzi Machinery, for instance, makes

everything for noodle processing. Equipment for this company includes vacuum dough mixers and mixing tanks, aging machines, rolling equipment, drying ovens, dough sheet folders, noodle forming and cutting machines, starch spreaders, noodle crushers and noodle conveyors. Once the product is complete, there is packaging, labeling, loading and transporting to be done.

Other equipment exhibitors showcased cookie mixing, baking, freezing, i.e., meats (grilling and slicing), mixing and more. There are several companies that have developed new technologies for locating and removing contaminants and foreign objects such as metal from food (analytic laboratory instruments). Schmoll also visited with packing company representatives. One company makes packing inserts that absorb the liquid in meat packages in grocery stores. Schmoll reported she promoted Kandiyohi County and Willmar's Industrial Park for development/expansion to those with whom she visited.

NEW BUSINESS

Ag/Renewable Energy community happenings/projects. Schmoll and Tepfer reported that the West Central CERTS Steering Committee meets tomorrow to review and make recommendations on funding seed grants for energy saving projects.

Tepfer reported on the hydroponic project that is near completion just west of New London on Highway 40. Lettuce Abound will grow salad greens in a clean medium inside a controlled environment using very little square feet of space. Tepfer stated the energy use for lighting in this business will be substantial enough that rebates are being offered to the company by Kandiyohi Power Company.

ADJOURNMENT—There being no further business, the meeting was adjourned at approximately 9:10 a.m.

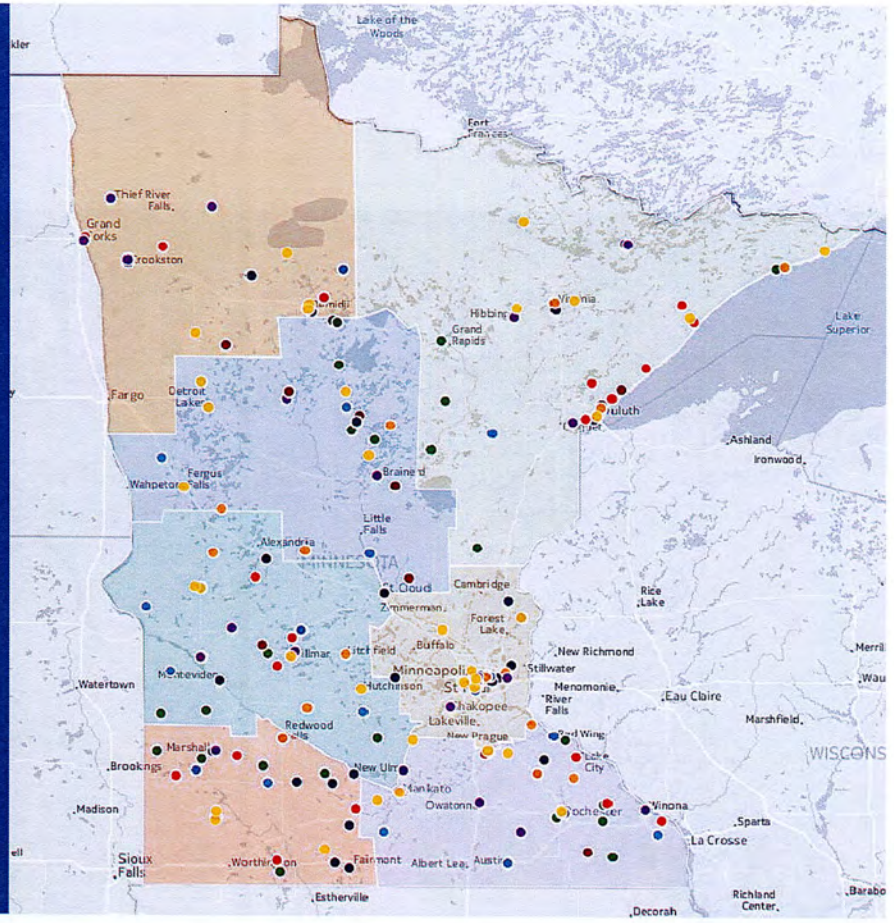
NEXT MEETING—The next regular meeting is **7:30 a.m., Thursday, December 21, 2017**, at Christianson, PLLP, Willmar.

CERTs: Biomass for Poultry

Fritz Ebinger, J.D.
Willmar, Minnesota
November 16, 2017

Road Map

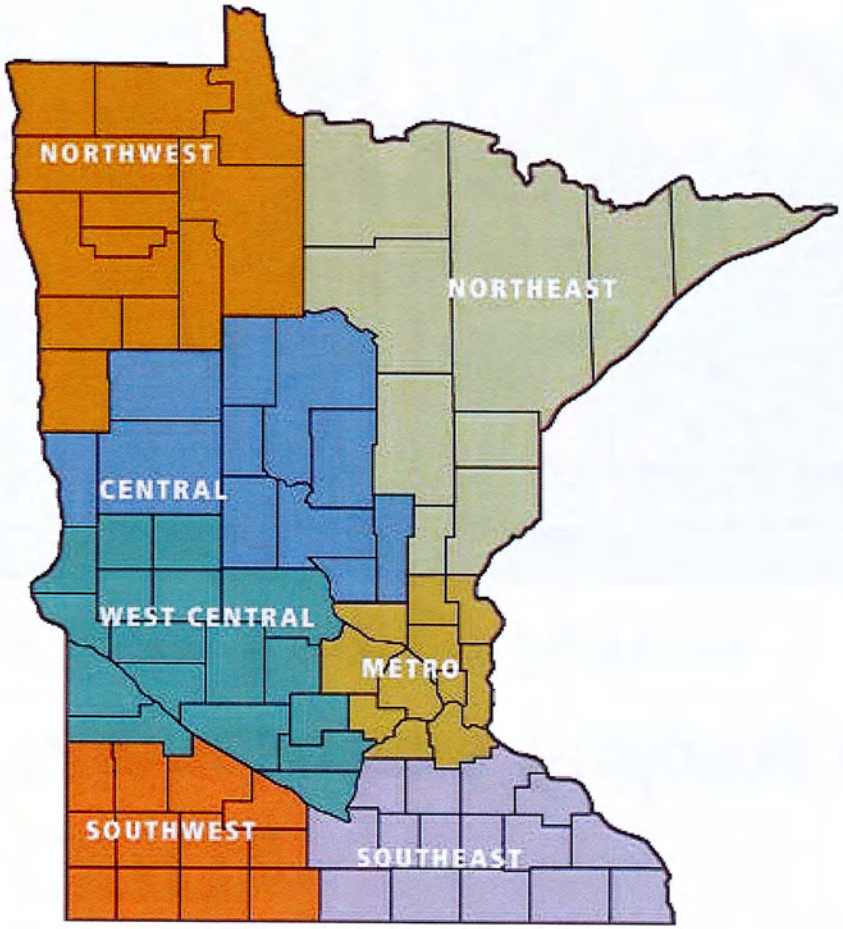
- What is CERTs?
- MN Poultry in General
- Project & Funding
- Data & Economics
- Bird Health



CERTs:
Minnesotans Building a Clean Energy Future

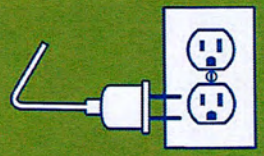
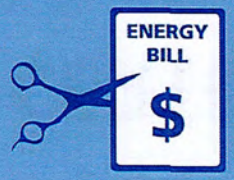
Mission: We connect individuals and their communities to the resources they need to identify and implement community-based clean energy projects

How Does CERTs Work?



- **Staff:** Regional coordinators and statewide support
- **Steering Committees:** One per region; governing body for regional team
- **Regional Teams:** Anyone can join; broad range of skills, interest, and backgrounds

What Does CERTs Do?

LEARN 	Write blog posts & case studies Create educational guides Manage diverse web-based tools
CONNECT 	Host events, tours, and conferences Help with community organizing Connect people to technical resources
ACT 	Provide seed grant funding and more Deliver research-based campaigns Spur other statewide programs

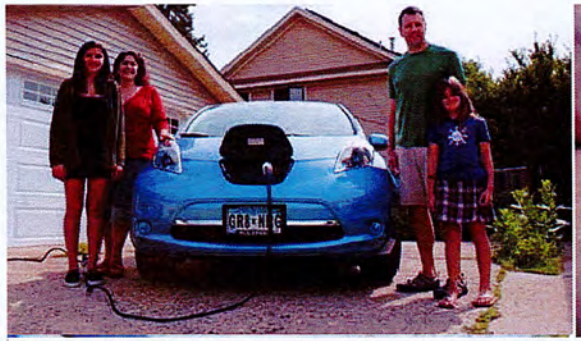
CERTified Campaigns

Provide clear, actionable ways to save energy

- Sharing information about poultry-specific lighting
- Guiding people through funding options soup: USDA RD, NRCS, MDA, CIP, REC…

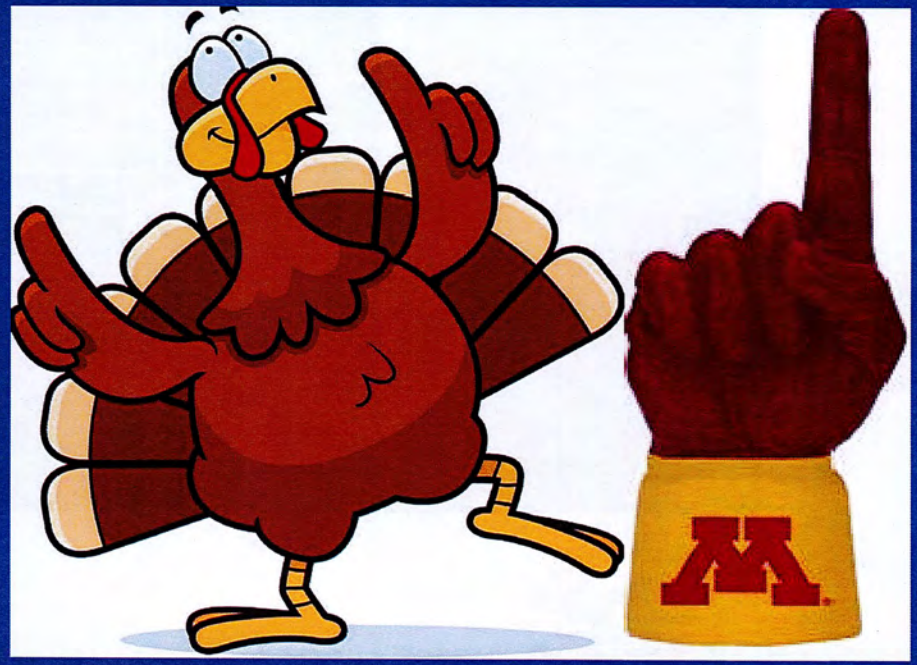
CleanEnergyResourceTeams.org/Turkeys

Renewable Energy



Why biomass for poultry?

- **Minnesota is the #1 turkey producing state.**
  - 46 million yearly
  - 450 farms
- **Big on chickens**
  - 47 million chickens
  - 300 farms
- **Mostly LP heat**



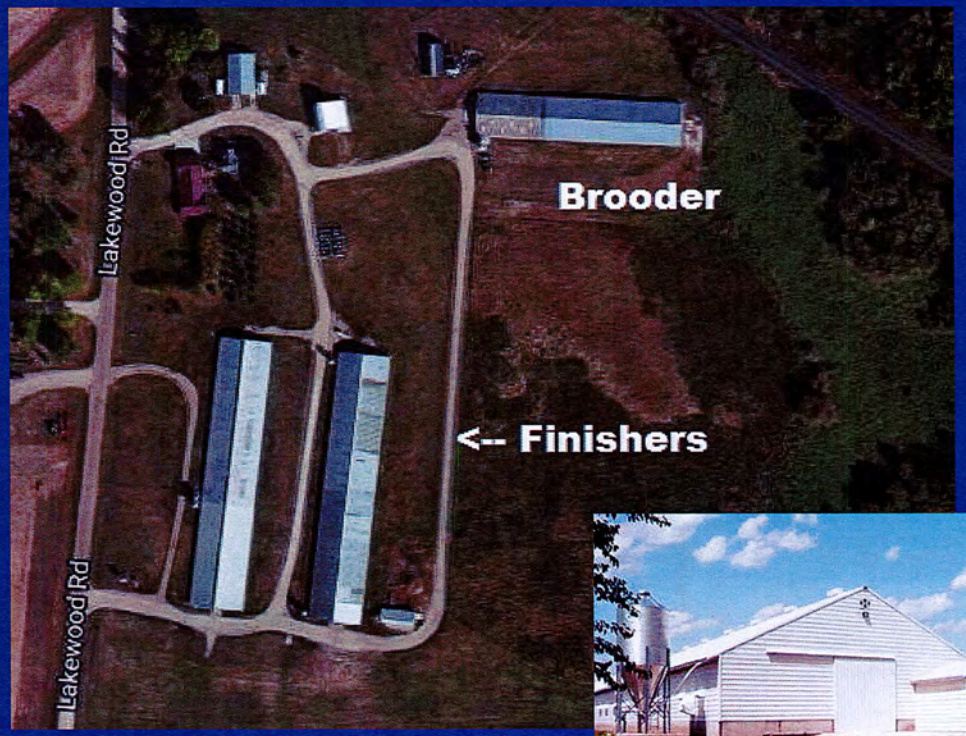
Turkeys like it HOT

Turkey Brooder Barns

- Two days to 4-6 weeks
- Barn temp is 90°F / 32°C
- Lowers by week

Finisher Barns

- Weeks 7 – 18 or 20
- Temp 75°F / 24°C



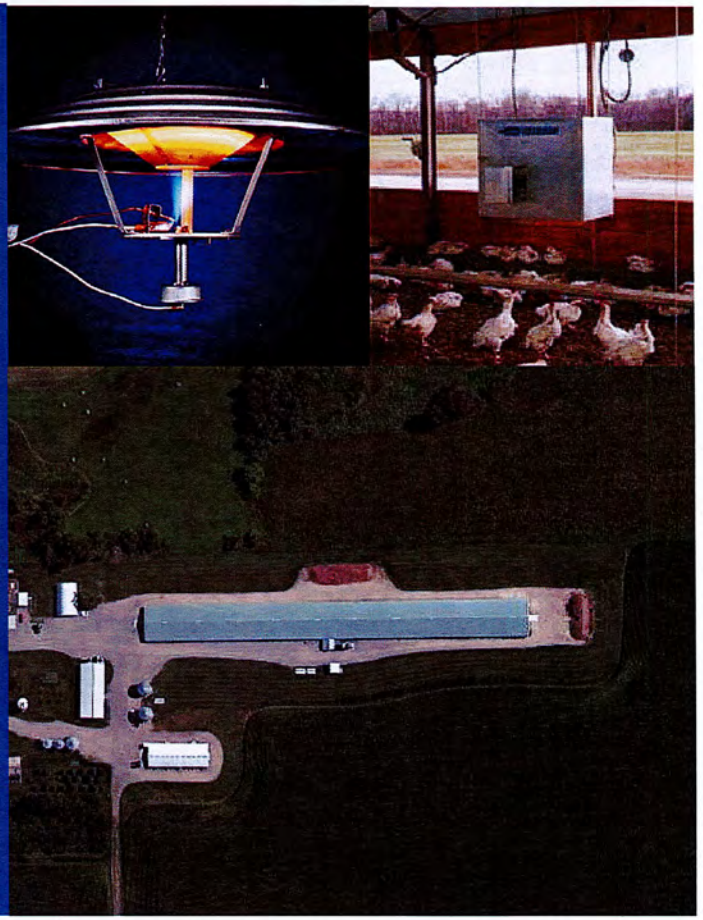
Chickens like it a little HOTTER

Chicken Broiler Barns (day old to 6 weeks)

Barn temp start at 93°F (34°C) and decreases weekly to 72°F (20°C) before load out at 6+ lbs

Poultry & Btus

- Long, skinny barns
- 60-70 ft x 300-400 ft
- 3 MMBtus to heat a barn this size for 1 hour in cold months (avg. 1.5 MMBtu)
- Year with a hard winter can consume over 4,000 MMBtus



Project Originators

Photo Credit: Kimm Anderson, St. Cloud Times

Project History

- Original idea: Put a 1.2 MMBtu wood chip furnace on a turkey brooder barn:
  - Heat *half* with the furnace
  - Heat the other half with LP
- Went through several grant applications before the project landed

Shorter European Barn >>>

Insurance Barrier

- For the original attempt, insurer refused coverage
- Cited NFPC 211 Standard for Chimneys, Fireplaces & Vents and solid fuel problems
  - Ash disposal
  - Sparking
  - Human error

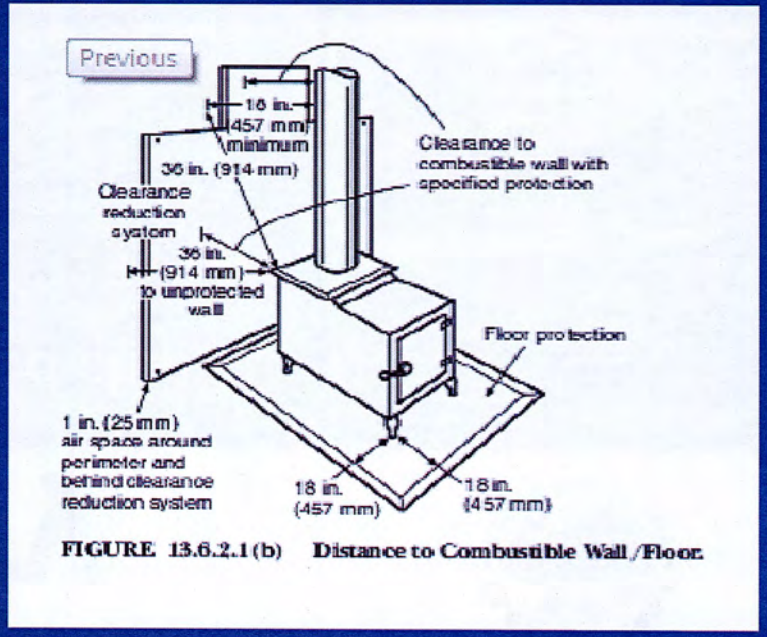
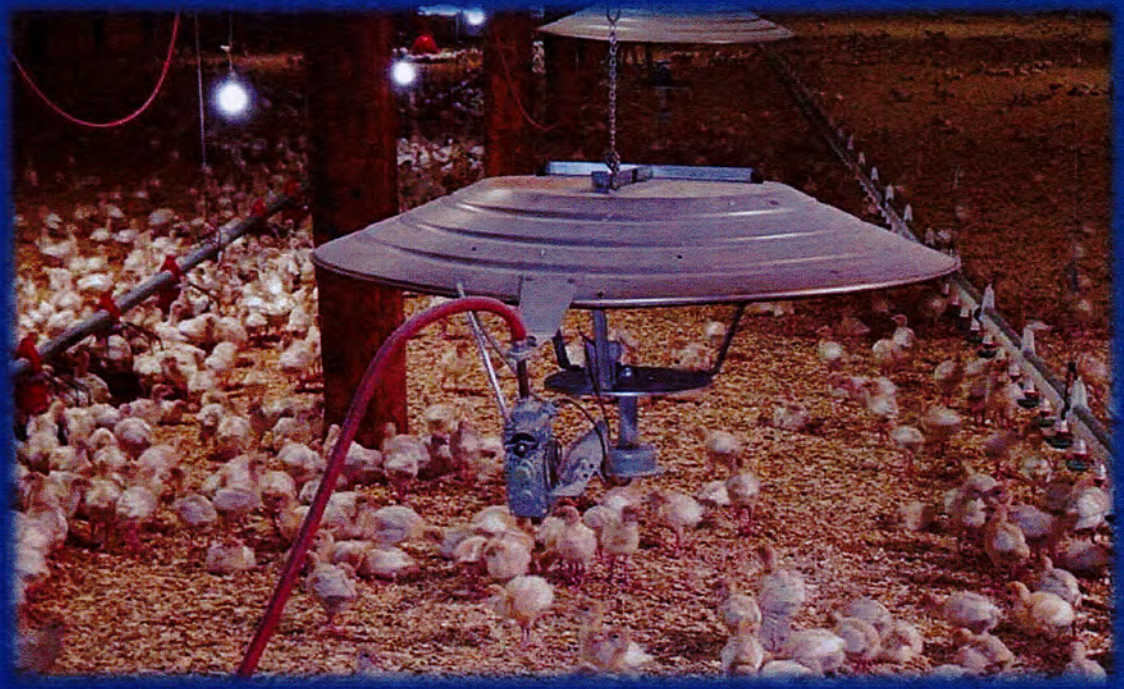


FIGURE 13.6.2.1(b) Distance to Combustible Wall/Floor.

Conventional Poultry Heating

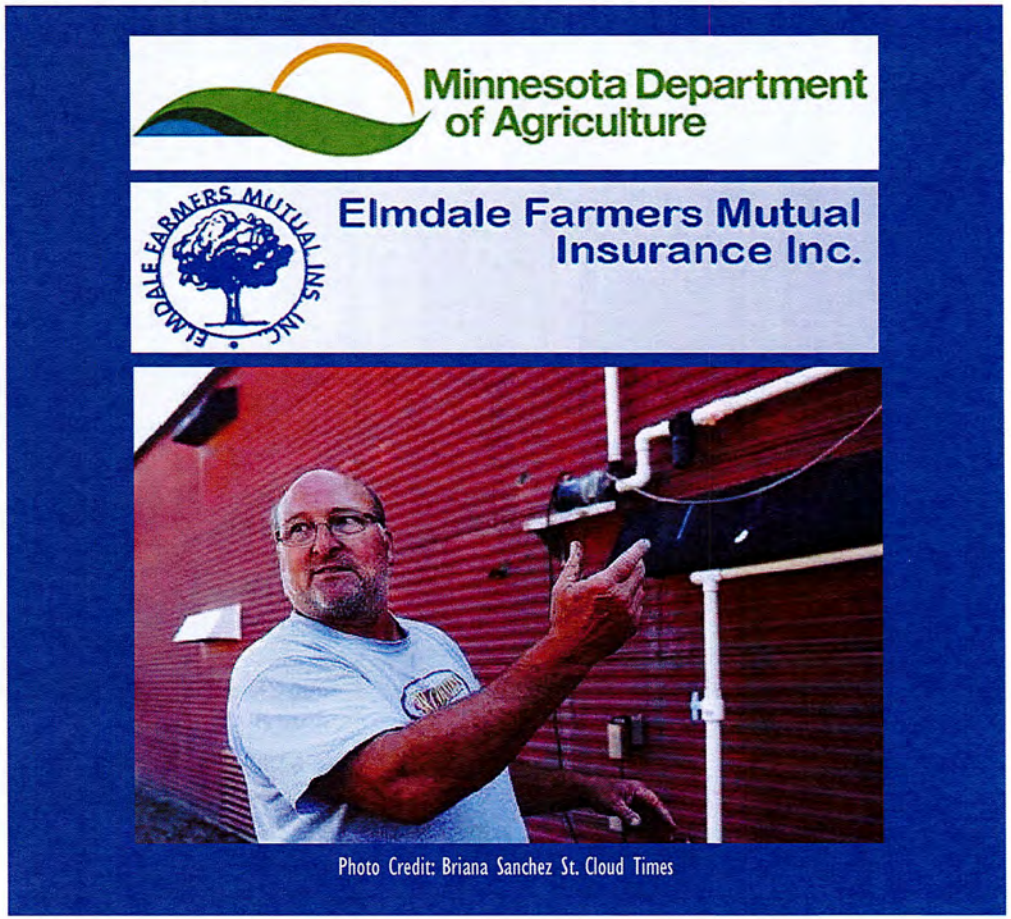
Dozens of open flame heaters over wood chips and feathers



Poultry Heating Reality

The Viking Project

- Funded by MN Dept. of Ag's NextGen Energy Grant (Thank you!)
- Insured by Elmdale Farmers Mutual Insurance
- Hosted by Bill Koenig
- Installed by Jim Eincyk



The Viking Project

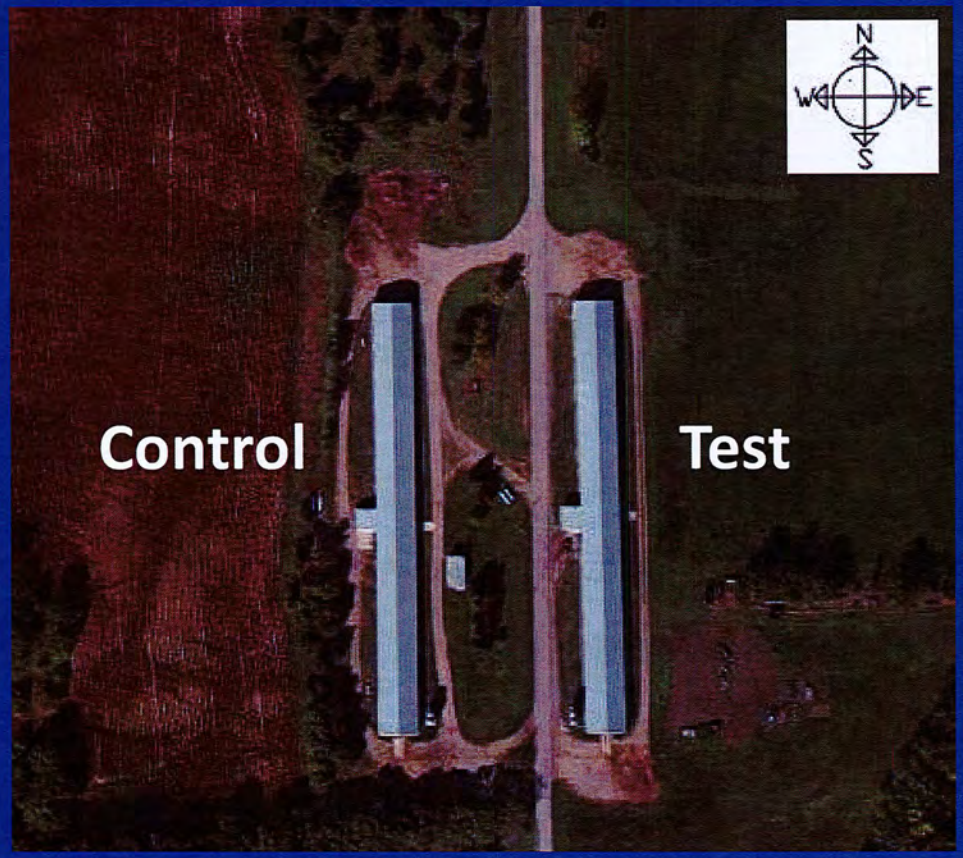
- Mabre made 1.65 mil Btu forced air furnace
- $71,000 for shipping, tech, 15 HP blower, feed augers, stirrers, and XL hopper.
- $23,000 in ducting, chimney, 800' polymax & labor
- $28,400 in barn construction w/ cement pad
- TOTAL $122,400 in hardware, install labor & shipping

The Viking Project

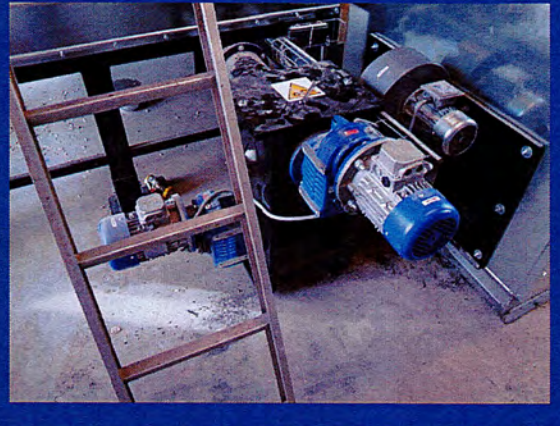
Two-story broiler chicken barn near Albany, MN

The Viking Project

The Viking Project



The Viking Project



Data & Economics

- Twelve flocks across two winters (and years!)
- Hardwoods with moisture content under 15% and *chipped* 2 inches or less
- Fuel blends: furniture byproduct, trim/moulding, dry white oak, recycled construction wood

Wood Chips!

White Oak, 15% M.C. $95 ton

Furniture Material, 8% M.C. $50 ton

Trim/Moulding, 10% M.C. $38 ton

Recyc. Construction, 15% M.C. $70 ton

Contracts & Incentives

- Farmer receives the margin between the farmer's wood costs per flock and the LP cost average of his peers per flock on a square footage basis
- Incentive design: use <u>less</u> or use a ***cost-effective alternative fuel***

Data & Economics

Flock	Dates	Wood Tons	LP Offset	$/gal LP	$/ton wood	Fuel Cost Savings
1	08/25/15 - 10/03/15	9.56	61%	$ 1.29	$ 48.60	$ 244.88
2	10/04/15 -12/08/15	22.29	74%	$ 1.29	$ 76.67	$ 1,283.89
3	12/09/15 - 02/08/16	43.45	68%	$ 1.06	$ 76.67	$ 1,269.10
4	02/09/16 - 04/06/16	33.14	67%	$ 1.00	$ 62.35	$ 269.83
5	04/07/16 - 06/03/16	2	77%	$ 1.01	$ 73.33	$ 1,586.51
6	06/04/16 - 07/29/16	0	0	$ 0.99	$ -	$ (658.35)
7	07/30/16 - 09/27/16	3.9	75%	$ 0.99	$ 81.25	$ (19.88)
8	09/28/16 - 11/29/16	22.56	93%	$ 0.99	$ 59.78	$ 721.58
9	11/30/16 - 01/24/17	47.44	100%	$ 1.00	$ 49.39	$ 2,426.80
10	01/25/17 - 03/22/17	24	82%	$ 1.19	$ 59.00	$ 5,317.00
11	04/03/17 - 05/14/17	22.78	72%	$ 1.24	$ 59.00	$ 2,139.14
12	05/29/17 - 07/20/17	8.6	89%	$ 1.24	$ 59.00	$ 1,476.60

$76.67/wood ton ≅ $0.84 gal/LP

$49.39/wood ton ≅ $0.53 gal/LP

Operability

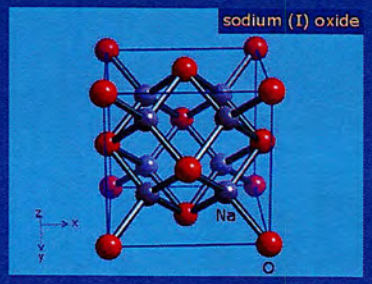
- Labor per Flock
  - 5.6 hours filling hopper (0 with conveyor)
  - 1.0 hr cleaning cabinet and polymax tubes
  - 0.5 hr cleaning out ashes
  - 1.0 hr cleaning heat exchanger

  Total 8.1 hours

One hiccup after 5 flocks: Condensate plaque on the heat exchanger tubes. Turned into hot charcoal bits in the Polymax tubes

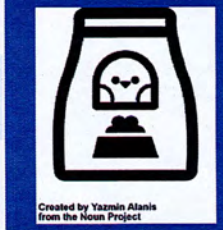
Ash Content

- Burns well – ash had less than 1 Btu/lb left
  - 2.8% phosphorus (P_2O_5)
  - 11.5% potassium oxide (K_2O)
- BUT also high in sodium oxide (Na_2O)
- Salts are not good for soil amendment



2016 Flock Health

2016 Year	Liq. Propane Barn	Wood Heat Barn
Effective Cost	35.49	**35.15**
Average Weight	6.36	6.28
Feed Conversion	1.841	**1.823**
Field Condemns	.61	**.52**
Livability	91.2%	90.93%
Litter	.75	.73
Effective Cost Ranking	124/183	**72/183**
Condemned Ranking	152/205	**107/205**



Winter 16-17 Flock Health

Three flock averages

Average Results	LP Barn	Wood Barn
Feed Conversion	1.813	1.787
Weight	5.699	6.422
Field Condemn Percent (heads)	.266	0.316
Livability	93.069	87.848
Effective Cost	37.26	35.39

Winter 16-17 Flock Health

Three winter '16-'17 flock rankings out of 26 barns

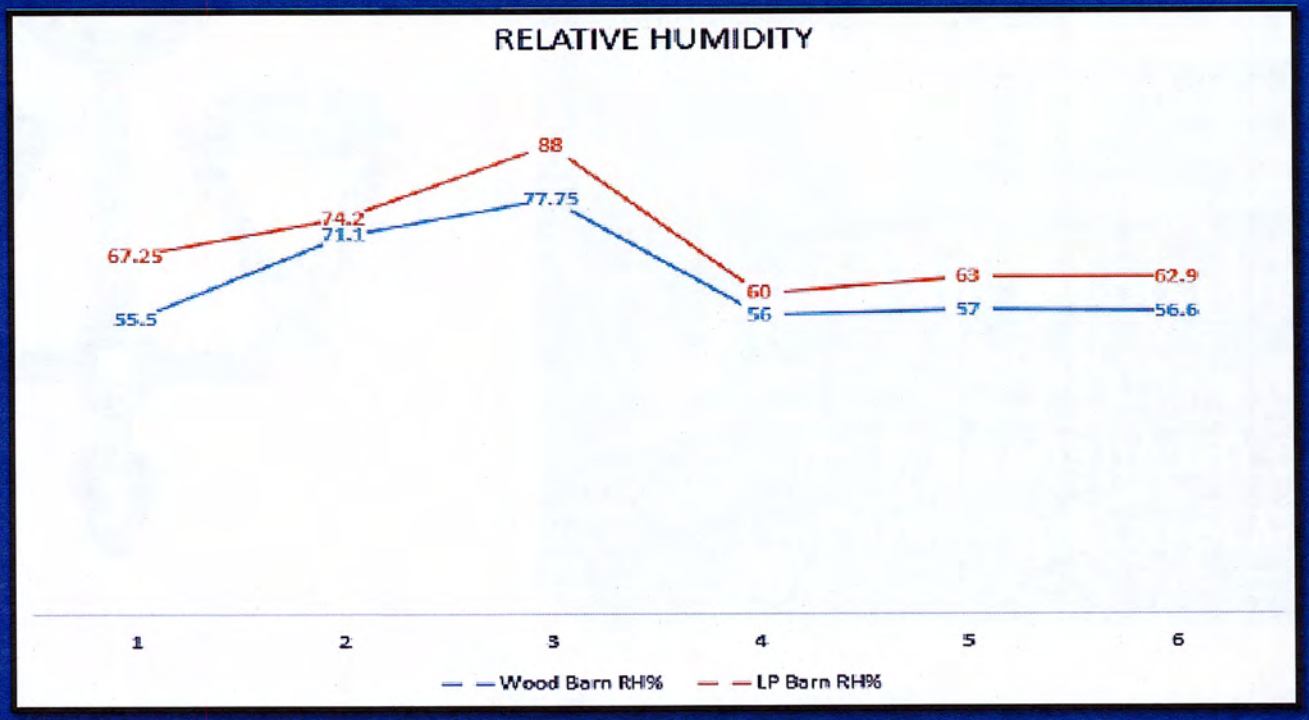
	LP Dec/Jan	Wood Dec/Jan	LP Oct/Nov	Wood Oct/Nov	LP Sep/Oct	Wood Sep/Oct
Feed Conversion	13/26	6/26	6/26	16/26	15/26	16/26
Weight	15/26	1/26	29/26	20/26	5/26	6/26
Field Condemn % (heads)	9/26	10/26	10/26	11/26	23/26	18/26
Livability	3/26	11/26	10/26	8/26	13/26	8/26
Effective Cost	17/26	6/26	12/26	7/26	10/26	5/26

Air Quality

CAVEAT

The air quality data is largely anecdotal. Long-term, scientific analysis is needed for legitimacy

Air Quality – RH%



Air Quality

Created by Arthur Shlain
from Noun Project

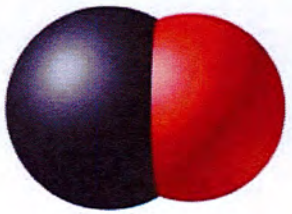
The sole laboratory analysis showed virtually no difference between the Liquid Propane Barn and the Wood Chip Barn

Analysis	Ammonia (NH3) in PPMv	Carbon Monoxide (CO) in %	Oxygen (O2) in %
Control Sample	0.254	0.4	21.0
Propane Barn	0.246	0.4	20.7
Wood Barn	0.272	0.4	20.4

Air Quality – Flock 9

Flock 9 tracked air quality data on a daily basis

Barn	Carbon Monoxide (CO) %	Ammonia (NH_3) in PPMv	Oxygen (O_2) %	Relative Humidity %
Wood	0.19	0.227	22.7	56.6
Liq. Prop.	0.86	0.283	22.3	62.9



What's the Payback?

Effective Cost: the cost to the integrator of growing a pound of meat. Includes livability (don't reach slaughter), pharma, rent…

Fuel savings alone: **16.2 years** (ho-hum)

- $129,955 investment (just fuel, no tax credits or deprec.) divided by $8,029 annual fuel savings

Fuel savings and Effective Cost Savings: **6.3 years**

- $2,095 cost reduction estimate *per flock**** with the annual $8,029 fuel savings
- $129,955 ÷ [($2,095 x 6 flocks) + $8,029 fuel savings]

CERTs:
Minnesotans Building a Clean Energy Future

Learn more: Visit the CERTs website, attend an upcoming event, or connect with a member of our staff.
www.mncerts.org

Contact me:
Fritz Ebinger
Rural Energy Development
612-626-1028
ebing007@umn.edu

Flock Production and Effective Cost

Veterinary analysis of bird health in relation to the barn's heat source was beyond the scope of this project. GNP Companies (now Pilgrim's Pride) was hesitant to make health claims based on this project in light of the many variables that determine flock health (chick genetics, weather stress, pathogen prevalence, etc.). Before a legitimate claim on health benefits from the use of wood heat, there is a need for additional research on the health impacts from the use of different heat sources in relation to barn air quality.

However, GNP Companies provided Viking Company with summaries of the 2016 flock performance, as well as three winter flocks between the Control and Test Barns. The flock performance data provides some insight into the production benefits of using wood heat as a thermal source in contrast to conventionally heated barns. Table 7 summarizes the 2016 data provided by GNP Companies. Table 8 summarizes the three cold month flocks of 2016-2017.

Table 7: 2016 Barn Position and Flock Statistics provided by GNP Companies

2016 Year	Control Barn	Test Barn
Effective Cost per Lb.	$0.3549	$0.3515
Average Weight	6.36 lbs	6.28 lbs
Feed Conversion	1.841	1.823
Field Condemns Percent (heads)	0.61	0.52
Livability	91.2%	90.93%
Litter per Bird	$0.075	$0.073
Effective Cost Ranking	124/183	72/183
Condemned Ranking	152/205	107/205

Table 8: Barn Position and Flock Statistics for Cold Months 2016-2017 Three Flock Averages (9/28/16-11/29/16, 11/30/16-01/24/17, and 1/25/17-3/22/17 Flocks) provided by GNP Companies

'16-'17 Cold Month Averages	Control Barn	Test Barn
Adjusted Feed Conversion	1.813	1.787
Adjusted Weight in Lbs.	5.699	6.422
Total Condemned Percent (weight)	0.088	0.214
Field Condemned Percent (heads)	0.266%	0.316%
Livability Percent	93.069%	87.848%
Fuel Cost (Cents/Bird)	$0.14916	$0.13717
Daily Gain (Lbs.)	0.1325	0.1487
Effective Cost per Lb.	$0.3726	$0.3539

"Effective Cost" is the cost to the integrator of growing a pound of meat. It includes, but is not limited to, feed, fuel, electricity, pharmaceuticals, water treatments, extra materials (i.e. extra litter), livability (birds that die before slaughter), and barn rent among other matters. GNP Companies did not provide the method or all factors by which it calculates effective cost.

Nonetheless, the data provided by GNP Companies in Tables 7 and 8 shows the Test Barn producing chickens at a lower effective cost. Lower fuel costs, heavier bird weight, reduced feed conversion rates

and reduced field condemns support the lower effective cost numbers in the Test Barn, though there is reason to believe other factors are at work. In practice, reducing effective cost saves the integrator money.

By way of example, a $0.0187 effective cost savings demonstrated in the Test Barn for the 2016-2017 cold months multiplied by 240,000 pounds of meat (typical for a flock) by three flocks equals $13,464 in production cost savings for the integrator (alternatively, $4,488 per flock). This is an estimated $6,285 above the calculated fuel cost savings of from Viking Company's use of wood chips for the same three flocks (alternatively, $2,095 additional effective cost savings beyond fuel cost savings). There are strong indicators that wood heat in poultry production provides a dual benefit of reduced fuel cost and increased production for the producer and the integrator. Regardless, a direct study of air quality, its impacts on flock health, and the resulting production benefits from using wood heat is necessary to reach a scientific conclusion.