CERTs: Biomass for Poultry

Fritz Ebinger
Heating the Midwest
April 10, 2017
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 state-wide 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
Minnesota is the #1 turkey producing state.

- 46 million yearly
- 450 farms

Big on chickens

- 47 million chickens
- 300 farms

Mostly LP heat
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 starts 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 >>>>
• For the original project: Insurance broker refused coverage
• Cited NFPC 211 Standard for Chimneys, Fireplaces & Vents and solid fuel problems
  • Ash disposal
  • Sparking
  • Human error
Poultry Heating Reality

20-40 open flame heaters over a bed of wood chips and feathers
ON JANUARY 23, 2016
Fire kills 17,000 Jennie-O poults, nearly destroys barn
Cause of fire has not yet been determined

LIVESTOCK SEE MASSIVE CASUALTIES IN UPPER MIDWEST FARM FIRES
Farmers and safety groups are at odds over how to prevent casualties.
By Maya Rao Star Tribune | DECEMBER 26, 2014 — 6:30AM

SHERIFF: MORE THAN 8,000 TURKEYS LOST IN MEEKER COUNTY BARN FIRE
February 21, 2017 5:25 PM

25,000 chickens perish in southern Minnesota farm fire

MULTIPLE FIRE CREWS BATTLE TURKEY BARN FIRE NEAR HANSKA
12 NOV 16
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
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 tubing & labor
- $28,400 in barn construction
- 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

• Ten flocks across two winters

• Hardwoods with moisture content under 15% and sized 2 inches or less

• Blends of fuel: furniture byproduct, trim/molding, dry white oak
Wood Chips!

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

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

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

Recyc. Construction, 15% M.C. $70 ton
## Data & Economics

<table>
<thead>
<tr>
<th>Flock</th>
<th>Wood Tons</th>
<th>LP Offset</th>
<th>$/gal LP</th>
<th>$/ton wood</th>
<th>Fuel Cost Savings</th>
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</thead>
<tbody>
<tr>
<td>08/25/15 - 10/03/15</td>
<td>9.56</td>
<td>61%</td>
<td>$1.29</td>
<td>$48.60</td>
<td>$244.88</td>
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<tr>
<td>10/04/15 - 12/08/15</td>
<td>22.29</td>
<td>74%</td>
<td>$1.29</td>
<td>$76.67</td>
<td>$1,283.89</td>
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<tr>
<td>12/09/15 - 02/08/16</td>
<td>43.45</td>
<td>68%</td>
<td>$1.06</td>
<td>$76.67</td>
<td>$1,269.10</td>
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<tr>
<td>02/09/16 - 04/06/16</td>
<td>33.14</td>
<td>67%</td>
<td>$1.00</td>
<td>$62.35</td>
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<tr>
<td>04/07/16 - 06/03/16</td>
<td>2</td>
<td>77%</td>
<td>$1.01</td>
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<td>06/04/16 - 07/29/16</td>
<td>0</td>
<td>0</td>
<td>$0.99</td>
<td>-</td>
<td>$ (658.35)</td>
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<tr>
<td>07/30/16 - 09/27/16</td>
<td>3.9</td>
<td>75%</td>
<td>$0.99</td>
<td>$81.25</td>
<td>$ (19.88)</td>
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<tr>
<td>09/28/16 - 11/29/16</td>
<td>22.56</td>
<td>93%</td>
<td>$0.99</td>
<td>$59.78</td>
<td>$721.58</td>
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<tr>
<td>11/30/16 - 01/24/17</td>
<td>47.44</td>
<td>100%</td>
<td>$1.00</td>
<td>$49.39</td>
<td>$2,426.80</td>
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$76.67/wood ton ≈ $0.84 gal/LP

$49.39/wood ton ≈ $0.53 gal/LP
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

<table>
<thead>
<tr>
<th>2016 Year</th>
<th>Liq. Propane Barn</th>
<th>Wood Heat Barn</th>
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<tbody>
<tr>
<td>Effective Cost</td>
<td>35.49</td>
<td>35.15</td>
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<tr>
<td>Average Weight</td>
<td>6.36</td>
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<tr>
<td>Feed Conversion</td>
<td>1.841</td>
<td>1.823</td>
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<tr>
<td>Field Condemns</td>
<td>.61</td>
<td>.52</td>
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<tr>
<td>Livability</td>
<td>91.2%</td>
<td>90.93%</td>
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<tr>
<td>Litter</td>
<td>.75</td>
<td>.73</td>
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<tr>
<td>Effective Cost Ranking</td>
<td>124/183</td>
<td>72/183</td>
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<tr>
<td>Condemned Ranking</td>
<td>152/205</td>
<td>107/205</td>
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</tbody>
</table>
Winter 16-17 Flock Health

Three most recent flock averages

<table>
<thead>
<tr>
<th>Average Results</th>
<th>LP Barn</th>
<th>Wood Barn</th>
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<tbody>
<tr>
<td>Feed Conversion</td>
<td>1.813</td>
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<tr>
<td>Weight</td>
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<td>Field Condemn Percent (heads)</td>
<td>.266</td>
<td>0.316</td>
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<tr>
<td>Livability</td>
<td>93.069</td>
<td>87.848</td>
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<tr>
<td>Effective Cost</td>
<td>37.26</td>
<td>35.39</td>
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</table>
### Winter 16-17 Flock Health

Three most recent flock rankings out of 26 barns

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<tbody>
<tr>
<td>Feed Conversion</td>
<td>13</td>
<td>6</td>
<td>6</td>
<td>16</td>
<td>15</td>
<td>16</td>
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<tr>
<td>Weight</td>
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<td>1</td>
<td>29</td>
<td>20</td>
<td>5</td>
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<tr>
<td>Field Condemn %</td>
<td>9</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>(heads)</td>
<td></td>
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<td></td>
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<tr>
<td>Livability</td>
<td>3</td>
<td>11</td>
<td>10</td>
<td>8</td>
<td>13</td>
<td>8</td>
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<tr>
<td>Effective Cost</td>
<td>17</td>
<td>6</td>
<td>12</td>
<td>7</td>
<td>10</td>
<td>5</td>
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</table>
Happy Birds!
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

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