

Benton's Biomass Burner Report



September 19, 2011

A man with a beard, wearing a red jacket and light blue jeans, stands in a field of tall, dry grass. The background is a soft-focus field of similar grass. The text is overlaid on the right side of the image.

Biomass Boiler

- The biomass boiler was constructed in 2009 at a cost of \$2.1 million; the district received \$700,000 in grant funds toward the project.
- The biomass boiler replaced the district's oil-fired boiler system. Biomass boilers produce thermal energy through renewable fuels.
- The school district chose to fuel the boiler with switchgrass in order to maximize the amount of local involvement in the project.

How does it work?

- The boiler system is relatively simple thanks to computer technology that automates and monitors each step of the process — the briquettes move through a series of belts and augers from the holding pit up the fuel conveyor to the boiler, water is heated through combustion at approximately 1378 degrees F, and then transported to the 2,100 feet of underground pipes by hot water pumps that run to each building. Any left over ash is sent to the ash pit by three inside augers, and the ash is emptied every two to three days.

A man with a beard and short dark hair, wearing a red jacket and light blue jeans, stands in a field of tall, golden-brown grass. The background is a soft-focus field of similar grass. The title 'Switchgrass' is overlaid in the upper right.

Switchgrass

- Switchgrass, a tall, native, warm-season prairie grass can be grown easily in this part of the state with minimal fertilizer and water. The switchgrass is harvested using traditional agricultural equipment, and can yield 3-4 tons per acre. When densified into briquettes, it is four times as dense as ground switchgrass, allowing easier storage and transport.

A man with short dark hair and a beard, wearing a red jacket and light blue jeans, stands in a field of tall, dry grass. The background is a soft-focus field of similar grass. The title 'Briquettes' is overlaid on the top right of the image.

Briquettes

- The briquettes are made on site, using a mobile briquetting unit developed by the company. While they didn't develop the first mobile unit, this is the first one to be used by this company in Central Pennsylvania. Adam Dantscher and his business partner John Bootie are spending 60 days in Benton producing 300 tons of briquettes, enough to last the entire winter. On average, the district uses 3-3.5 tons of switchgrass per day.

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Project Costs

- Richard Angleo: General Contractor
- Contract: \$633,600.00
- Change Orders: \$107,136.95
- TOTAL: \$740,736.95
- 16.9% increase from original contract

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Project Costs

- Rado Enterprises, Inc. Biomass Fired Boiler Contract
- Contract: \$510,000.00
- Change Orders: \$0
- TOTAL: \$510,000.00

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Project Costs

- Rado Enterprises, Inc. HVAC Contract
- Contract: \$651,600.00
- Change Orders: \$20,402.00
- Court Ordered Payment: \$35,000.00
- TOTAL: \$707,002.00
- 8% increase from original contract

A man with a beard and short dark hair, wearing a red jacket and light blue jeans, stands in a field of tall, dry grass. He is looking towards the camera with a neutral expression. The background is a soft-focus field of similar grass.

Project Costs

- Albarell Electric, Inc. Electrical Contract
- Contract: \$157,368.00
- Change Orders: \$10,068.14
- TOTAL: \$167,436.14
- 6.3% increase from original contract

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Project Costs

- Antz Energy System Plumbing Contract
- Contract: \$41,166.00
- Change Orders: \$2,617.88
- TOTAL: \$43,783.88
- 6.4% increase from original contract

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Project Costs

- El Associates Architectural Contract
- Contract: \$98,000.00
- Accrued Expenses: \$98,919.45
- (as per contract)
- TOTAL: \$196,919.45
- 101% increase from original contract


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Project Costs

- Total Contracts: \$2,091,734.00
- Change Orders: \$274,144.42
- **GRAND TOTAL: \$2,365,878.42**
- **13.1% increase from original contracts**

Additional Expenses

- Air Plan approval, operating permits, stack testing: \$25,706.66
 - Legal Fees: \$71,712.26
 - Building Permits/inspections: \$5,820.00
- TOTAL: \$103,239.52**

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- **TOTAL COST:** \$2,469,117.94

- Less costs from additional storage to building not related to biomass boiler and paving:

\$176,129.87

TOTAL COST: \$2,292,988.07

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Funding Sources:

- TOTAL COST: \$2,292,988.07
- LESS: PEDA GRANTS: (\$700,000.00)
- General Obligation Note: (\$900,000.00)

- Total Funds Outstanding: \$692,988.07

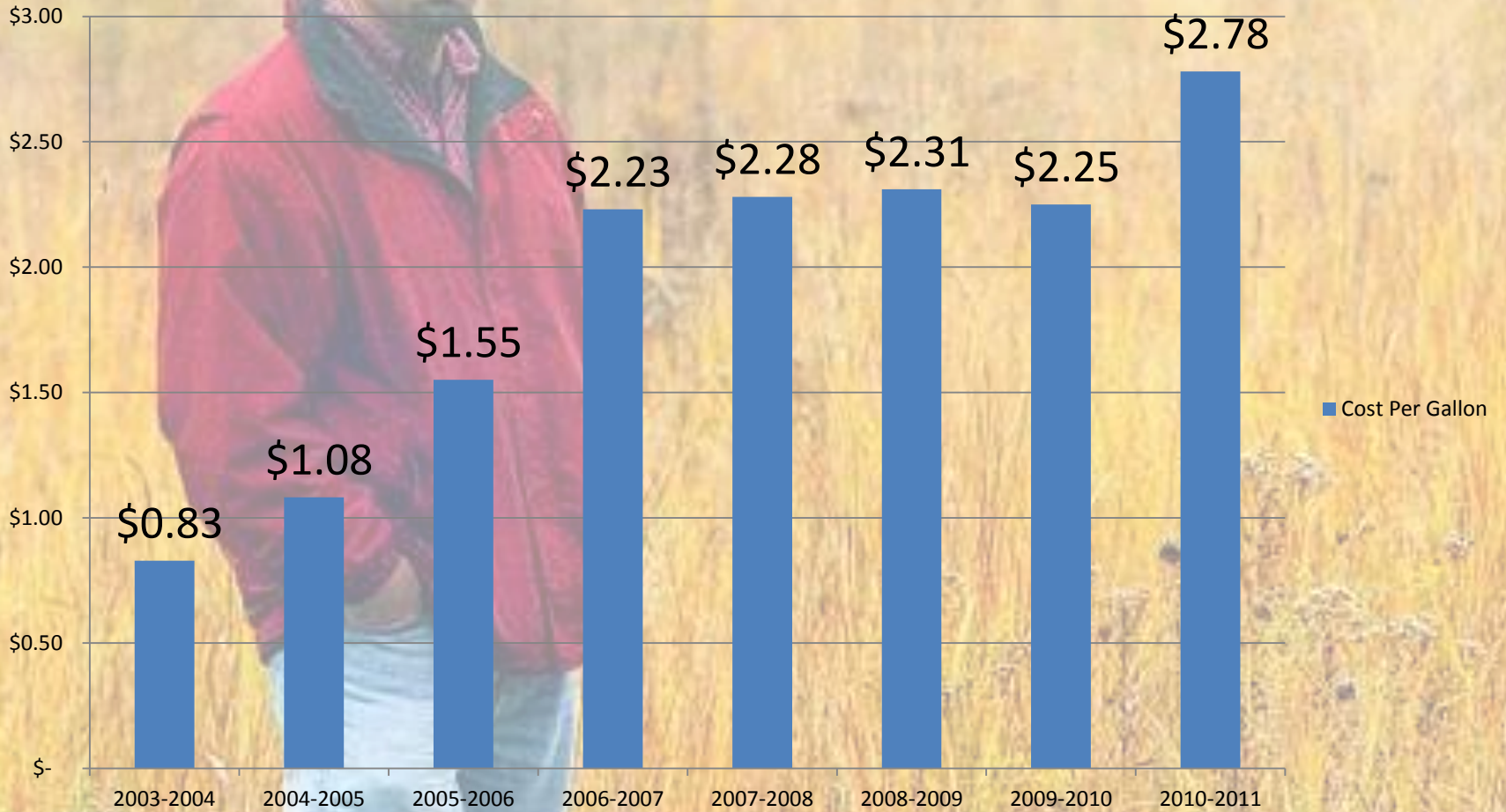
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Solutions

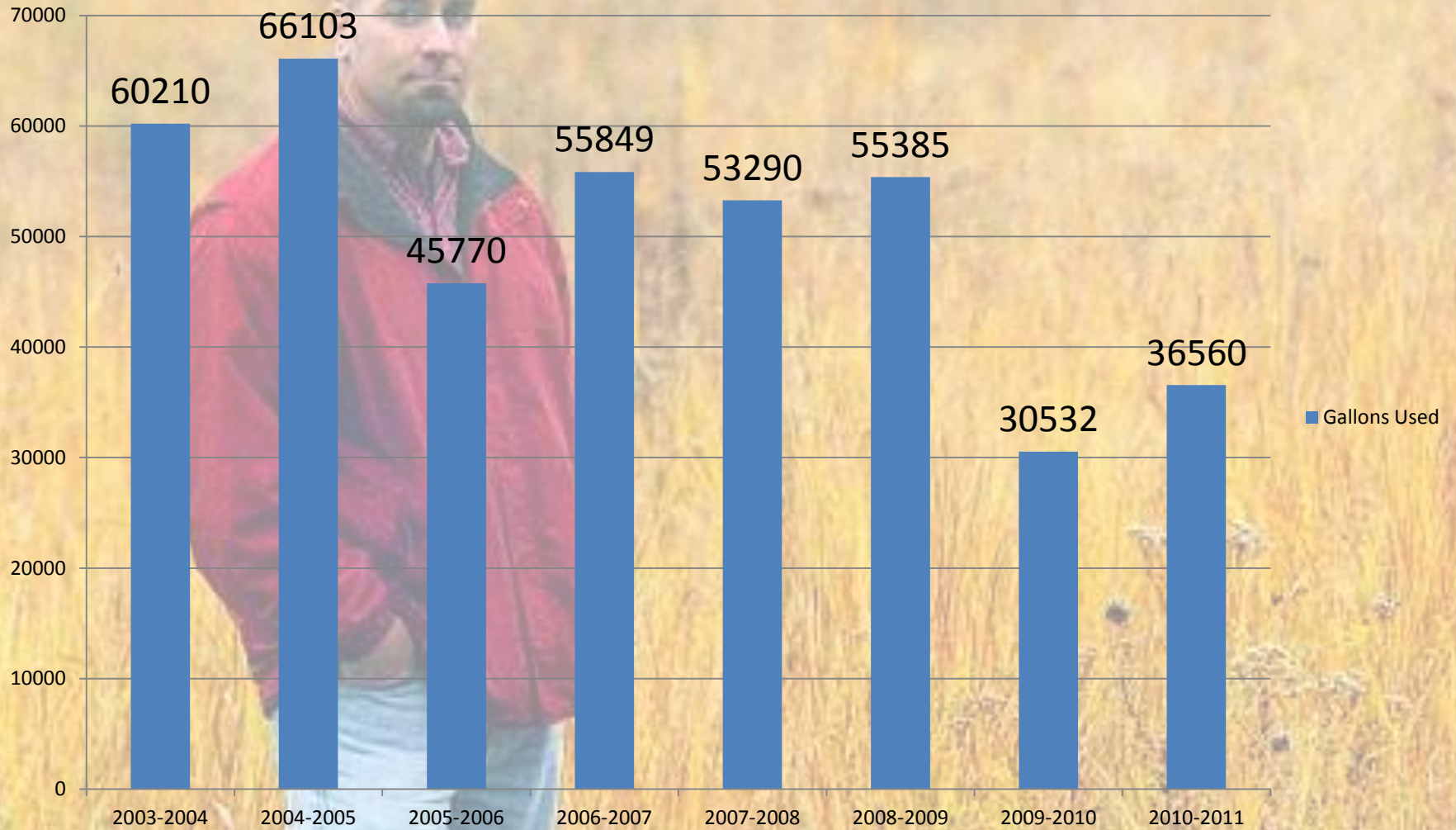
The original plan was to pay the \$692,988.07 from the general fund or to secure a general obligation note to cover the balance.

The board approved a \$800,000.00 general obligation note. This money will be used to cover the biomass balance due and to pay the McClure Company for the energy audit- not related to the biomass plant.

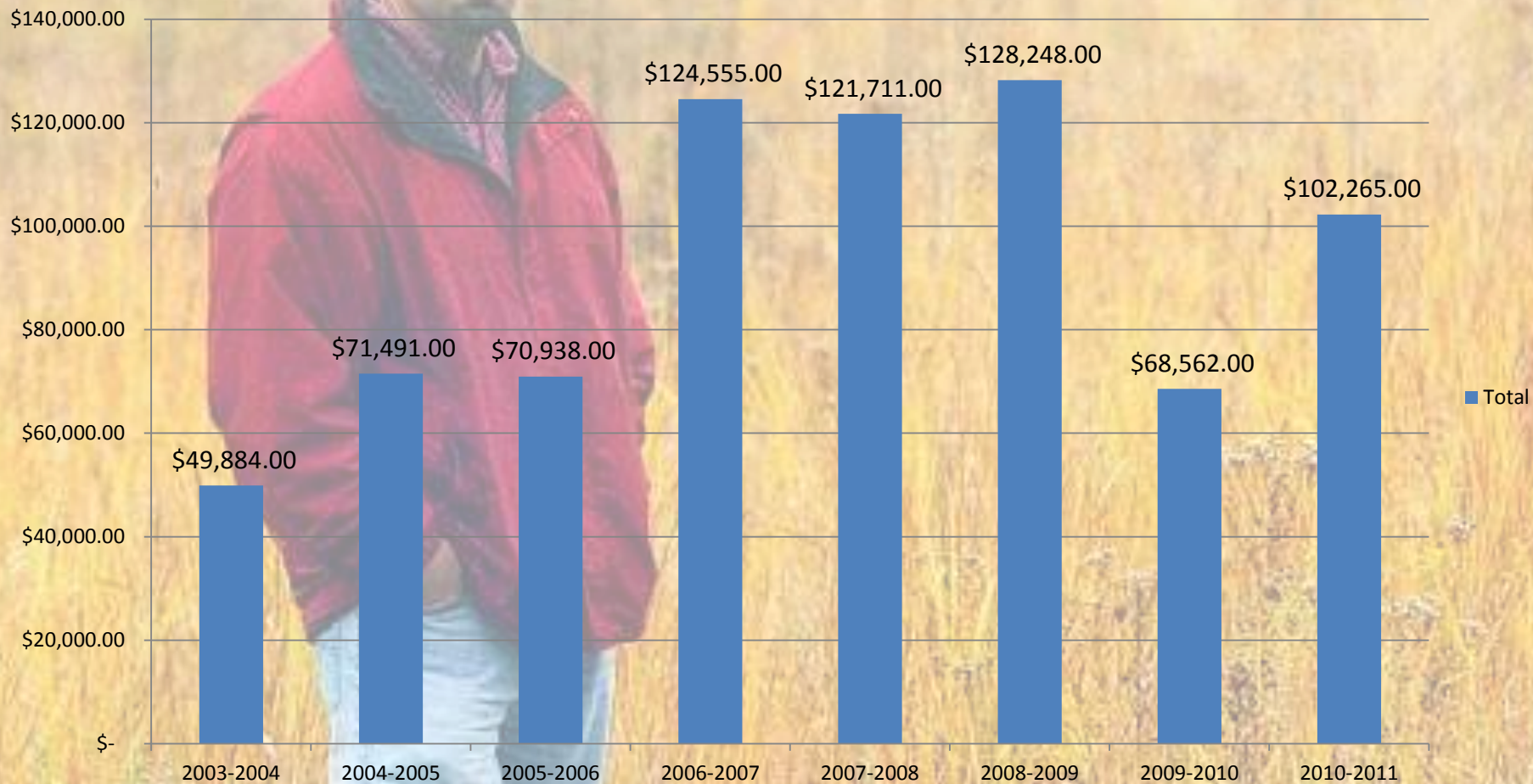
Cost Per Gallon



Gallons Used



Total Cost of Fuel



Switchgrass Purchased

2009-2010

29.2625 tons	\$1490.40
218.060 tons	\$0.00 (Ernst Seed)
RC&D Reimbursement:	-\$1440.00
TOTAL:	
247.3225 tons	\$50.40 cost

Switchgrass Purchased

2010-2011

187.9388 tons

\$10,659.38

99.3700 tons

\$0.00 (Ernst Seed)

RC&D Reimbursement:

-\$13,768.33

TOTAL:


287.3088 tons

(\$3108.95)

Switchgrass Expenses 2009-10

- Storage: \$6,000.00 Fritz Farms



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Switchgrass Expenses 2010-11

- Storage: \$2,000.00
- Densification: \$8,302.46
- **Total: \$10,302.46**

Switchgrass Burned:

2009-2010

247.323 tons

2010-2011

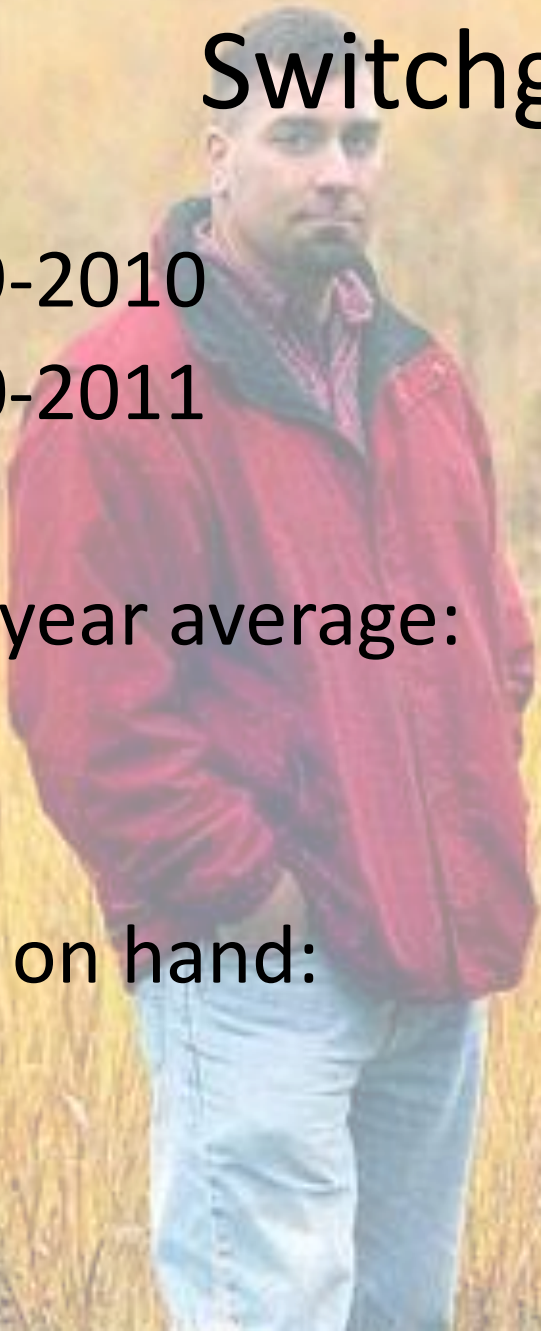
191.6195 tons

Two year average:

219.47125 tons

Tons on hand:

95.6888 tons



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Fuel Savings

Six year average of fuel consumption:

56, 101 gallons

Today's average cost of fuel per gallon:

\$2.51

Today's fuel cost would be: **\$140,813.92**

Using the biomass burner we saved on average:

\$38, 548.92 in fuel

Future of the Biomass

- Looking into burning wood chips
- Researching other fuel sources
- Consulting with McClure Company for additional energy savings for the future