



**Fort Ridgely State Park - Contact Station  
(B40393)**

Energy Auditor:

Date of Assessment:

**Chris Droske, CEM | Energy Advisor**  
Franklin Energy Services, LLC  
2303 Wycliff St., Suite 2E | St. Paul, MN 55114

5/11/2015

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## Executive Summary



The Minnesota Department of Natural Resources requested that Franklin Energy perform an energy assessment to identify energy-related opportunities that show potential for improvement and investment options. This is the first step toward developing a long-term energy plan for **Fort Ridgely State Park**. Chris Droske of Franklin Energy services visited **Fort Ridgely State Park** on May 11th, 2015 and met with **Joanne Svendsen**.

**Fort Ridgely State Park** has already implemented a number of energy saving measures, such as:

- Fluorescent lighting throughout the facility
- Plastic placed on windows to reduce drafts during winter
- Programmable thermostats with aggressive energy saving setback schedule
- Low flow 1.5 gpm faucet aerators

The following energy savings opportunities are the measures you may want to consider first, based on the recent walk-through of your facility. Corresponding savings values can be found in the following Energy Conservation Opportunities table.

- Install a photocell to ensure exterior lights are shutoff during daytime
- Replace exterior HID light with LED light
- Replace T12 and T8 fluorescent troffers with LED troffers

Key strategic opportunities include:

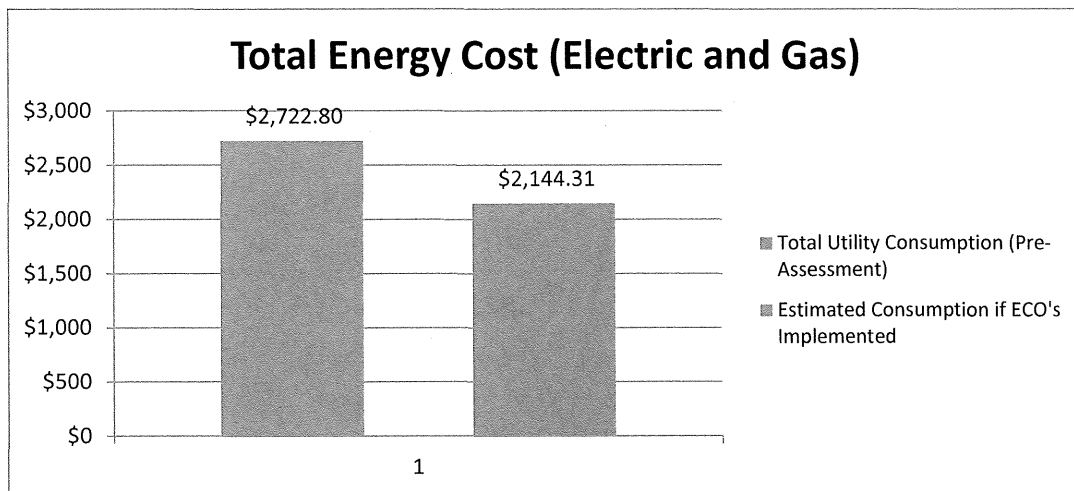
- Airsealing and Insulation
- Upgrade to Energy Star Ice Holding Cabinet

*Additional opportunities to consider can be found later in the report.*

## Building and Energy Profile

### Building Profile

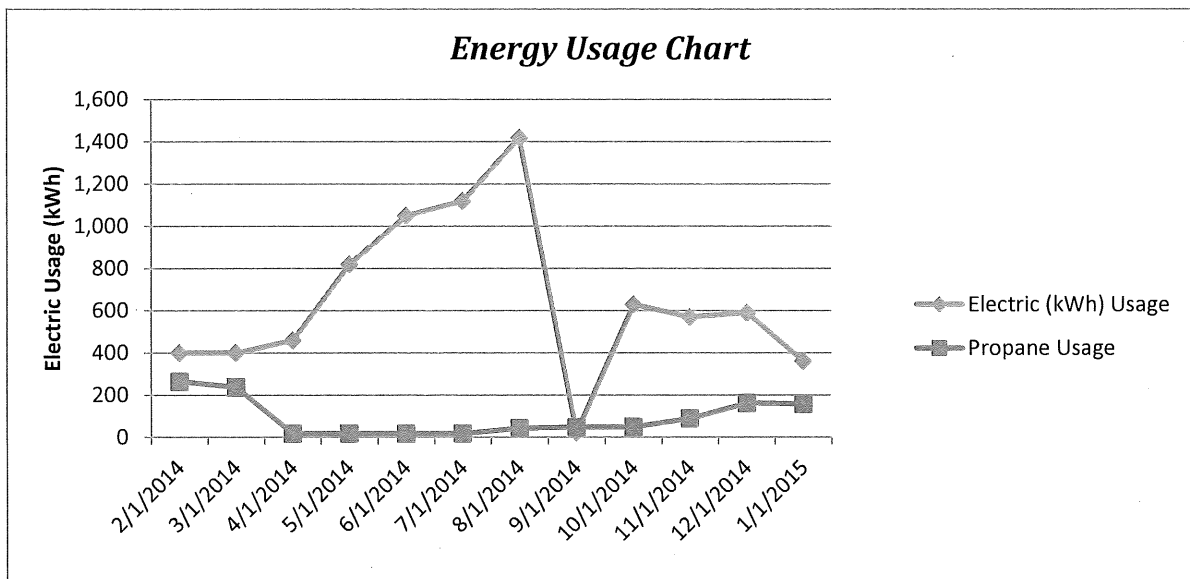
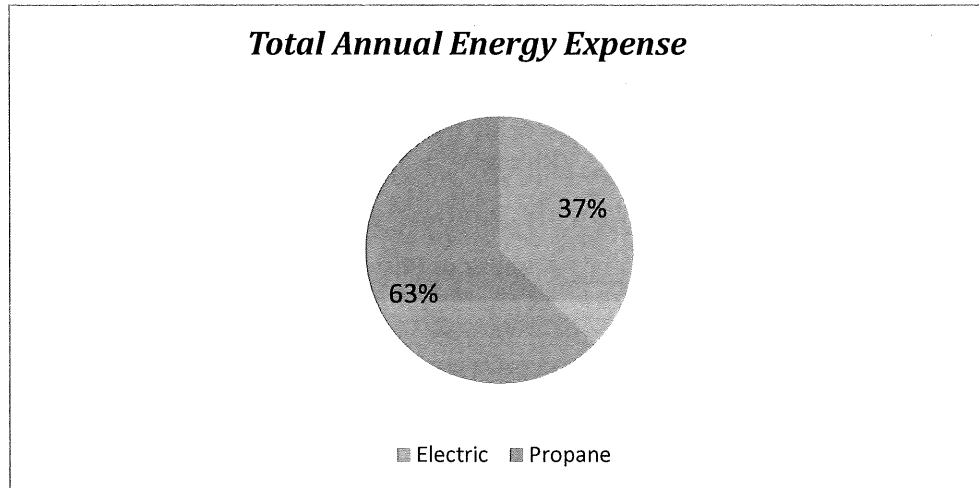
Type of Building:	<u>Office</u>	Year Built:	<u>N/A</u>
Floor Area (s.f.):	<u>672</u>	Weekly Operating Hours:	<u>8-4 M-F</u>
Number of Workers:	<u>3</u>	Number of PCs:	<u>3</u>
Percent of Space Heated:	<u>100</u>	Type of Heating:	<u>Propane</u>
Percent of Space Cooled:	<u>100</u>	Type of Cooling:	<u>Electric A/C</u>



Percent \$ Savings: 21%

## Energy Use Profile

The following chart identifies your electric and propane use.



## Energy Conservation Opportunities

*Please refer to the Conservation Opportunity Analysis section following this table for a detailed description.*

	Energy Conservation Opportunity	Estimated Demand Savings (kW/yr)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$) <sup>1</sup>	Simple Payback (Years) <sup>2</sup>	Estimated Utility Incentives (\$)
<b>Payback less than 2 years (low/no cost opportunities)</b>								
1	Install a photocell to ensure exterior lights are shutoff during daytime	0.0	1,062	0	\$118	\$50	0.4	\$0
2	Replace exterior HID light with LED light	0.0	699	0	\$91	\$175	1.9	\$0
<b>Payback 2 – 10+ years (low/no cost opportunities)</b>								
3	Replace exterior halogen spots with equivalent LEDs	0.2	95	0	\$12	\$40	3.2	\$0
<b>Payback 2 – 10+ years (capital cost opportunities)</b>								
4	Replace T12 and T8 fluorescent troffers with LED troffers	1.1	2,748	0	\$357	\$1,800	5.0	\$0
<b>Total</b>		<b>1.3</b>	<b>4,605</b>	<b>0</b>	<b>\$578</b>	<b>\$2,065</b>	<b>3.6</b>	<b>\$0</b>

<sup>1</sup> Estimated capital cost includes estimated equipment and labor costs unless otherwise noted. Capital Cost is defined as the total equipment and labor cost for the project. Incremental Cost refers to the additional cost associated with the increased capital cost for replacing standard equipment with higher efficiency equipment.

<sup>2</sup> Simple Payback includes incentive unless estimated value is not given.

## ***Energy Conservation Opportunity Analysis***

### **Opportunity 1: Install a photocell to ensure exterior lights are shutoff during daytime**

An exterior wallpack was left on and operating during daytime hours. You may want to consider installing a photocell to only allow this fixture to operate during night-time hours. A photocell is a simply a light sensor that turns a circuit on/off depending on light level. Estimated costs are \$50 for a photocell. A rebate may be available through your local utility.

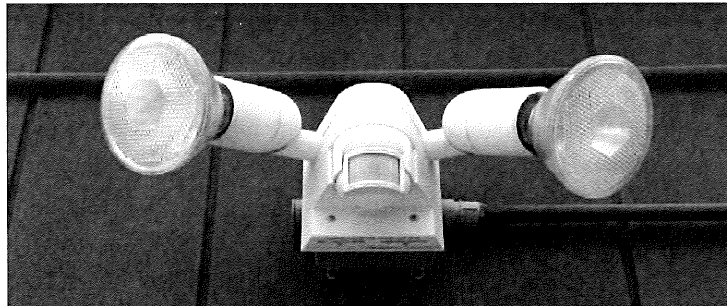


### **Opportunity 2: Replace exterior HID light with LED light**

The exterior wallpacks contain high pressure sodium lamps. You may want to consider replacing these fixtures with LED wallpacks. LED wallpacks use roughly 50% less energy, and last up to 3 times longer without lumen degradation. Rebates may be available from your local utility for this project.

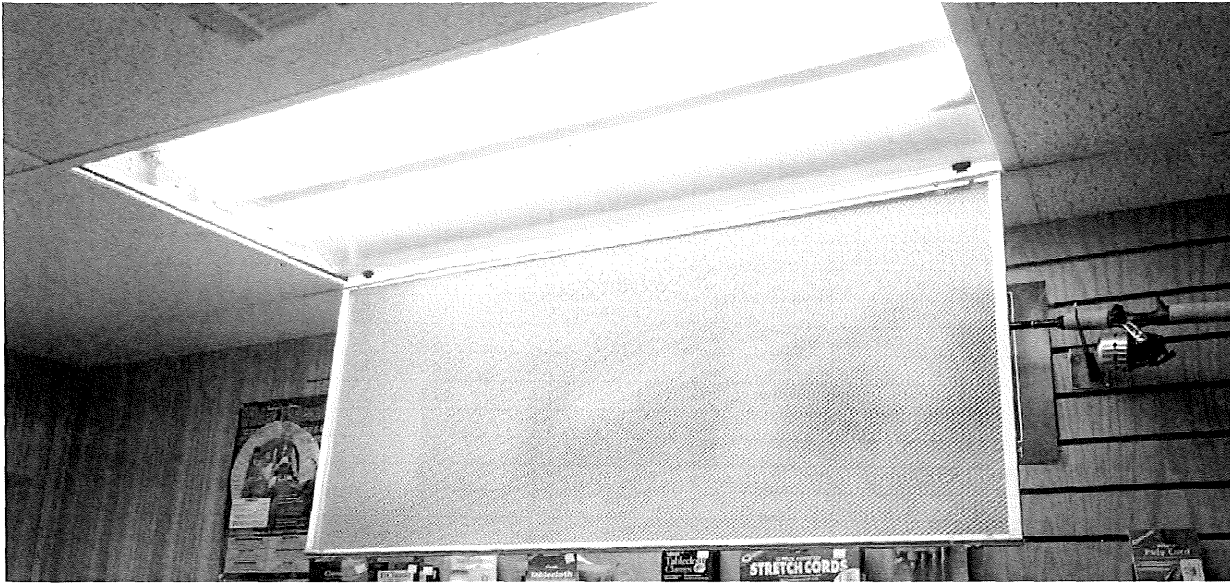
### **Opportunity 3: Replace exterior halogen spots with equivalent LEDs**

The exterior security lights contain (2) halogen lamps. You may want to consider replacing these lamps with LEDs. LED's will last up to 20x longer than your halogen lamps, while using 75% less energy. LED lamps also thrive in cold environments, so their rated life will likely be achieved as this fixture is located outside. Your local utility may incentive this replacement, so please speak to them to find available rebates.



### **Opportunity 4: Replace T12 and T8 fluorescent troffers with LED troffers**

The contact station primarily consists of T12 troffers with a few troffers containing T8 lamps. T12 fluorescent lighting is an outdated technology that has been replaced with T8 fluorescent and LED lighting. Instead of the margin efficiency gains with the retrofit to T8 lamps, you may want to consider replacing all the troffers with LED troffers. LED's offer a better light quality, and last up to 5 longer before needing replacement. Retrofitting troffers costs roughly \$100 per troffer, while a replacement costs roughly \$150. The wattage reduction would be 40-75% per fixture. Incentives may be available through your local utility.



#### **Opportunity 5: Airsealing and Insulation**

The contact station has an estimated insulation value of R5 around the exterior of the foundation with the perimeter completely insulated. Underneath the trailer in the crawl space, poly was found, but it was unsealed. Recommendations are to seal the poly below the crawl space and to improve insulation levels as possible to avoid the continued issue of the septic system freezing during winter.

#### **Opportunity 6: Upgrade to Energy Star Ice Holding Cabinet**

The ice cabinet appears to be over 15 years old, and improvements have been made in refrigeration cycles that can vastly lower the energy cost of this holding cabinet. If the unit is leased, consider speaking to your distributor about upgrading to a new unit. If owned, you may want to consider upgrading to a high-efficiency unit.

#### **Opportunity 7: Perform tune-up on Furnace - A/C System**

The Furnace and Air Conditioning should be tuned up yearly to achieve maximize performance as there are not large efficiency gains to be achieved by upgrading to a new unit of this equipment style.

## Annual Electric Consumption

*Previous 12 months (definition of terms can be found in the glossary)*

**February 2014 - January 2015**

Month	Billing Period (Days)	Actual Demand (kW)	Billed Demand (kW)	Total Energy (kWh)	Total Cost (\$)	Cost/kWh (\$)	Power Factor
Feb-14				400	\$ 57.03	\$ 0.14	
Mar-14				400	\$ 58.41	\$ 0.15	
Apr-14				460	\$ 61.84	\$ 0.13	
May-14				820	\$ 100.07	\$ 0.12	
Jun-14				1,050	\$ 133.88	\$ 0.13	
Jul-14				1,120	\$ 143.69	\$ 0.13	
Aug-14				1,420	\$ 173.40	\$ 0.12	
Sep-14				23	\$ 2.80	\$ 0.12	
Oct-14				630	\$ 82.24	\$ 0.13	
Nov-14				570	\$ 74.08	\$ 0.13	
Dec-14				590	\$ 77.62	\$ 0.13	
Jan-15				360	\$ 54.24	\$ 0.15	
<b>Total</b>	<b>0</b>			<b>7,843</b>	<b>\$ 1,019.30</b>	<b>--</b>	<b>--</b>
Avg.				654	\$ 84.94	--	
Blended Rate						\$ 0.13	

## Annual Gas Consumption

*Previous 12 months (definition of terms can be found in the glossary)*

**February 2014 - January 2015**

Month	Billing Period (Days)	Total Energy	Total Cost (\$)	Cost/Therm(\$)	Degree Days (DD)	Therms/DD
Feb-14		265	\$ 557.00	\$ 2.11		#DIV/0!
Mar-14		236	\$ 394.00	\$ 1.67		#DIV/0!
Apr-14		17	\$ 28.50	\$ 1.68		#DIV/0!
May-14		18	\$ 29.50	\$ 1.65		#DIV/0!
Jun-14		17	\$ 28.50	\$ 1.68		#DIV/0!
Jul-14		18	\$ 29.50	\$ 1.64		#DIV/0!
Aug-14		43	\$ 60.60	\$ 1.41		#DIV/0!
Sep-14		48	\$ 65.90	\$ 1.38		#DIV/0!
Oct-14		49	\$ 68.10	\$ 1.38		#DIV/0!
Nov-14		88	\$ 99.90	\$ 1.14		#DIV/0!
Dec-14		163	\$ 164.00	\$ 1.01		#DIV/0!
Jan-15		157	\$ 178.00	\$ 1.14		#DIV/0!
<b>Total</b>	<b>0</b>	<b>1,118</b>	<b>\$ 1,703.50</b>	<b>--</b>		<b>--</b>
Avg.		93.18		--	--	
Blended Rate				\$ 1.52		





**Minnesota**

**Department of Natural Resources**



## Fort Ridgely State Park - Chalet (B40080)

Energy Auditor:

Date of Assessment:

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## Executive Summary



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**Fort Ridgely State Park** has already implemented a number of energy saving measures, such as:

- Fluorescent lighting throughout the facility
- Woodfire heat with propane backup
- New refrigerator
- Estimated R-20 attic insulation

The following energy savings opportunities are the measures you may want to consider first, based on the recent walk-through of your facility. Corresponding savings values can be found in the following Energy Conservation Opportunities table.

- Add insulation from R-20 to R-50
- Clean and Tune Furnace
- Replace T12 fluorescent lighting with LED lighting

Key strategic opportunities include:

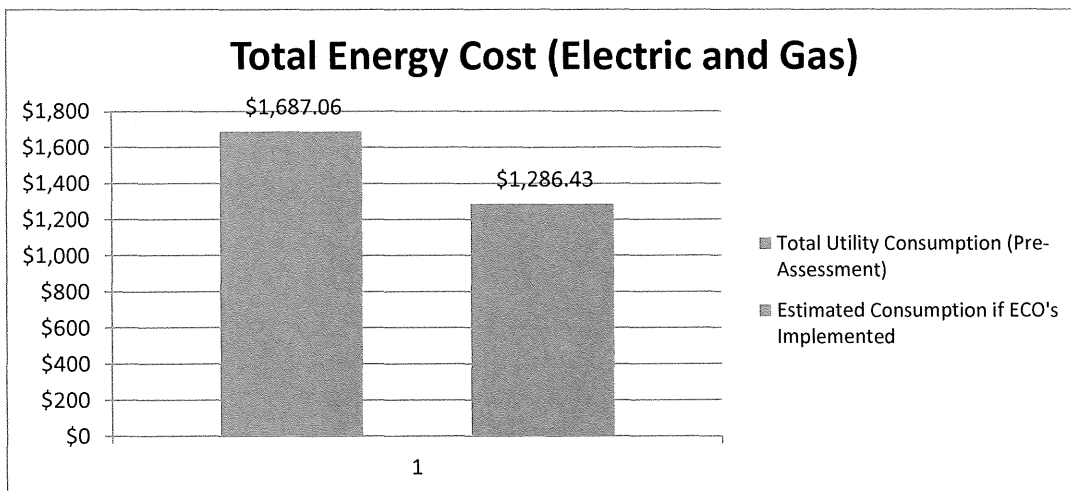
- Adjust filter slot so filter fits snug

*Additional opportunities to consider can be found later in the report.*

## Building and Energy Profile

### Building Profile

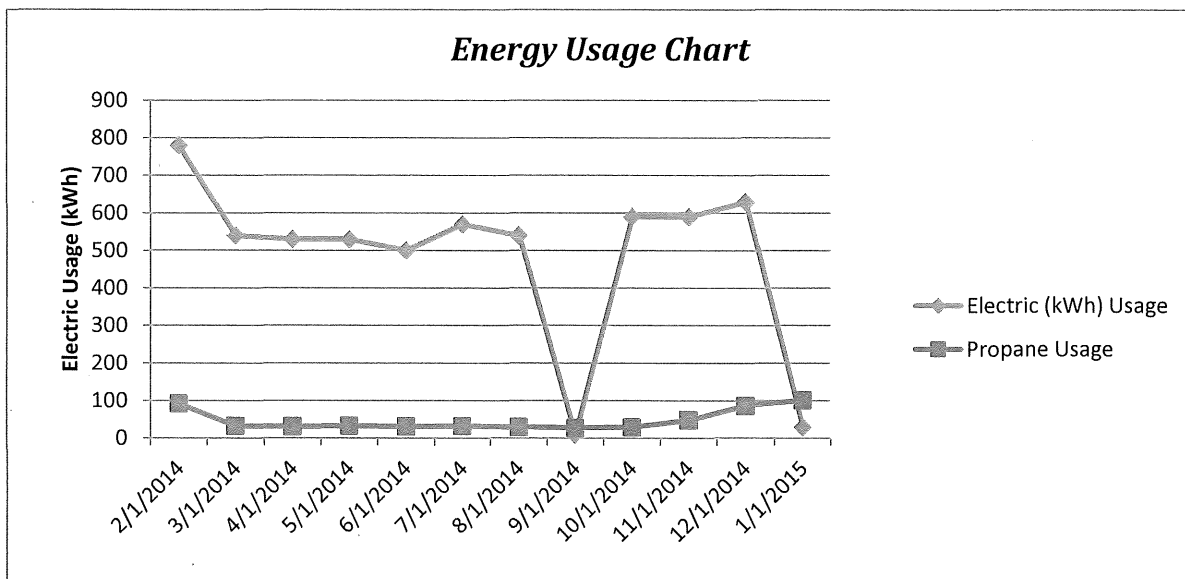
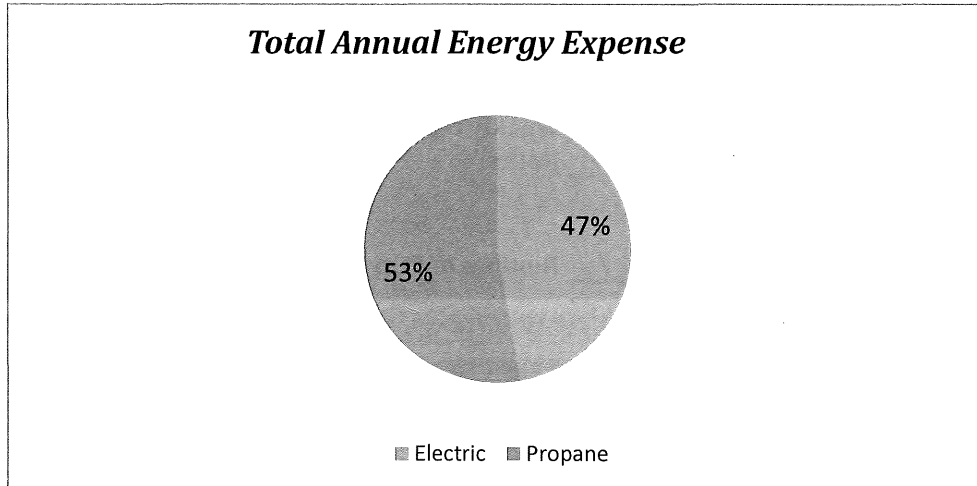
Type of Building:	<u>Chalet</u>	Year Built:	<u>N/A</u>
Floor Area (s.f.):	<u>2,500</u>	Weekly Operating Hours:	<u>As Rented</u>
Number of Workers:	<u>0</u>	Number of PCs:	<u>0</u>
Percent of Space Heated:	<u>100</u>	Type of Heating:	<u>Propane</u>
Percent of Space Cooled:	<u>0</u>	Type of Cooling:	<u>N/A</u>



Percent \$ Savings: 24%

## Energy Use Profile

The following chart identifies your electric and propane use.



## Energy Conservation Opportunities

*Please refer to the Conservation Opportunity Analysis section following this table for a detailed description.*

	Energy Conservation Opportunity	Estimated Demand Savings (kW/yr)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$) <sup>1</sup>	Simple Payback (Years) <sup>2</sup>	Estimated Utility Incentives (\$)
<b>Payback less than 2 years (low/no cost opportunities)</b>								
1	Perform tune-up on furnace	0.0	0	22	\$34	\$50	1.5	\$0
<b>Payback 2 – 10+ years (low/no cost opportunities)</b>								
2	Replace exterior HID lights with LED lights	0.0	399	0	\$54	\$400	7.3	\$0
3	Replace T12 fluorescent lighting with LED lighting	0.4	823	0	\$112	\$900	8.0	\$0
<b>Payback 2 – 10+ years (capital cost opportunities)</b>								
4	Increase insulation in the attic	0.0	0	129	\$200	\$1,200	6.0	\$0
<b>Total</b>		<b>0.4</b>	<b>1,222</b>	<b>151</b>	<b>\$401</b>	<b>\$2,550</b>	<b>6.4</b>	<b>\$0</b>

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<sup>2</sup> Simple Payback includes incentive unless estimated value is not given.

## ***Energy Conservation Opportunity Analysis***

### **Opportunity 1: Perform tune-up on furnace**

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Consider performing a tune-up on your furnace to optimize performance and ensure safe operation of the equipment. By tuning up your furnace, you can see performance gains as great as 5%, and it gives you an easy way to detect future problems. Estimated savings were based upon a tune-up being performed every other year.



### **Opportunity 2: Replace exterior HID lights with LED lights**

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The exterior wallpacks contain high pressure sodium lamps. You may want to consider replacing these fixtures with LED wallpacks. LED wallpacks use roughly 50% less energy, and last up to 3 times longer without lumen degradation. Rebates may be available from your local utility for this project.



### **Opportunity 3: Replace T12 fluorescent lighting with LED lighting**

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The shop consists of T12 fluorescent fixtures. T12 fluorescent lighting is an outdated technology that has been replaced with T8 fluorescent and LED lighting. Instead of the marginal efficiency gains with the retrofit to T8 lamps, you may want to consider replacing all the troffers with LED troffers. LED's offer a better light quality, and last up to 5 longer before needing replacement. Retrofitting troffers costs roughly \$100 per troffer, while a replacement costs roughly \$150. The wattage reduction would be 40-75% per fixture. Incentives may be available through your local utility.



#### **Opportunity 4: Increase insulation in the attic**

The insulation in the attic appears to be about 6-7" and consists of fiberglass batting. The estimated insulation value is R-20. This measure identifies the energy savings that could be realized if additional insulation was added to reach the recommended value of R-49. While there is an upfront cost, the relative ease of adding insulation makes this a worthwhile endeavor.



#### **Opportunity 5: Adjust filter slot so filter fits snug**

The filter is not fitting snug in the filter slot. Make some adjustments to maximize filtration performance.

## Annual Electric Consumption

*Previous 12 months (definition of terms can be found in the glossary)*

### February 2014 - January 2015

Month	Billing Period (Days)	Actual Demand (kW)	Billed Demand (kW)	Total Energy (kWh)	Total Cost (\$)	Cost/kWh (\$)	Power Factor
Feb-14				780	\$ 94.10	\$ 0.12	
Mar-14				540	\$ 72.55	\$ 0.13	
Apr-14				530	\$ 68.52	\$ 0.13	
May-14				530	\$ 71.05	\$ 0.13	
Jun-14				500	\$ 73.25	\$ 0.15	
Jul-14				570	\$ 82.15	\$ 0.14	
Aug-14				540	\$ 77.57	\$ 0.14	
Sep-14				9	\$ 1.25	\$ 0.14	
Oct-14				590	\$ 78.16	\$ 0.13	
Nov-14				590	\$ 76.05	\$ 0.13	
Dec-14				630	\$ 81.66	\$ 0.13	
Jan-15				30	\$ 21.02	\$ 0.70	
<b>Total</b>	<b>0</b>			<b>5,839</b>	<b>\$ 797.33</b>	<b>--</b>	<b>--</b>
<b>Avg.</b>				<b>487</b>	<b>\$ 66.44</b>	<b>--</b>	
<b>Blended Rate</b>						<b>\$ 0.14</b>	

## Annual Gas Consumption

*Previous 12 months (definition of terms can be found in the glossary)*

### February 2014 - January 2015

Month	Gallons of Propane	Total Energy	Total Cost (\$)	Cost/Therm(\$)	Degree Days (DD)	Therms/DD
Feb-14	96.7	92	\$ 249.00	\$ 2.70		#DIV/0!
Mar-14	34.07	33	\$ 53.33	\$ 1.64		#DIV/0!
Apr-14	32.97	31	\$ 51.61	\$ 1.64		#DIV/0!
May-14	34.07	33	\$ 53.33	\$ 1.64		#DIV/0!
Jun-14	32.97	31	\$ 51.61	\$ 1.64		#DIV/0!
Jul-14	34.07	33	\$ 53.33	\$ 1.64		#DIV/0!
Aug-14	30.71	29	\$ 42.11	\$ 1.44		#DIV/0!
Sep-14	28.94	28	\$ 38.15	\$ 1.38		#DIV/0!
Oct-14	29.91	29	\$ 39.42	\$ 1.38		#DIV/0!
Nov-14	50.68	48	\$ 55.11	\$ 1.14		#DIV/0!
Dec-14	91.15	87	\$ 87.24	\$ 1.00		#DIV/0!
Jan-15	105.82	101	\$ 115.49	\$ 1.14		#DIV/0!
<b>Total</b>	<b>602.06</b>	<b>575</b>	<b>\$ 889.73</b>	<b>--</b>		<b>--</b>
<b>Avg.</b>	<b>50.17</b>	<b>47.91</b>		<b>--</b>	<b>--</b>	
<b>Blended Rate</b>				<b>\$ 1.55</b>		





**Fort Ridgely State Park - Horse Camp Lodge  
(B40447)**

Energy Auditor:

Date of Assessment:

**Chris Droske, CEM | Energy Advisor**  
Franklin Energy Services, LLC  
2303 Wycliff St., Suite 2E | St. Paul, MN 55114

5/11/2015

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## Executive Summary



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**Fort Ridgely State Park** has already implemented a number of energy saving measures, such as:

- Fluorescent lighting throughout the facility
- Building is not heated or cooled
- Newer appliances

The following energy savings opportunities are the measures you may want to consider first, based on the recent walk-through of your facility. Corresponding savings values can be found in the following Energy Conservation Opportunities table.

- Replace incandescent lamps with equivalent LEDs
- Install occupancy sensors on interior lights
- Replace T12 and T8 fluorescent lighting with LED lighting

*Additional opportunities to consider can be found later in the report.*

## Energy Conservation Opportunities

*Please refer to the Conservation Opportunity Analysis section following this table for a detailed description.*

	Energy Conservation Opportunity	Estimated Demand Savings (kW/yr)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$) <sup>1</sup>	Simple Payback (Years) <sup>2</sup>	Estimated Utility Incentives (\$)
<b>Payback less than 2 years (low/no cost opportunities)</b>								
1	Replace incandescent lamps with equivalent LEDs	0.3	703	0	\$96	\$105	1.1	\$0
<b>Payback 2 - 10+ years (low/no cost opportunities)</b>								
2	Install occupancy sensors on interior lights	0.6	528	0	\$72	\$200	2.8	\$0
3	Replace T12 and T8 fluorescent lighting with LED lighting	0.4	650	0	\$89	\$600	6.8	\$0
<b>Total</b>		1.2	1,880	0	\$257	\$905	3.5	\$0

<sup>1</sup> Estimated capital cost includes estimated equipment and labor costs unless otherwise noted. Capital Cost is defined as the total equipment and labor cost for the project. Incremental Cost refers to the additional cost associated with the increased capital cost for replacing standard equipment with higher efficiency equipment.

<sup>2</sup> Simple Payback includes incentive unless estimated value is not given.

## ***Energy Conservation Opportunity Analysis***

### **Opportunity 1: Replace incandescent lamps with equivalent LEDs**

The interior lights contain 60 and 65W incandescent lamps. You may want to consider replacing these lamps with LEDs. LED's will last up to 20x longer than your halogen lamp, while using 75% less energy. LED lamps also thrive in cold environments, so their rated life will likely be achieved as one of these bulbs would be in the unconditioned basement. Your local utility may incentive this replacement, so please speak to them to find available rebates.



### **Opportunity 2: Install occupancy sensors on interior lights**

You may want to install Occupancy Sensors to automatically turn lights off in areas such as restrooms, storage rooms, or other rooms where lights could get left on. Occupancy sensors limit the amount of time the lights in each room are left on while unoccupied. Sensors can be purchased fairly inexpensively, for roughly \$20-\$100 each depending on type and style. The savings for installing these sensors varies greatly depending on the quantity of fixtures controlled as well as the amount of human traffic through the room. The typical payback for a break room and restroom installation is under two years. This estimates the savings of installing them on the fixtures inside both the lodging and basement areas of the building.

### **Opportunity 3: Replace T12 and T8 fluorescent lighting with LED lighting**

The horse lodge consists of T12 and T8 fluorescent fixtures. T12 fluorescent lighting is an outdated technology that has been replaced with T8 fluorescent and LED lighting. Instead of the marginal efficiency gains with the retrofit to T8 lamps, you may want to consider replacing all the troffers with LED troffers. LED's offer a better light quality, and last up to 5 longer before needing replacement. Retrofitting troffers costs roughly \$100 per troffer, while a replacement costs roughly \$150. The wattage reduction would be 40-75% per fixture. Incentives may be available through your local





**Fort Ridgely State Park - Horse Camp  
Sanitation (B40450)**

Energy Auditor:

Date of Assessment:

**Chris Droske, CEM | Energy Advisor**  
Franklin Energy Services, LLC  
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5/11/2015

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**Fort Ridgely State Park** has already implemented a number of energy saving measures, such as:

- Fluorescent lighting throughout the facility
- Occupancy sensors on fluorescent lighting
- Photocells on exterior lighting

The following energy savings opportunities are the measures you may want to consider first, based on the recent walk-through of your facility. Corresponding savings values can be found in the following Energy Conservation Opportunities table.

- Add insulation on domestic hot water piping
- Replace water heater with on-demand tankless water heater
- Replace T12 fluorescent lighting with LED lighting

*Additional opportunities to consider can be found later in the report.*

## Energy Conservation Opportunities

*Please refer to the Conservation Opportunity Analysis section following this table for a detailed description.*

	Energy Conservation Opportunity	Estimated Demand Savings (kW/yr)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$) <sup>1</sup>	Simple Payback (Years) <sup>2</sup>	Estimated Utility Incentives (\$)
<b>Payback less than 2 years (low/no cost opportunities)</b>								
1	Add insulation on domestic hot water piping	0.0	0	156	\$241	\$200	0.8	\$0
<b>Payback 2 - 10+ years (low/no cost opportunities)</b>								
2	Replace T12 fluorescent fixtures with LED fixtures	0.4	494	0	\$67	\$800	11.9	\$0
<b>Payback 2 - 10+ years (capital cost opportunities)</b>								
3	Replace water heater with on-demand tankless water heater	0.0	0	233	\$361	\$1,500	4.2	\$0
<b>Total</b>		0.4	494	389	\$669	\$2,500	3.7	\$0

<sup>1</sup> Estimated capital cost includes estimated equipment and labor costs unless otherwise noted. Capital Cost is defined as the total equipment and labor cost for the project. Incremental Cost refers to the additional cost associated with the increased capital cost for replacing standard equipment with higher efficiency equipment.

<sup>2</sup> Simple Payback includes incentive unless estimated value is not given.

## ***Energy Conservation Opportunity Analysis***

### **Opportunity 1: Add insulation on domestic hot water piping**

Insulating your hot water pipes reduces heat loss and can raise the temperature of water delivered to a faucet 2°F–4°F. This allows for a lower water temperature setting on your water heater. You also won't have to wait as long for hot water when you turn on a faucet or showerhead, which helps conserve water. Valuable energy savings can be achieved by insulate all accessible hot water pipes, especially within 3 feet of the water heater. It's also a good idea to insulate the cold water inlet pipes for the first 3 feet. Estimated savings were based upon installing 50' of insulation on the domestic hot water lines in the channel between the two bathrooms.



### **Opportunity 2: Replace T12 fluorescent fixtures with LED fixtures**

The horse camp sanitation building consists of T12 fluorescent fixtures. T12 fluorescent lighting is an outdated technology that has been replaced with T8 fluorescent and LED lighting. Instead of the marginal efficiency gains with the retrofit to T8 lamps, you may want to consider replacing all the troffers with LED troffers. LED's offer a better light quality, and last up to 5 longer before needing replacement. Retrofitting troffers costs roughly \$100 per troffer, while a replacement costs roughly \$150. The wattage reduction would be 40-75% per fixture. Incentives may be available through your local utility.

### **Opportunity 3: Replace water heater with on-demand tankless water heater**

Your electric water heater is old and out of date. You may want to consider replacing this unit with an on-demand tankless water heater. This style of water heater will only heat water as needed as opposed to storing water which is beneficial because the occupacny and usage of the horse camp changes throughout the summer. Tankless units are also estimated to last twice as long as conventional units, and do not suffer from standby loss like a tradition unit.







Minnesota

Department of Natural Resources



## Fort Ridgely State Park - Residence (B40090)

Energy Auditor:

Date of Assessment:

**Chris Droske, CEM | Energy Advisor**  
Franklin Energy Services, LLC  
2303 Wycliff St., Suite 2E | St. Paul, MN 55114

5/11/2015

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## Executive Summary



The Minnesota Department of Natural Resources requested that Franklin Energy perform an energy assessment to identify energy-related opportunities that show potential for improvement and investment options. This is the first step toward developing a long-term energy plan for **Fort Ridgely State Park**. Chris Droske of Franklin Energy services visited **Fort Ridgely State Park** on May 11th, 2015 and met with **Joanne Svendsen**.

**Fort Ridgely State Park** has already implemented a number of energy saving measures, such as:

- 6" of insulation with a mixture of blown fiberglass and cellulose
- Lighting left off since building is unoccupied
- Decided to have an energy assessment performed to determine future opportunities if building resumes occupancy

The following energy savings opportunities are the measures you may want to consider first, based on the recent walk-through of your facility. Corresponding savings values can be found in the following Energy Conservation Opportunities table.

- Replace incandescent lamps with equivalent LEDs
- Replace T12 fluorescent lighting with LED lighting

Key strategic opportunities include:

- Air-seal attic, attic hatch, electrical, plumbing, basement, rim joists, and cracks in foundation.
- Results of Blower Door
- Replace leaking water heater

***Additional opportunities to consider can be found later in the report.***

## Energy Conservation Opportunities

*Please refer to the Conservation Opportunity Analysis section following this table for a detailed description.*

	Energy Conservation Opportunity	Estimated Demand Savings (kW/yr)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$) <sup>1</sup>	Simple Payback (Years) <sup>2</sup>	Estimated Utility Incentives (\$)
<b>Payback 2 – 10+ years (low/no cost opportunities)</b>								
1	Replace incandescent lamps with equivalent LEDs	0.7	825	0	\$96	\$280	2.9	\$0
2	Replace T12 fluorescent lighting with LED lighting	0.1	274	0	\$32	\$300	9.4	\$0
<b>Payback 2 – 10+ years (capital cost opportunities)</b>								
3	Upon failure, install new high-efficiency boiler	0.0	0	66	\$186	\$3,000	16.1	\$0
<b>Total</b>		<b>0.9</b>	<b>1,099</b>	<b>66</b>	<b>\$315</b>	<b>\$3,580</b>	<b>11.4</b>	<b>\$0</b>

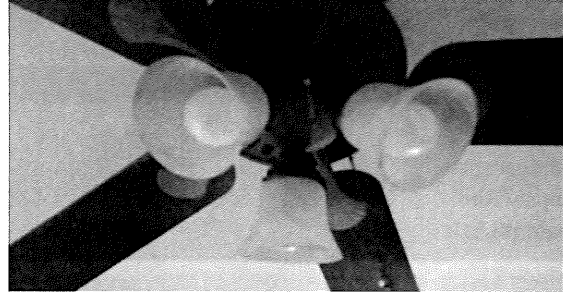
<sup>1</sup> Estimated capital cost includes estimated equipment and labor costs unless otherwise noted. Capital Cost is defined as the total equipment and labor cost for the project. Incremental Cost refers to the additional cost associated with the increased capital cost for replacing standard equipment with higher efficiency equipment.

<sup>2</sup> Simple Payback includes incentive unless estimated value is not given.

## ***Energy Conservation Opportunity Analysis***

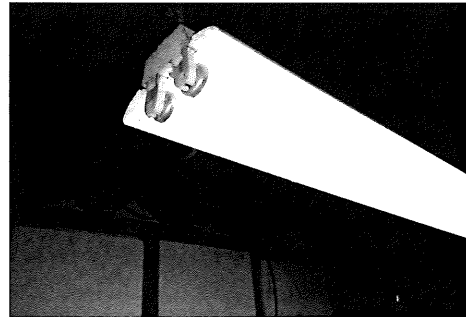
### **Opportunity 1: Replace incandescent lamps with equivalent LEDs**

The interior lights consist of 60 and 75W incandescent lamps. You may want to consider replacing these lamps with LEDs. LED's will last up to 20x longer than your halogen lamp, while using 75% less energy. Your local utility may incentive this replacement, so please speak to them to find available rebates.



### **Opportunity 2: Replace T12 fluorescent lighting with LED lighting**

The basement of the residence consists of T12 fluorescent fixtures. T12 fluorescent lighting is an outdated technology that has been replaced with T8 fluorescent and LED lighting. Instead of the marginal efficiency gains with the retrofit to T8 lamps, you may want to consider replacing all the troffers with LED troffers. LED's offer a better light quality, and last up to 5 longer before needing replacement. Retrofitting troffers costs roughly \$100 per troffer, while a replacement costs roughly \$150. The wattage reduction would be 40-75% per fixture. Incentives may be available through your local utility.



### **Opportunity 3: Upon failure, install new high-efficiency boiler**

Conventional gas combustion boilers generate by-products which are vented out through a chimney, along with a considerable amount of heat. The primary waste products are water vapor and carbon dioxide. Newer designs increase energy efficiency by reducing the amount of heat that escapes and by extracting heat from the flue gas before it is vented. These boilers use much less energy than conventional boilers. You should only consider upgrading to a high-efficiency boiler when near end of life, as it's not cost effective to do so before. Estimated savings were based on upon replacing a 80% efficient propane boiler with a 95% efficient propane boiler.



#### **Opportunity 4: Air-seal attic, attic hatch, electrical, plumbing, basement, rim joists, and cracks in foundation**

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The house currently uses knob and tube wiring, so this will need to get upgraded before additional insulation is added. It's important to note that insulation and airsealing would improve the energy performance of the house. Air sealing should be performed at all cracks and permiations while insulation should take place in the attic and walls. Be sure to have a second blower door analysis done after insulating and airsealing to ensure ventilation is still met.



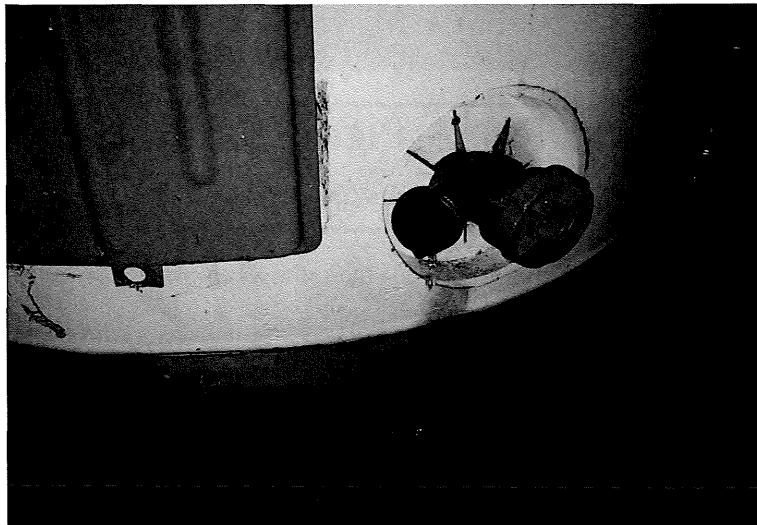
#### **Opportunity 5: Blower Door Results**

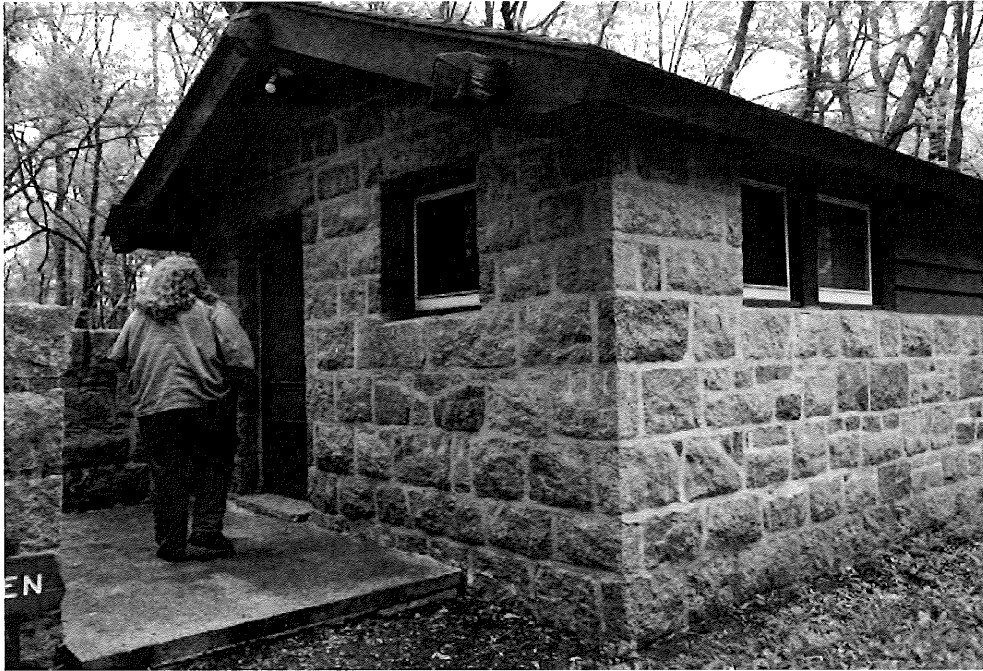
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The results of the blower door is 1616 CFM which is shown to be an average residence in terms of air infiltration. Further air sealing could be done to lessen this value and improve indoor comfort and energy efficiency.

#### **Opportunity 6: Replace leaking water heater**

The water heater was leaking. You may want to replace the unit before it is used again as the intergrity of this tank has likely been compromised. Be sure to look for a high-efficiency or energy-star rated tank for your next purchase





## Fort Ridgely State Park - Picnic Sanitation (B40088)

Energy Auditor:

Date of Assessment:

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5/11/2015

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## Executive Summary



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**Fort Ridgely State Park** has already implemented a number of energy saving measures, such as:

- 50% of the fixtures are compact fluorescent lamps

The following energy savings opportunities are the measures you may want to consider first, based on the recent walk-through of your facility. Corresponding savings values can be found in the following Energy Conservation Opportunities table.

- Install occupancy sensors on lighting
- Replace halogen and CFLs with LED's

*Additional opportunities to consider can be found later in the report.*

## Energy Conservation Opportunities

*Please refer to the Conservation Opportunity Analysis section following this table for a detailed description.*

	Energy Conservation Opportunity	Estimated Demand Savings (kW/yr)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$) <sup>1</sup>	Simple Payback (Years) <sup>2</sup>	Estimated Utility Incentives (\$)
Payback 2 – 10+ years (low/no cost opportunities)								
1	Replace halogen and CFL lamps with LEDs	0.2	365	0	\$47	\$120	2.5	\$0
2	Install occupancy sensors on lighting	0.0	57	0	\$7	\$100	13.5	\$0
<b>Total</b>		<b>0.2</b>	<b>422</b>	<b>0</b>	<b>\$55</b>	<b>\$220</b>	<b>4.0</b>	<b>\$0</b>

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<sup>2</sup> Simple Payback includes incentive unless estimated value is not given.



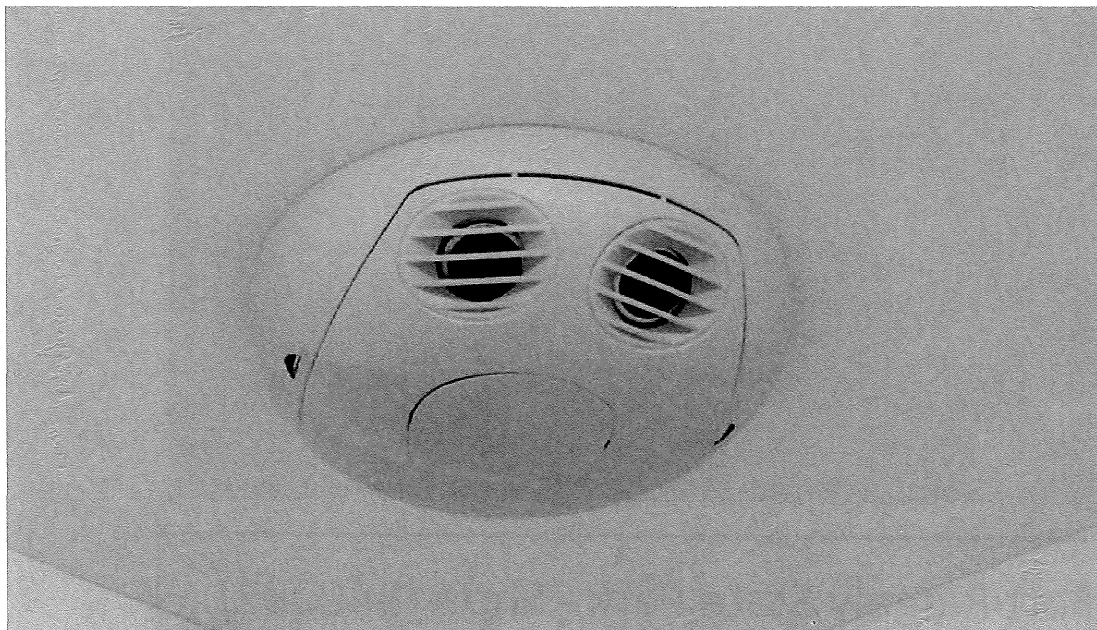
## ***Energy Conservation Opportunity Analysis***

### **Opportunity 1: Replace halogen and CFL lamps with LEDs**

The exterior security lights contain (2) halogen lamps. You may want to consider replacing these lamps with LEDs. LED's will last up to 20x longer than your halogen lamps, while using 75% less energy. LED lamps also thrive in cold environments, so their rated life will likely be achieved as this fixture is located outside. Your local utility may incentive this replacement, so please speak to them to find available rebates.

### **Opportunity 2: Install occupancy sensors on lighting**

You may want to install Occupancy Sensors to automatically turn lights off in areas such as restrooms, storage rooms, or other rooms where lights could get left on. Occupancy sensors limit the amount of time the lights in each room are left on while unoccupied. Sensors can be purchased fairly inexpensively, for roughly \$20-\$100 each depending on type and style. The savings for installing these sensors varies greatly depending on the quantity of fixtures controlled as well as the amount of human traffic through the room. The typical payback for a break room and restroom installation is under two years. Estimates were conservative assuming that lamp operation is 2,000 hours per year being reduced to 1,000 hours per year.





**Minnesota**

**Department of Natural Resources**



## Fort Ridgely State Park - Shop (B40082)

Energy Auditor:

Date of Assessment:

**Chris Droske, CEM | Energy Advisor**

5/11/2015

Franklin Energy Services, LLC

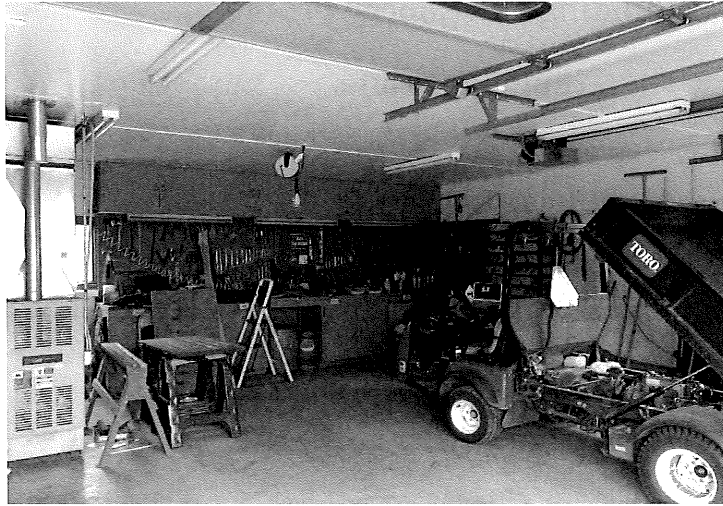
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## Executive Summary



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**Fort Ridgely State Park** has already implemented a number of energy saving measures, such as:

- Fluorescent lighting throughout the facility
- Woodfire heat with propane backup
- Put plastic over A/C during winter
- Exterior fluorescent lighting

The following energy savings opportunities are the measures you may want to consider first, based on the recent walk-through of your facility. Corresponding savings values can be found in the following Energy Conservation Opportunities table.

- Replace exterior incandescent lamp with equivalent LED
- Install occupancy sensors on interior lights
- Replace T12 fluorescent lighting with LED lighting

Key strategic opportunities include:

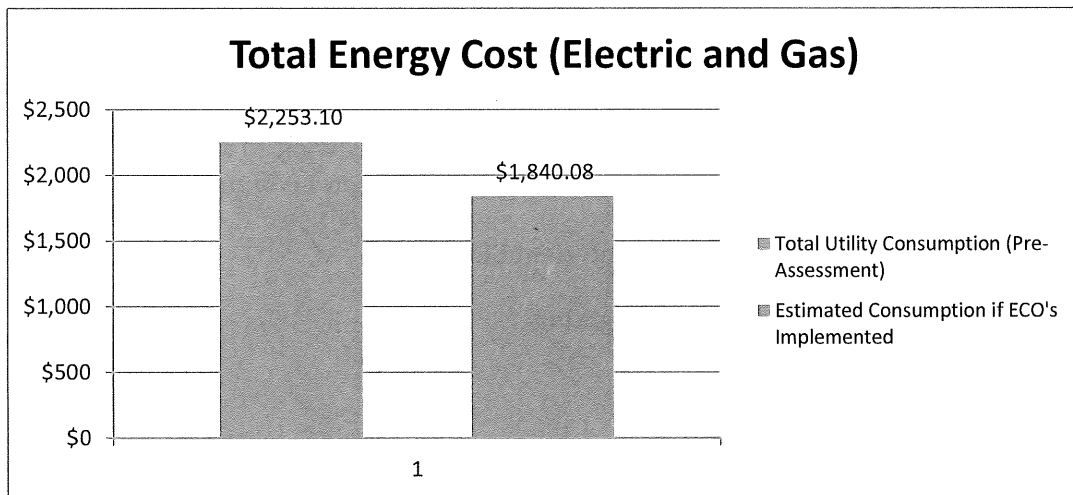
- Upgrade to Energy Star Refrigerator
- Install an A/C Cover

*Additional opportunities to consider can be found later in the report.*

## Building and Energy Profile

### Building Profile

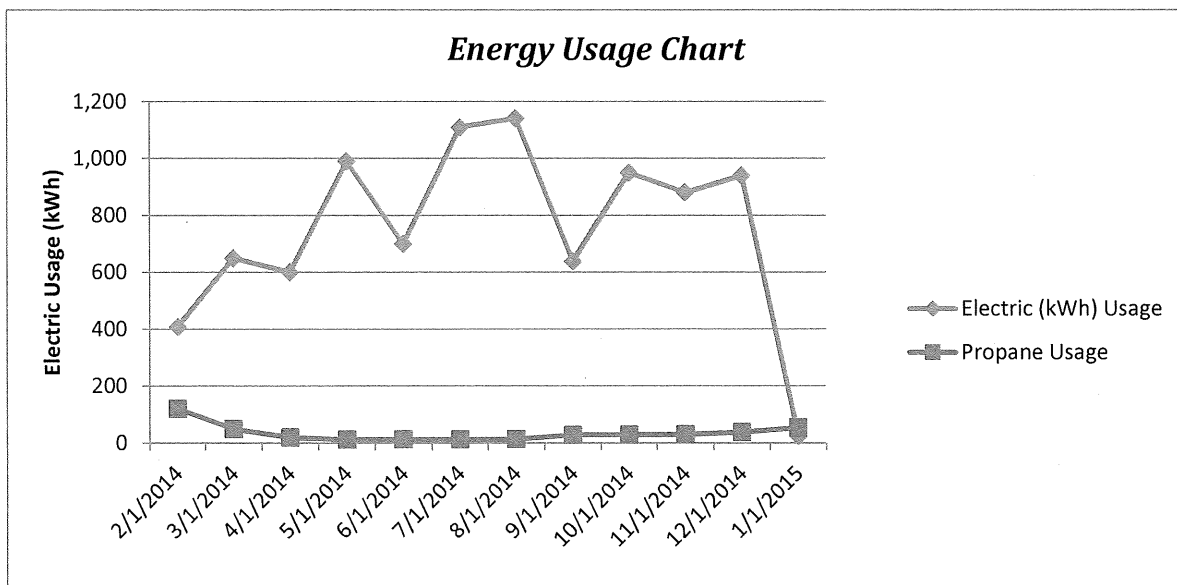
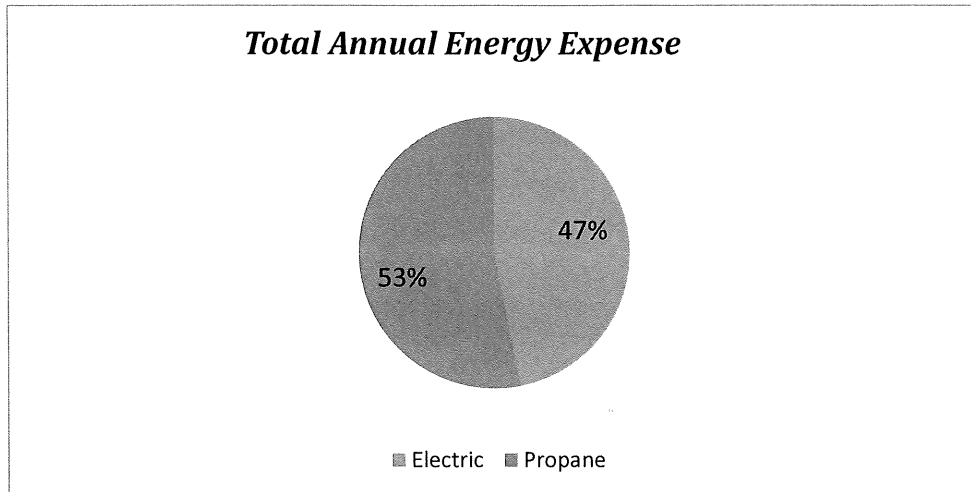
Type of Building:	<u>Shop</u>	Year Built:	<u>N/A</u>
Floor Area (s.f.):	<u>1,000</u>	Weekly Operating Hours:	<u>8-4 M-F</u>
Number of Workers:	<u>3</u>	Number of PCs:	<u>1</u>
Percent of Space Heated:	<u>100</u>	Type of Heating:	<u>Propane</u>
Percent of Space Cooled:	<u>40</u>	Type of Cooling:	<u>Electric A/C</u>



Percent \$ Savings: 18%

## Energy Use Profile

The following chart identifies your electric and propane use.



## Energy Conservation Opportunities

*Please refer to the Conservation Opportunity Analysis section following this table for a detailed description.*

	Energy Conservation Opportunity	Estimated Demand Savings (kW/yr)	Estimated Energy Savings (kWh/yr)	Estimated Thermal Savings (Therm/yr)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$) <sup>1</sup>	Simple Payback (Years) <sup>2</sup>	Estimated Utility Incentives (\$)
<b>Payback less than 2 years (low/no cost opportunities)</b>								
1	Replace exterior incandescent lamp with equivalent LED	0.1	228	0	\$27	\$40	1.5	\$0
<b>Payback 2 – 10+ years (low/no cost opportunities)</b>								
2	Install occupancy sensors on interior lights	0.0	337	0	\$39	\$200	5.1	\$0
<b>Payback 2 – 10+ years (capital cost opportunities)</b>								
3	Replace T12 fluorescent lighting with LED lighting	0.7	1,371	0	\$160	\$1,500	9.4	\$0
4	Upon failure, install new high-efficiency propane furnace	0.0	0	66	\$186	\$3,000	16.1	\$0
<b>Total</b>		<b>0.9</b>	<b>1,936</b>	<b>66</b>	<b>\$413</b>	<b>\$4,740</b>	<b>11.5</b>	<b>\$0</b>

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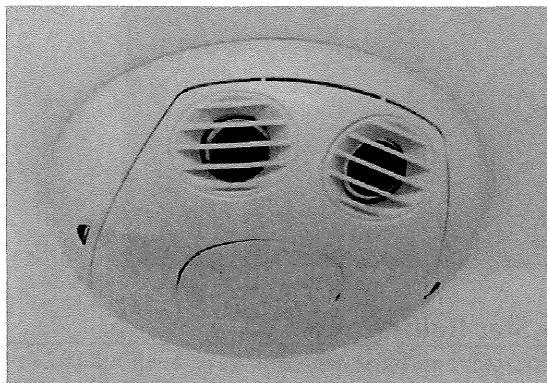
## ***Energy Conservation Opportunity Analysis***

### **Opportunity 1: Replace exterior incandescent lamp with equivalent LED**

The exterior light contains an incandescent lamp that is 200W. You may want to consider replacing this lamps with an LED. LED's will last up to 20x longer than your halogen lamp, while using 75% less energy. LED lamps also thrive in cold environments, so their rated life will likely be achieved as this fixture is located outside. Your local utility may incentive this replacement, so please speak to them to find available rebates.

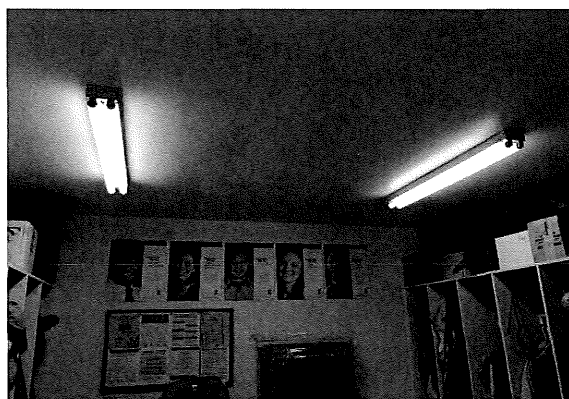
### **Opportunity 2: Install occupancy sensors on interior lights**

You may want to install Occupancy Sensors to automatically turn lights off in areas such as restrooms, storage rooms, or other rooms where lights could get left on. Occupancy sensors limit the amount of time the lights in each room are left on while unoccupied. Sensors can be purchased fairly inexpensively, for roughly \$20-\$100 each depending on type and style. The savings for installing these sensors varies greatly depending on the quantity of fixtures controlled as well as the amount of human traffic through the room. The typical payback for a break room and restroom installation is under two years. This estimates the savings of installing them on the fixtures inside both the office and shop portions of the building.



### **Opportunity 3: Replace T12 fluorescent lighting with LED lighting**

The shop consists of T12 fluorescent fixtures. T12 fluorescent lighting is an outdated technology that has been replaced with T8 fluorescent and LED lighting. Instead of the marginal efficiency gains with the retrofit to T8 lamps, you may want to consider replacing all the troffers with LED troffers. LED's offer a better light quality, and last up to 5 longer before needing replacement. Retrofitting troffers costs roughly \$100 per troffer, while a replacement costs roughly \$150. The wattage reduction would be 40-75% per fixture. Incentives may be available through your local utility.



#### **Opportunity 4: Upon failure, install new high-efficiency propane furnace**

Conventional gas combustion furnaces generate by-products which are vented out through a chimney, along with a considerable amount of heat. The primary waste products are water vapor and carbon dioxide. Newer designs increase energy efficiency by reducing the amount of heat that escapes and by extracting heat from the flue gas before it is vented. These furnaces use much less energy than conventional furnaces. You should only consider upgrading to a high-efficiency furnace when near end of life, as it's not cost effective to do so before. Estimated savings were based on upon replacing a 80% efficient propane furnace with a 95% efficient propane furnace.

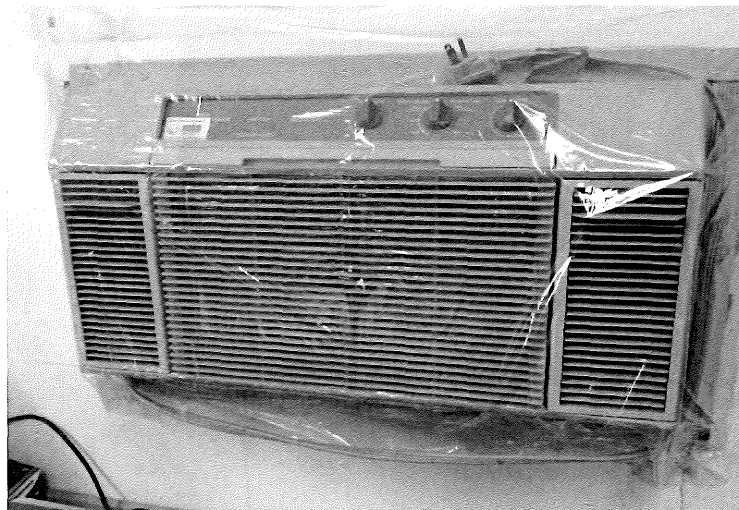


#### **Opportunity 5: Upgrade to Energy Star Refrigerator**

The refrigerator appears to be over 25 years old, and improvements have been made in refrigeration cycles that can vastly lower the energy cost of this refrigerator. In fact, a refrigerator manufactured prior to 1992 uses nearly 7 times more energy than a modern Energy Star rated model. Please consider replacing this unit to save over \$200 a year in energy costs.

#### **Opportunity 6: Install an A/C cover**

Your air conditioning unit is covered with plastic during the winter to help reduce drafts. This plastic has no insulation value, and is hardly working as an effective air seal. Consider purchasing a true air conditioner cover to properly air seal and insulate the air conditioning unit during winter months.





## Annual Electric Consumption

*Previous 12 months (definition of terms can be found in the glossary)*

**February 2014 - January 2015**

Month	Billing Period (Days)	Actual Demand (kW)	Billed Demand (kW)	Total Energy (kWh)	Total Cost (\$)	Cost/kWh (\$)	Power Factor
Feb-14				410	\$ 58.00	\$ 0.14	
Mar-14				650	\$ 83.66	\$ 0.13	
Apr-14				600	\$ 75.19	\$ 0.13	
May-14				990	\$ 117.09	\$ 0.12	
Jun-14				700	\$ 95.35	\$ 0.14	
Jul-14				1,110	\$ 142.59	\$ 0.13	
Aug-14				1,140	\$ 143.35	\$ 0.13	
Sep-14				640	\$ 81.52	\$ 0.13	
Oct-14				950	\$ 114.87	\$ 0.12	
Nov-14				880	\$ 104.58	\$ 0.12	
Dec-14				940	\$ 112.99	\$ 0.12	
Jan-15				25	\$ (71.94)	\$ (2.88)	
<b>Total</b>	<b>0</b>			<b>9,035</b>	<b>\$ 1,057.25</b>	--	--
Avg.				753	\$ 88.10	--	
<b>Blended Rate</b>						<b>\$ 0.12</b>	

## Annual Gas Consumption

*Previous 12 months (definition of terms can be found in the glossary)*

**February 2014 - January 2015**

Month	Gallons of Propane	Total Energy	Total Cost (\$)	Cost/Therm(\$)	Degree Days (DD)	Therms/DD
Feb-14	127	121	\$ 528.73	\$ 4.36		#DIV/0!
Mar-14	52	50	\$ 288.00	\$ 5.80		#DIV/0!
Apr-14	21	20	\$ 69.96	\$ 3.49		#DIV/0!
May-14	13.6	13	\$ 21.38	\$ 1.65		#DIV/0!
Jun-14	14.1	13	\$ 22.09	\$ 1.64		#DIV/0!
Jul-14	13.6	13	\$ 21.38	\$ 1.65		#DIV/0!
Aug-14	14.1	13	\$ 22.09	\$ 1.64		#DIV/0!
Sep-14	29.97	29	\$ 38.86	\$ 1.36		#DIV/0!
Oct-14	31.49	30	\$ 41.50	\$ 1.38		#DIV/0!
Nov-14	32.54	31	\$ 42.88	\$ 1.38		#DIV/0!
Dec-14	39.86	38	\$ 45.32	\$ 1.19		#DIV/0!
Jan-15	56.13	54	\$ 53.66	\$ 1.00		#DIV/0!
<b>Total</b>	<b>445.39</b>	<b>425</b>	<b>\$ 1,195.85</b>	--		--
Avg.	37.12	35.45		--	--	
<b>Blended Rate</b>				<b>\$ 2.81</b>		