Efficiency Maine
Business Energy Audit Program
Walk-through Energy Report

Town of Harpswell
Harpswell, ME 04079

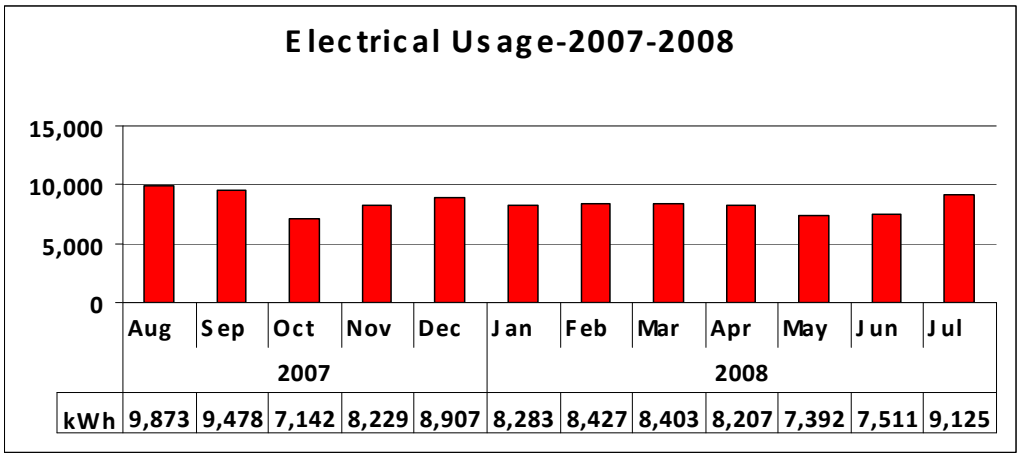
Contact: Bill Wells, Codes Officer
Phone: 207-833-5771
Email: bwells@town.harpswell.me.us
Audit Date: September 25, 2008
Follow-up Date: March 2009
Building Sq. Ft.: ~ 11,400 square feet
 # Employees: 19
Hours of operation: Mon, Tues, Wed & Fri. 8:300 am – 4:30 pm
Thurs. 1:00 pm – 6:30 pm
Business Type: Town office building
Fed tax ID: 01-6000193
Electric Utility Co: CMP
Environment: Sunny, 65 ℉

SITE DESCRIPTION

The Town of Harpswell office building is located at 263 Mountain Road overlooking Harpswell Sound.

ENERGY USAGE

Electricity usage in kWh's is graphed below from August 2007 – July 2008 (a year's representation) for a total usage of 100,977 kilowatts at a cost of $12,935 with an average price of $.13 per kilowatt.



Estimated major electrical usage breakdown:
(See individual sections for calculations by table and details)

Standard usage:
Lighting ~ 20%
Sump pump ~ 5%
Dehumidifier ~ 5%
Electronic equipment ~ 5%
Water heater ~ 5%
Exhaust fans ~ 2.5%

Seasonal usage:
Space heaters (5 units) ~ 10%
Air conditioners (5 units) ~ 20%

Town of Harpswell

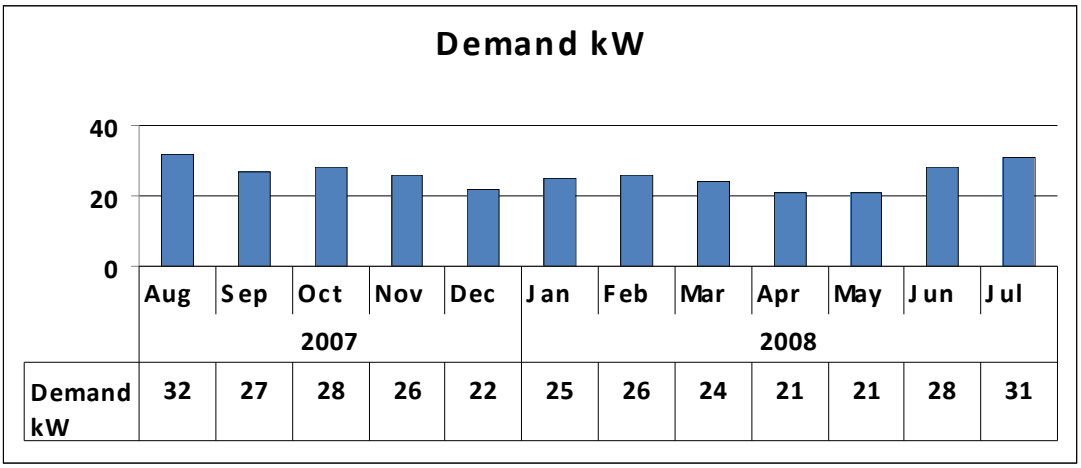
Electricity Usage-2007-2008 (MGS)

		kWh	Cost	Demand kW	Demand Charge
2007	Aug	9,873	1,258	32	232
	Sep	9,478	1,140	27	195
	Oct	7,142	847	28	202
	Nov	8,229	954	26	187
	Dec	8,907	1,107	22	212
2008	Jan	8,283	1,152	25	237
	Feb	8,427	1,264	26	252
	Mar	8,403	1,212	24	227
	Apr	8,207	992	21	127
	May	7,392	892	21	128
	Jun	7,511	937	28	173
	Jul	9,125	1,180	31	194
	Total	100,977	$12,935	311	$2,366
Mo	Avg	8,415	$1,078	26	$197
Avg	$/kW		$0.13		

There appear to be no other significant electrical equipment devices with a demand other than the elevator which was reported to be used minimally. It is recommended that you conduct a comprehensive review of the electrical consumption for the building.

Demand Charge: What is the Demand Charge? The demand meter constantly measures electrical energy consumption. The demand charge is based on the highest amount of energy used in any given 15 minute period during the typical 30 day billing

cycle and this charge is added to the metered kilowatts. The demand usage in kW's for your facility is graphed below:



For detailed information regarding your electric bill and your current level of service, go to the CMP web site below and select the **Medium General Service Secondary** schedule:

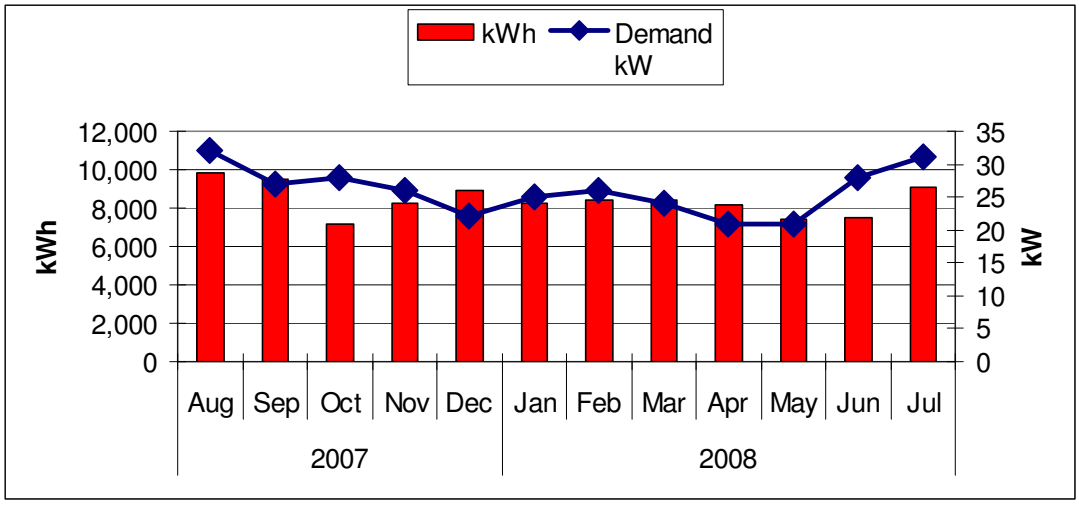
http://www.cmpco.com/YourBusiness/pricing/pricingSchedules/default.html

RATE MGS-S
MEDIUM GENERAL SERVICE - SECONDARY

BASIC RATE PER MONTH

	Winter Billing Months December - March	Non-Winter Billing Months April - November
Service Charge		
Single Phase	$24.46	$24.46
Three Phase	$31.90	$31.90
Demand Charge	$8.46/kW	$6.20/kW
kWh Charge	$0.004794/kWh	$0.004794/kWh

The graph below has the kWh's (consumption) and kW's (electrical demand) plotted together.



It is important to review this relationship on a monthly basis. If the demand increases and the kWh's remain stable, then this may indicate the intermittent use of a large motor, electrical equipment or that a motor could be going bad. Typically the demand-kW curve should follow the usage-kWh curve. That is, if one goes up or down, the other should follow. If this pattern is disrupted, then this may be an indication of a possible electrical equipment issue or an indication of a high use of a motor for a short period of time.

A strategy to reduce demand charges can begin with education of all personnel who use your facility. You can stagger the on/off time of devices that use a significant amount of electricity such as large HP motors, refrigeration, etc., or consider a different service with peak and off peak charges. You may also reduce consumption by replacing older inefficient equipment with energy efficient equipment.

In terms of specifics regarding your demand charges, there are five separate air conditioners. If they were all operating simultaneously, it would equate to a 25 kW demand. As you can see, air conditioning explains the increase from June-September. Your monthly demand average is 26 kW. The lighting represents just over 10 kW and the portable space heaters are about 7.5 kW.

The propane –fired generator has a 20 kW capacity, therefore, if you lose power and run the generator, you will need to reduce the building load (such as the portable electric heaters or AC).

Town of Harpswell					
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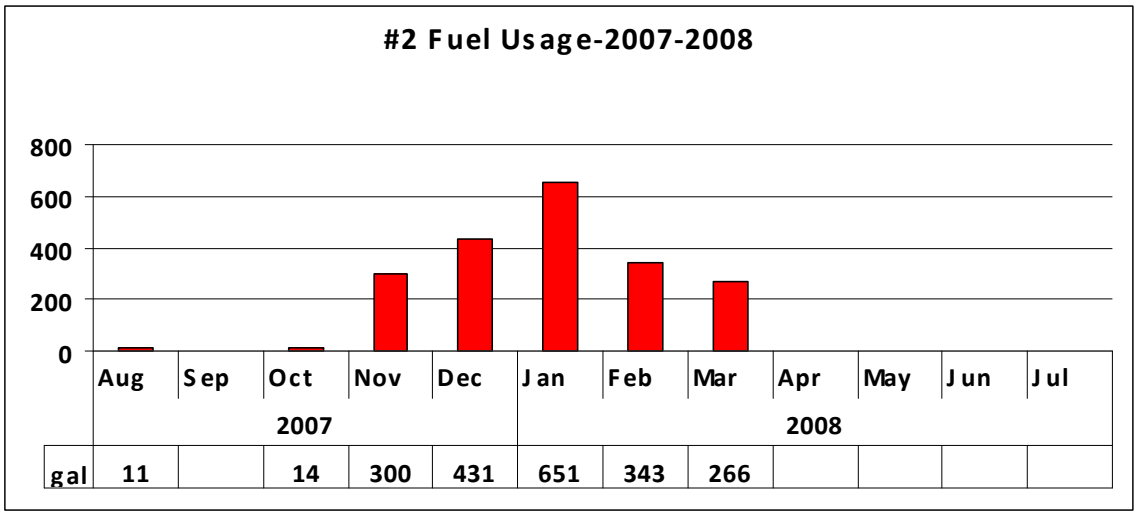
Mo	Avg	8,415	$1,078	26	$197
Avg	$/kW		$0.13		

Fuel oil usage from August 2007 – July 2008 was 2,016 gallons at a cost of $4.507 at an average price of $2.24.



Town of Harpswell			
#2 Fuel Usage-2007-2008			
		gal	cost
2007	Aug	11	24
	Sep		
	Oct	14	33
	Nov	300	673
	Dec	431	970
2008	Jan	651	1,461
	Feb	343	770
	Mar	266	576
	Apr		
	May		
	Jun		
	Jul		
	Total	2,016	$4,507
Month	Average	168	$376
$/gal	Average		$2.24

LIGHTING

Do-It-Yourself Measures:

- ☐ **Clean Fixtures**
- ☐ **Repaint or clean reflective surfaces**
- ☒ **Reduce Wattage**
- ☒ **Reschedule Custodial Services**
- ☒ **Reset Exterior Lighting Schedule**
- ☒ **Relamp Incandescent to Compact Fluorescent**

Service Technician:

- ☒ **Install Occupancy Sensors**
- ☐ **Install Dimmer Switches**
- ☐ **Install Photoelectric Cells**
- ☐ **Relamp outside lights to High Pressure Sodium**
- ☐ **Install Lighting Time Clocks**
- ☒ **Install Additional Switching**
- ☐ **Install LED or Electroluminescent Exit Signs**

Comments: The table below provides an approximate potential for energy savings opportunities to reduce electrical lighting consumption throughout the facility. It is a guide to help you understand and plan for achieving **energy savings** by managing your building lighting.

Table notes and annual operating hour assumptions:

- Tables based on $.15 per kW
- Hours per day used in the tables were provided by the facility.
- The lighting reductions under the suggested retrofit are assumptions based on percentages; they could be greater or less.

The lighting table indicates the potential annual lighting savings that may be achieved by upgrading some of your lighting and installing automatic controls. Some of the savings may be small, but the cumulative total adds up and if energy prices continue to increase, the savings will as well. Also, there is an opportunity to use cash incentives to help defray the cost of the lighting upgrades.

Town of Harpswell												
	Location	Fixture type	# of fixture	Watts per Fixture	Daily Total kWh	Hrs/ Day	# of Days	Annual Operating Hours	Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
Existing	Conference	CFL-track lights	12	13	0.156	4	260	1040	162	$24		
Retrofit	Conference	No change										
Existing	Conference	CFL-Pendants	4	13	0.052	4	260	1040	54	$8		
Retrofit	Conference	No change										
Existing	Conference	2L 1x4 T8	12	30	0.36	4	260	1040	374	$56		
Retrofit	Conference	No change										
Existing	Committee	3L 2x4 T8	3	87	0.261	4	260	1040	271	$41		
Retrofit	Committee	sensor 50%	3	87	0.261	2	260	520	136	$20	$20	136
Existing	Stairwell	2L 2x4 T12	3	75	0.225	4	260	1040	234	$35		
Retrofit	Stairwell	sensor 75%	3	75	0.225	1	260	260	59	$9	$26	176
Existing	Code Enforce	3L 2x4 T8	12	87	1.044	8	260	2080	2,172	$326		
Retrofit	Code Enforce	No change										
Existing	Accessing	3L 2x4 T8	9	87	0.783	8	260	2080	1,629	$244		
Retrofit	Accessing	sensor 50%	9	87	0.783	4	260	1040	814	$122	$122	814
Existing	Town Clerk	3L 2x4 T8	9	87	0.783	8	260	2080	1,629	$244		
Retrofit	Town Clerk	No change										
Existing	Lobby	3L 2x4 T8	10	87	0.87	8	260	2080	1,810	$271		
Retrofit	Lobby	No change										
Existing	Air lock	CFL	4	13	0.052	1	260	260	14	$2		
Retrofit	Air lock	No change										
Existing	Information	3L 2x4 T8	4	87	0.348	8	260	2080	724	$109		
Retrofit	Information	No change										
Existing	lobby	3L 2x4 T8	5	87	0.435	4	260	1040	452	$68		
Retrofit	lobby	No change										
Existing	Addition restrooms	1L 2x4 T8	8	30	0.24	5	260	1300	312	$47		
Retrofit	Addition restrooms	sensor 95%	8	30	0.24	0.25	260	65	16	$2	$44	296
Existing	Admin hall	2L 2x4 T8	4	58	0.232	8	260	2080	483	$72		
Retrofit	Admin hall	No change										
Existing	Admin office	4L 2x4 T8	7	114	0.798	8	260	2080	1,660	$249		
Retrofit	Admin office	No change										
Existing	Break room	4L 2x4 T8	5	114	0.57	2	260	520	296	$44		
Retrofit	Break room	No change										
Existing	Recreation	3L 2x4 T8	6	87	0.522	4	260	1040	543	$81		
Retrofit	Recreation	No change										
Existing	Planning	3L 2x4 T8	10	87	0.87	8	260	2080	1,810	$271		
Retrofit	Planning	No change										
Existing	Lamppost/ fixtures	metal halide	6	350	2.1	13	180	2340	4,914	$737		
Retrofit	Lamppost/ fixtures	motion sensor 75%	6	350	2.1	3.25	180	585	1,229	$184	$553	3,686
					Daily Total kWh				Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
Estimated Annual Lighting Savings					10.7				19,542	$2,931	$766	5,107
Estimated Carbon Dioxide (CO2) Savings Tons Per Year												4.0

Lighting represents an estimated 20% of the total electric bill.

There is an opportunity to reduce your electrical consumption by employing lighting recommendations suggested for your facility. These are eligible for Efficiency Maine Lighting Cash Incentives (table for lighting incentives below). Detailed information on how to apply for the lighting incentives can be found at:
http://www.efficiencymaine.com/pdfs/Prescriptive-Cash-Incentives.pdf

The application for lighting and occupancy sensor incentives can be found at the following web site:

http://www.efficiencymaine.com/business_programs_lighting_guide.htm

http://www.efficiencymaine.com/pdfs/OccupancySensors.pdf

There is also a list of contractors, engineers and suppliers (program allies) who are familiar with the Efficiency Maine cash incentive program. They can provide guidance in obtaining cash incentives for your facility. Go to the following web site, select "New Search" and enter your **zip code** for suppliers in your area:
http://gdsit.gdsassociates.com/efficiencymainesearch/results.asp

efficiency MAINE

Lighting Refer to our Lighting Application for more details and descriptions

L10 New HPT8 Lamp & Ballast – Existing fixture	$15.00 Per Fixture
L15 New Fluorescent Fixtures – Retrofit	$25.00 Per Fixture
L16 New Fluorescent Fixtures – New construction	$15.00 Per Fixture
L20 Fluorescent Fixtures with Reflectors	$25.00 Per 8' Section
L25 Compact Fluorescent Hard-wired Fixtures	$12.00 Per Fixture
L30 High Efficiency Fluorescent Fixtures – Retrofit	$35.00 Per Fixture
L31 High Efficiency Fluorescent Fixtures – New construction	$20.00 Per Fixture
L32 Low Glare High Efficiency Recessed Fixture – Retrofit	$50.00 Per Fixture
L33 Low Glare High Efficiency Recessed Fixture – New construction	$35.00 Per Fixture
L35 Pendant Mounted Indirect Fluorescent Fixtures	$35.00 Per 4' Section
L40 High Intensity Fluorescent (H.I.F.) – Retrofit	$75.00 Per Fixture
L41 High Intensity Fluorescent (H.I.F.) – New construction	$35.00 Per Fixture
L60 Controls for H.I.F. Systems	$40.00 Per Fixture
L70 Occupancy Sensors – Remote mounted only	$50.00 Per Control
L71 Vacancy Sensors	$25.00 Per Control
X10 LED Exit Signs – Retrofit only	$10.00 Per Sign

Pre-approval is not required for lighting incentives under $1000. But, pre-approval ***is*** required for cash incentives over $1000. See the on-line prescriptive cash incentives application for details or call Efficiency Maine at 866-376-2463 and mention your energy audit.

The table below indicates options for lighting to reduce energy savings even further by selecting lighting output by space. For example, hallways have lower lighting requirements than a typical office work space.

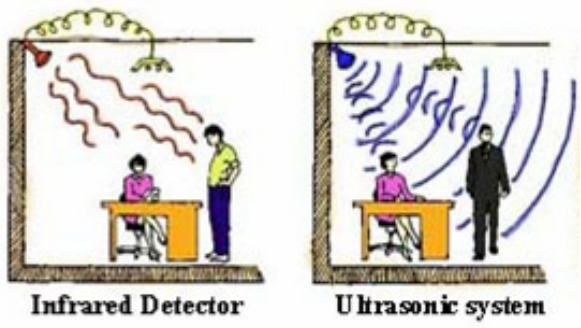
New T8 versus Old T12 Systems—System Performance and Savings						
System Lamps Number, wattage, type	System Ballasts	Input Watts	Ballast factor	Light Output vs. T12	Savings vs. T12	Net System Lumens/Watt*
(4) 34 W T12	(2) Energy-Saving Magnetic	144	.88	100%	N/A	56.2
Need more light output? Check out these options:						
System Lamps Number, wattage, type	System Ballasts	Input Watts	Ballast factor	Light Output vs. T12	Savings vs. T12	Net System Lumens/Watt*
(4) 30 W T8	(1) High-efficiency electronic	100	.87	118%	31%	95.7
(4) 32 W T8	(1) Standard electronic	112	.88	117%	22%	84.9
(4) 32 W T8	(1) High-efficiency electronic	106	.87	116%	26%	88.6
(4) 28 W T8	(1) High-efficiency electronic	93	.87	111%	35%	96.5
Need roughly the same light output? Check out these options						
System Lamps Number, wattage, type	System Ballasts	Input Watts	Ballast factor	Light Output vs. T12	Savings vs. T12	Net System Lumens/Watt*
(4) 30 W T8	(1) High-efficiency LW elec.	89	.77	105%	38%	95.2
(4) 32 W T8	(1) High-efficiency LW elec.	95	.77	103%	34%	87.5
(4) 25 W T8	(1) High-efficiency electronic	83	.87	98%	42%	95.6
(4) 28 W T8	(1) High-efficiency LW elec.	82	.77	98%	43%	96.9
Willing to sacrifice some light output to maximize energy savings? Check out this option:						
System Lamps Number, wattage, type	System Ballasts	Input Watts	Ballast factor	Light Output vs. T12	Savings vs. T12	Net System Lumens/Watt*
(4) 25 W T8	(1) High-efficiency LW elec.	75	.77	87%	48%	93.6

Lighting controls are very effective when an area is not in use; reduced lighting levels save energy and operating expense. There are several ways of applying controls in buildings such as:

- Occupancy sensors- passive infrared
- Manual or building system activated timer switches
- High/low switched ballasts
- Building time clock or automated control systems
- Daylight harvesting sensors or dimming

Occupancy sensors are an excellent way to combat the electrical energy bill. Lighting usually accounts for 30-40% of the building's energy bill, yet many areas may be unoccupied for large parts of the day. Numerous occupancy sensor studies have concluded that typical lighting savings of over 40% can be achieved.

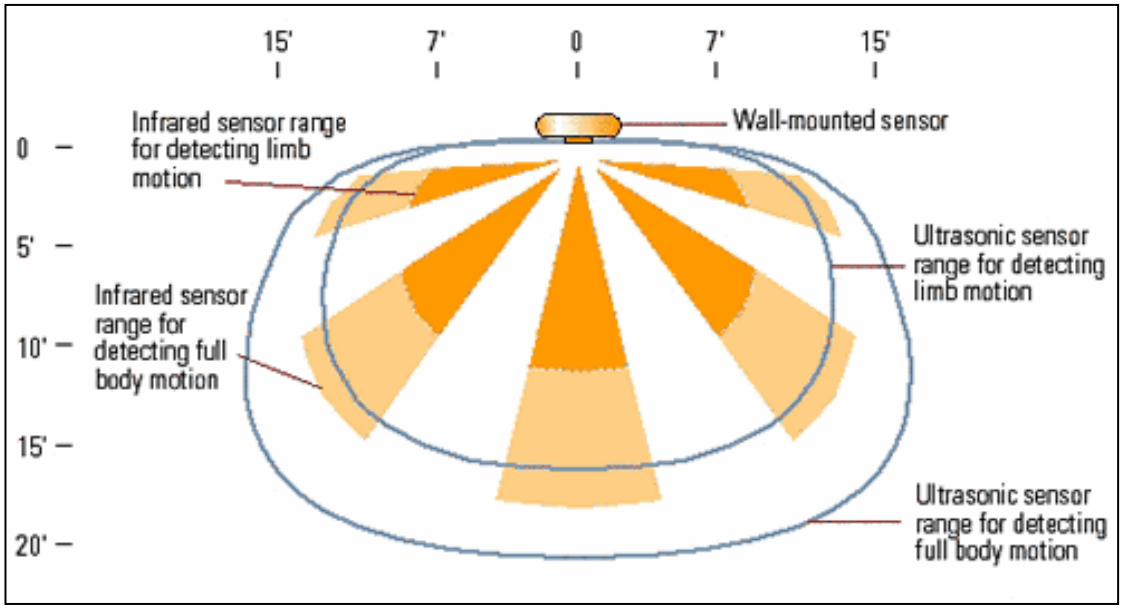
There are basically two types: Passive Infrared (PIR) which responds to changes in infrared background by movements in the area and Ultrasonic (US) units which generate high frequency sound waves to monitor changes in the signal return to detect occupancy.



There are also multi-technology units that combine both sensors for accurate monitoring with minimum false triggering. The following web site provides a good introduction for lighting control and application of occupancy sensors for your information: http://www.lightingtaxdeduction.org/technologies/intro-lighting-controls.html

The Efficiency Maine program provides prescriptive cash incentives for occupancy sensors which can be found at the following web site: http://www.efficiencymaine.com/pdfs/OccupancySensors.pdf. The incentives are available for:

- retrofit into existing fixtures
- wall mounted controls for individual or a bank of lights
- integration with new fixtures



In general, controls are essential in achieving the overall goal of reduced energy consumption. Reducing the energy consumption of the lighting system will typically result in additional tangible savings and benefits by lowering the internal heat gain in the space, thereby changing the needs for supplemental **heating, cooling, and ventilation**.

While occupancy sensors are a cost effective measure, it does create frequent switching which may reduce fluorescent lamp life hours, but the **calendar life will be considerably longer**. Also new "Programmed Rapid Start" ballasts significantly improve the life of frequently switched lamps. Daylight sensing controls are an effective and comfortable way to optimize energy use in rooms where abundant daylight is available for at least 25% of the time.

For your consideration regarding motion sensors: a general rule of thumb for motion sensing controls is that cost effectiveness varies depending on the overall energy

management skills of staff. People who are personally careful with energy outperform motion sensors, but for less well managed spaces, motion sensors are worthwhile.

There are a number of measures that may be applicable to help you generate and sustain energy savings such as employee awareness, a lighting plan, occupancy sensors, replacing incandescent lights with compact fluorescents, and rescheduling janitorial service.

Summary: Contact your local electrical supplier or electrician (most are familiar with Efficiency Maine's lighting program) for an estimate and be sure to mention the prescribed cash incentives. The Efficiency Maine Program has **prescribed lighting cash incentives.** If the total incentive request is greater than $1000, **pre-approval is required** before you purchase and install the equipment. Detailed information on lighting incentives can be found at:

http://www.efficiencymaine.com/pdfs/Prescriptive-Cash-Incentives.pdf

http://www.efficiencymaine.com/business_programs_lighting_guide.htm

http://www.efficiencymaine.com/pdfs/IndustrialLight.pdf

There is also a list of program allies which consists of contractors, suppliers, engineers, etc. for your area which can viewed at the following web site:

http://gdsit.gdsassociates.com/efficiencymainesearch/results.asp

There is a good introduction to the differences and savings of T12 vs. T8 lighting at the following web site:

ENERGY-SAVING T8 AND SUPER T8 LAMPS
http://www.lightingtaxdeduction.org/technologies/t8.html

BUILDING ENVELOPE

Do-It-Yourself Measures:

- ☒ **Weather-strip doors and windows**
- ☐ **Repair broken or cracked windows**
- ☐ **Caulk around door and window frames**
- ☐ **Seal building penetrations**

Service Technicians:

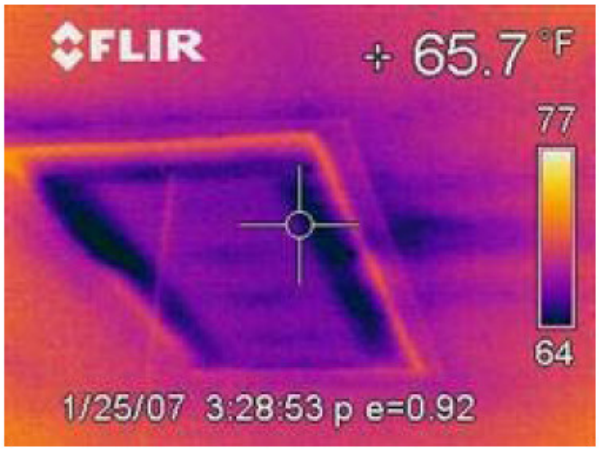
- ☐ **Insulate/Increase wall insulation**
- ☐ **Double glaze windows**
- ☐ **Replace R-2 rated wood doors w/ R-10 rated foam core, steel clad doors**
- ☒ **Add insulation to roof/ceiling**
- ☐ **Construct vestibule entrance**

Comments: The building is 11,400 square feet. There are two sections. The older section is two stories and was built in 1988 and is approximately 6,400 square feet. The new section which is also two stories was built in 2003 and is approximately 5,000 square feet. The exterior of the building has stained cedar shakes. There are architectural asphalt shingles on the roof and the windows in the older section are wood Anderson first generation double pane and the newer section has energy efficient vinyl windows.

The building has two entry foyer air locks at both public access locations. This is a good energy conservation measure.

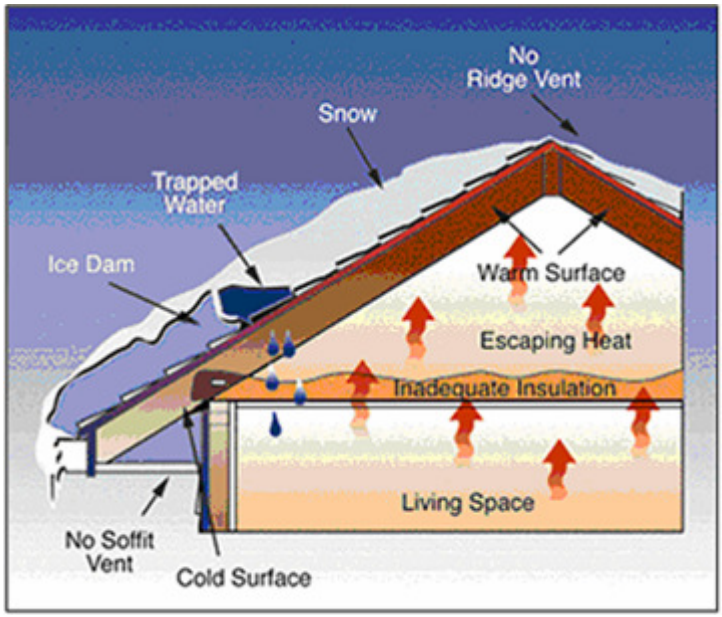
The attic access panels are not insulated. These are typically major losses of heat in the winter.

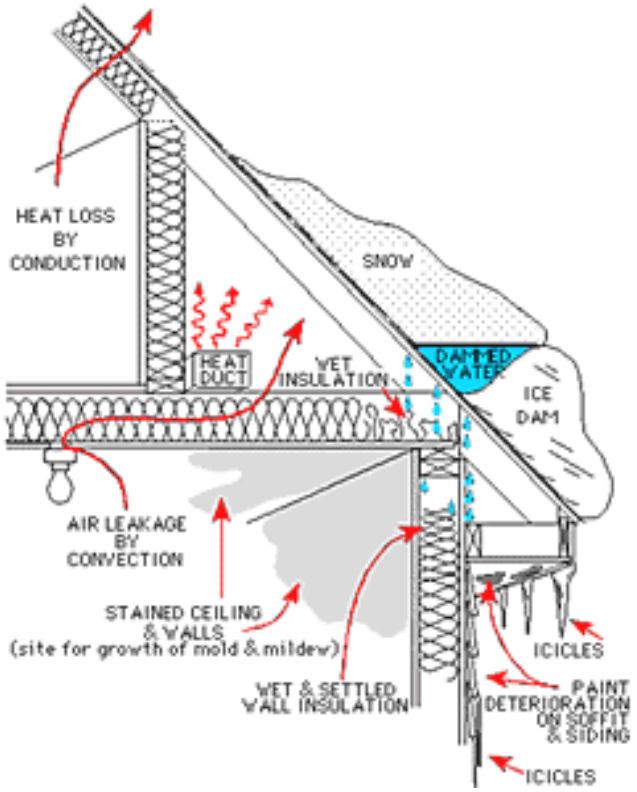
The pictures below are of a typical pull down roof/attic access panel that is not insulated. The picture to the right is an infrared picture of the access panel and the dark blue areas represents cold air infiltration



Ice dams are most common in northern climates. They occur when heavy snow buildup melts during the day and then refreezes when temperatures drop overnight.

After several days of melting-freezing cycles, it is common for the melted water and ice to work up under the shingles until water enters the attic and eventually does damage to the ceilings, wall and contents. In cases where the ice dam goes unnoticed for an extended period of time, it can do significant damage to the building and its contents.





The table below indicates the R values that should be obtained in cold climates:

Cost-effective Insulation R-values for Existing Buildings [a;1]							
		Insulate to these levels in the…				Ducts in unheated/uncooled spaces	
Climate	Heating system	Ceiling	Wood-frame wall	Floor	Basement or crawl space walls	Attic	Basement or crawl space
Cold, with mainly heating requirements	Gas/oil	R-38 to R-49	R-11 to R-22	R-25	R-11 to R-19	R-6 to R-11	R-2 to R-11
	Heat pump or electric resistance	R-49	R-11 to R-28	R-25	R-13 to R-19	R-6 to R-11	R-2 to R-11
(a) Adapted from the U.S. Department of Energy 1997 Insulation Fact Sheet available at (800)-DOE-EREC and Modera et al., Impact of Residential Duct Insulation on HVAC Energy Use and Life Cycle Cost to Consumers, *ASHRAE Transactions* 96-13-4.							

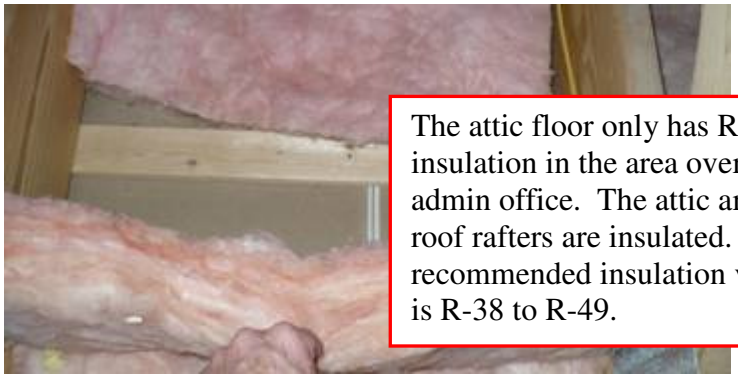
An R-value indicates insulation's resistance to heat flow with the higher the R-value, the greater the insulating effectiveness.

The R-value depends on the type of insulation and includes its material, thickness, and density. When calculating the R-value of a multilayered installation, add the R-values of the individual layers. Installing more insulation in your facility increases the R-value and the resistance to heat flow.

Type	Density	R Value (avg)
	Lb/CF	Per inch
Fiber Glass batts	2.5	3.0
Rock Wool	2.0	3.0
Cellulose	2.5	3.0
Pertlite (loose fill)	6.0	2.5
Vermiculite (loose fill)	6.0	2.5
Polystyrene rigid board	2.5	4.0
Polyurethane (rigid boards)	3.0	6.0
Polyisocyanurae (rigid boards)	3.0	6.0
Urethane Foam (sprayed)	2.0	8.0

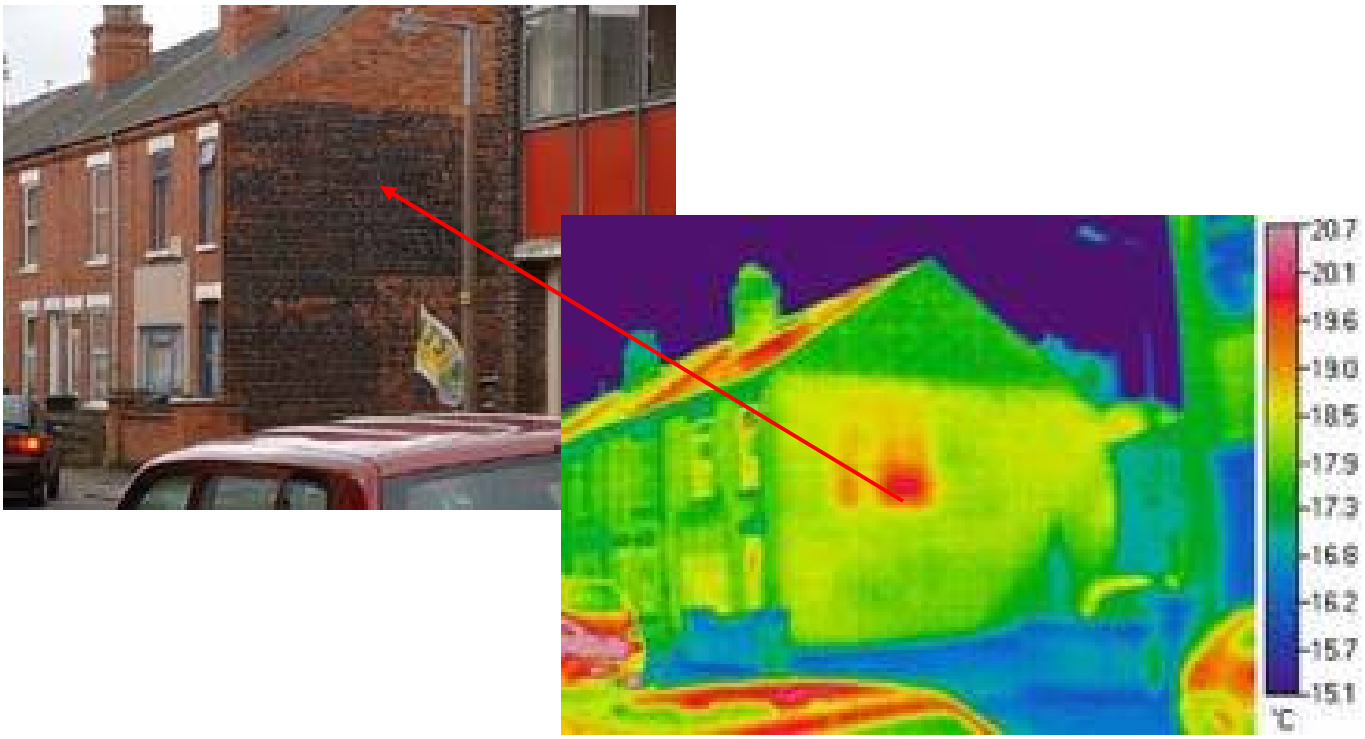
The effectiveness of insulation's resistance to heat flow also depends on how and where the insulation is installed. For example, insulation that is compressed will not provide its full rated R-value. The overall R-value of a wall or ceiling will be somewhat different from the R-value of the insulation itself because some heat flows around the insulation through the studs and joists. Therefore, it is important to properly install your insulation to achieve the maximum R-value. The Department of Energy web site below has additional information on insulation:

http://www1.eere.energy.gov/consumer/tips/insulation.html



The attic floor only has R11 insulation in the area over the admin office. The attic area roof rafters are insulated. The recommended insulation value is R-38 to R-49.

You may want to consider an infrared survey of your building to accurately determine the areas of heat escaping from your building. Below is an example of a brick building showing heat escaping (brighter colors) due to lack of insulation.



HEATING SYSTEM

Do-It-Yourself Measures:

- ☐ **Lower Heating Temperature**
- ☐ **Install New Furnace Filter as needed**

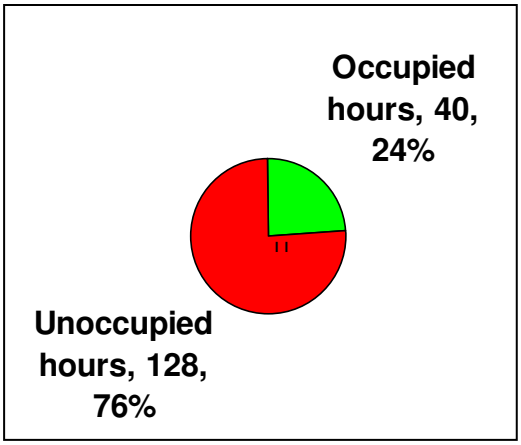
Service Technician:

- ☐ **Improve Controls**
- ☐ **Clean Heat Exchange Surfaces Annually**
- ☐ **Convert to Alternative Fuel**
- ☐ **Seal Leaky Air Ducts with Mastic**
- ☐ **Insulate Pipes/Ductwork**
- ☐ **Clean, Tune, & Evaluate Burner**
- ☐ **Install New Burner**
- ☐ **Replace Heating System**

Comments: Heat is provided by a 2003 Burnham oil-fired boiler that fires at a rate of 4.2 gallons per hour. Hot water is distributed via baseboard radiators in the original portion and forced hot air in the new section. The second level of the original section has been converted from baseboard to forced hot air.

There are a variety of thermostats in the building. These should be reviewed for proper settings and operations.

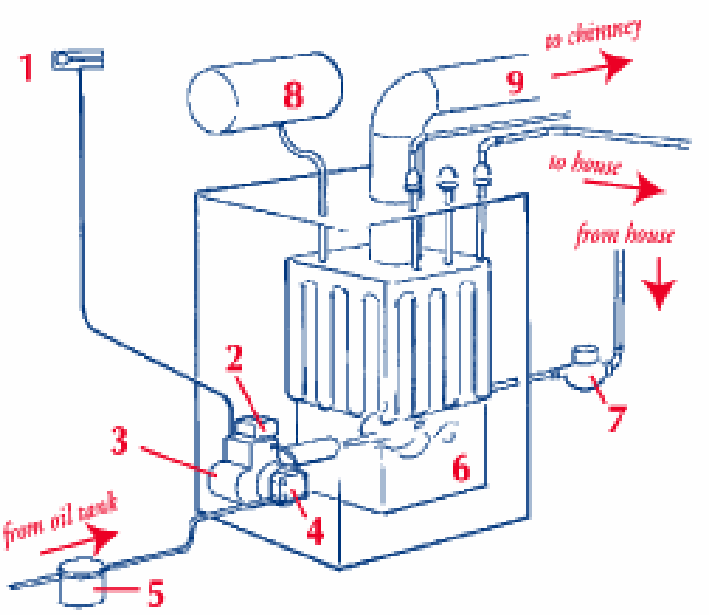
It is important to ensure that you have the ability to program your thermostats seven days a week. With the price of escalating fuel costs, this is one of the most important energy conservation measures you can take. For example, if the building is occupied 8 hours a day for 5 days a week, then it is only occupied 25% of a 7-day week.



As you can see by the red area on the pie chart, without an aggressive automatic programmed thermostat setback program, energy savings can be lost due to unnecessary heating/cooling of the building during the unoccupied hours. A comprehensive review of the building use should also be considered to include extended hours, janitorial service, etc.

Schematic Hydronic Oil Boiler System:

The thermostat (1) sends a signal to the controls (2) on the burner (3). The fuel pump (4) draws oil through a filter (5) to the burner. The burner turns the oil into a fine spray, mixes it with air and ignites it in the combustion chamber (6), causing the chamber to get very hot. Water circulates around the combustion chamber. A circulator (7) pumps the heated water through radiators or baseboards to heat the facility. An expansion tank (8) adjusts to varying pressures. Eventually, the water returns to the heating unit to begin the cycle again. Combustion emissions are vented out the flue (9).



It was reported that there are a number of portable heaters used during the winter. The table below indicates the energy and cost to operate portable electric space heaters which is approximately 10% of the annual electric consumption

Portable Electric Space Heaters												
	Location	Fixture type	# of fixtures	Watts per Fixture	Daily Total kWh	Hrs/ Day	# of Days	Annual Operating Hours	Yearly Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
Existing	Various	Portable heaters	5	1500	7.5	8	150	1200	9000	$1,350		
Retrofit	Various	Portable heaters	5	1500	7.5	4	150	600	4500	$675	$675	4500
									Yearly Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
									9000	$1,350	$675	4,500
Electric - Estimated Carbon Dioxide (CO2) Savings Tons Per Year												3.5

The portable space heaters represent approximately 10% of your electrical consumption.

There is a general rule of thumb that is applicable to reducing thermostats: for each degree you lower the thermostat, you can save between 1-3% of your energy bill.

DOMESTIC HOT WATER

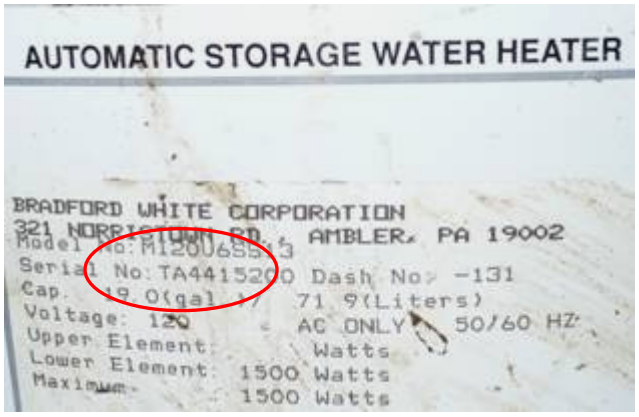
Do-It-Yourself Measures:

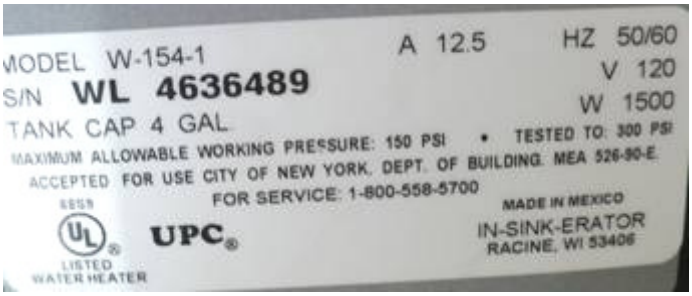
- ☐ **Lower temperature settings**
- ☐ **Flush tank to remove sediment**
- ☐ **Install flow restrictors on showers & faucets**
- ☐ **Insulate pipes**
- ☐ **Repair Leaky Faucets**

Service Technician:

- ☐ **Install point-of-use water heaters**
- ☐ **Repair leaks**
- ☐ **Clean coil of scale buildup**
- ☐ **Switch fuel type**
- ☒ **Install or reset time clocks**

Comments: Hot water is provided by a 19 gallon electric hot water heater located in the basement. There are no controls. There are two small four gallon electric hot water heaters in the restrooms in the new section. Likewise, these do not have any external controls.





Recommend that you investigate the installation of a seven day electronic/mechanical timer switch on your domestic hot water tank. An Intermatic Series 24 Hour Dial Model T104 is shown as an example for your information (www.intermatic.com). The table below indicates the potential savings that may be achieved by controlling the hot water heater with a timing clock.

Electric Water Heater add Timer												
	Location	Fixture type	# of fixtures	Watts per Fixture	Daily Total kWh	Hrs/ Day	# of Days	Annual Operating Hours	Yearly Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
Existing	Basement	19 Gal Electric Water Heater	1	1500	1.5	3	365	1095	1642.5	$246		
Retrofit	Basement	Add 7 day timer	1	1500	1.5	1	260	260	390	$59	$188	1253
Existing	Restrooms	4 Gal Electric Water Heater	2	1500	3	2	365	730	2190	$329		
Retrofit	Restrooms	Add 7 day timer	2	1500	3	0.5	260	130	390	$59	$270	1800
									Yearly Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
									3832.5	$575	$458	3,053
Electric - Estimated Carbon Dioxide (CO2) Savings Tons Per Year												2.4

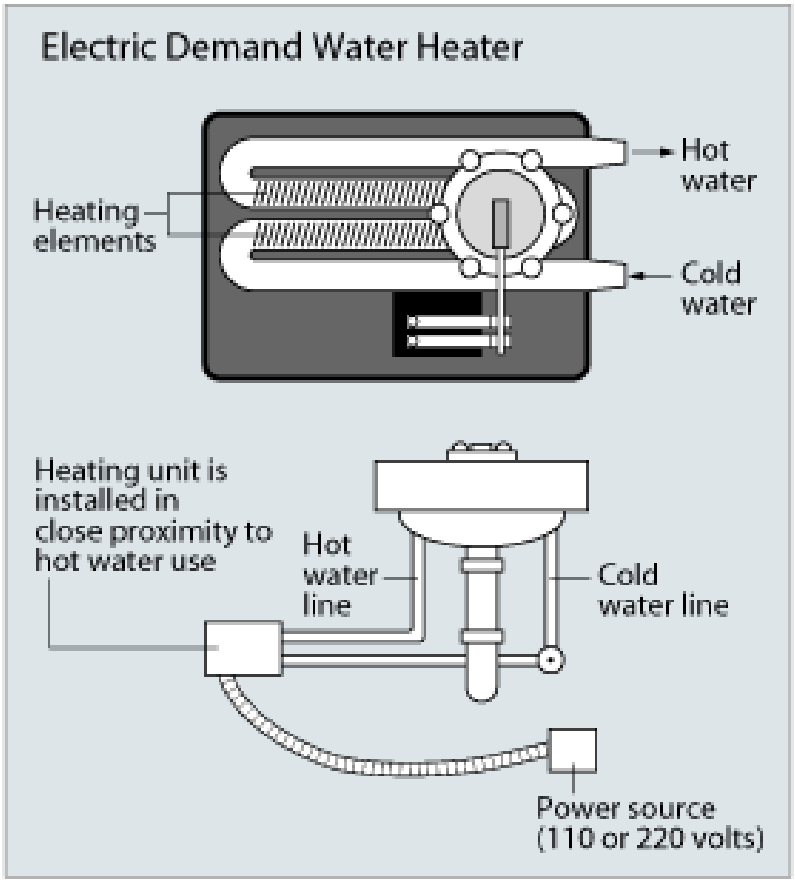
The electric hot water represents approximately 5% of your electrical consumption.

If your existing hot water tank fails, you should investigate/consider an "on-demand" (tankless or instantaneous) water heater. They provide hot water only as it is needed. Demand water heaters heat water directly without the use of a storage tank. Therefore, they avoid the standby heat losses associated with storage water heaters, which can save you money. When a hot water tap is turned on, cold water travels through a pipe into the unit and an electric element heats the water. As a result, demand water heaters deliver a constant supply of hot water. You do not need to wait for a storage tank to heat up and you only consume energy when you open the faucet.

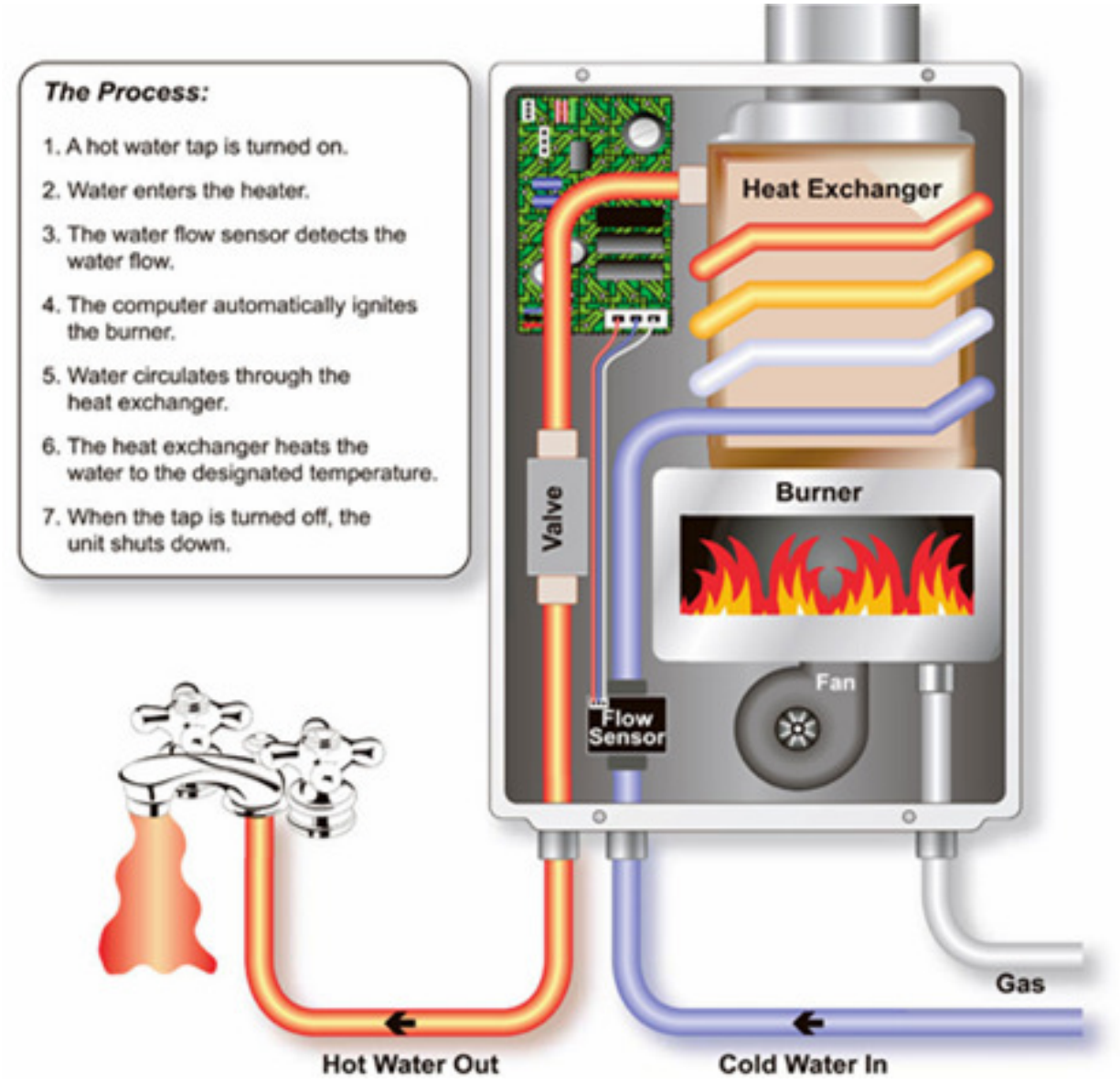
Tankless Water heaters	
Brand	Website
Bosch (Aquastar)	www.boschhotwater.com
Bradford White	www.bradfordwhite.com
Eccotemp	www.eccotemp.com
Infinion	www.tanklesswaterheaters.com
Monitor Products	www.monitorproducts.com
Noritz	www.noritzamerica.com
Paloma	www.palomawaterheaters.com
Rheem / Ruud	www.rheemtankless.com
Rinnai	www.foreverhotwater.com
Takagi	www.takagi.com
Toyotomi	www.toyotomiusa.com

How do demand water heaters work?: When a hot water tap is turned on, cold water travels through a pipe into the unit and the water is heated almost instantly by an electric element or gas-fired heat exchanger. As a result, demand water heaters deliver a constant supply of hot water. You do not need to wait for a storage tank to heat up and you only consume energy when you open the faucet. Typically, "on-demand" tankless water heaters provide hot water at a rate of 2–8 gallons per minute. The table to the right has the web sites of tankless water heater manufacturers. There are two basic types: electric and gas fired:

Electric demand water heaters provide approximately 2 gallons per minute and are typically used for small demands such as sinks in restrooms. These units eliminate the piping and heat source from typical hot water heaters, thereby saving energy. These units are $100-$300 each plus installation.



Gas-fired demand water heaters produce higher flow rates, up to 8 gallons per minute. These are typically used for higher demand appliances such as showers, dishwashers, washing machines, etc. Below is a schematic of a typical on-demand gas fired tankless heater.



Check with you local supplier for information regarding on-demand water heaters. The "ball park" range for a unit is approximately $1200-$1800, plus installation.

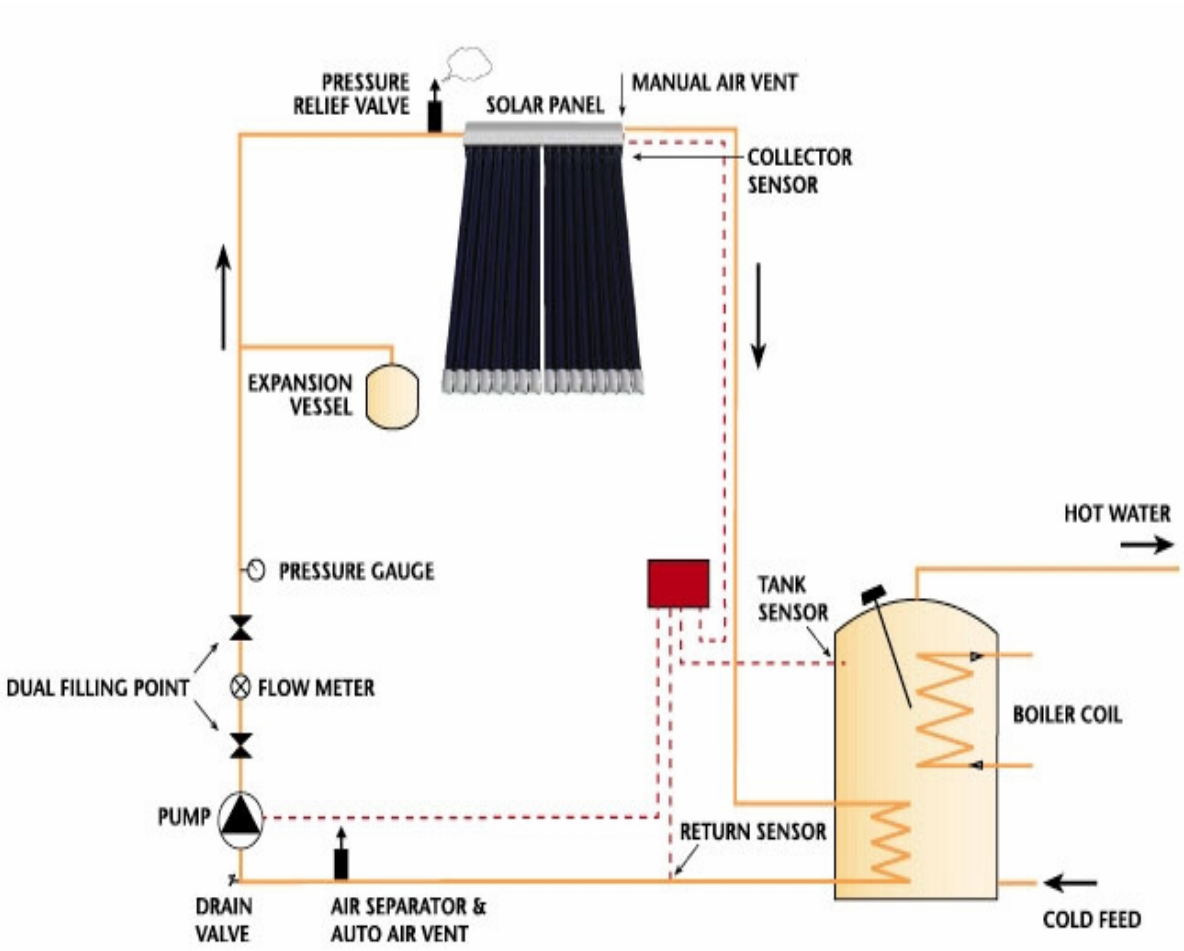
ALTERNATIVE ENERGY

Solar Energy

Below is information from the Efficiency Maine **Solar Thermal Systems**:
http://efficiencymaine.com/renewable_programs_solar.htm

- Solar hot water systems must be installed by licensed plumbers who have been qualified to install such systems by the Maine Public Utilities Commission, or by licensed plumbers working with someone who has been qualified to install such systems by the Maine Public Utilities Commission;
- List of Certified Solar Thermal Installers;

The schematic below is a typical domestic solar hot water system:



Wind Energy

Although rules have not yet been established for this program, we do know the following things about the program, which are part of the law signed by Governor Baldacci on April 18, 2008.

1. System has a peak generating capacity of 100 kilowatts or less that converts wind energy to electrical energy for use primarily in a residence, public facility or place of business that is located in an area with demonstrated wind power potential.
2. Installed in accordance with this subsection after January 1, 2009 that will be connected to the electrical grid.
3. Must be installed by a master electrician or by a factory trained and approved dealer for the qualified wind energy system working under the supervision of a master electrician.
4. Incentive is limited to residents of the state.

The following web sites provide additional information on wind generation. The True Winds site will tell you exactly what your average wind speed is based on your location.
WIND GUIDE: http://www.nrel.gov/docs/fy07osti/41954.pdf
TRUE WINDS: http://truewind.teamcamelot.com/ne/

AIR CONDITIONING

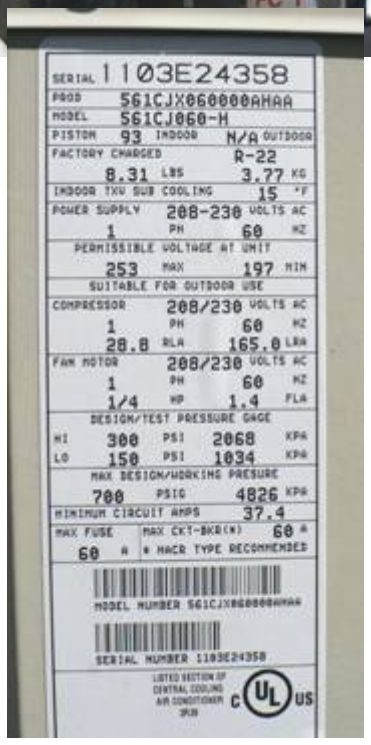
Do-It-Yourself Measures:

- ☐ **Clean outside air & return grilles**
- ☐ **Clean or replace air filters as needed**
- ☐ **Raise Cooling Temperatures**
- ☐ **Install Tinted Shades on South-Facing Windows**
- ☐ **Service Air Dampers**
- ☐ **Shut down ventilation system during unoccupied times**
- ☐ **Clean Cooling Coil Surfaces**
- ☐ **Complete Scheduled Maintenance Improvements**

Service Technician:

- ☐ **Seal leaky air ducts**
- ☐ **Vent Bathroom to Outdoors**
- ☐ **Improve Controls**
- ☐ **Evaluate System Efficiency**
- ☐ **Reduce ventilation rates where possible**
- ☐ **Replace or modify outside air dampers**
- ☐ **Improve Pipe/Duct Insulation**
- ☐ **Repair Leaks**

Comments: The air conditioning is provided by five Bryant units. These fan coil units are located in the attic areas. They deliver conditioned air via ductwork throughout the building. The condensing units are located outside in the area adjacent to the boiler room.

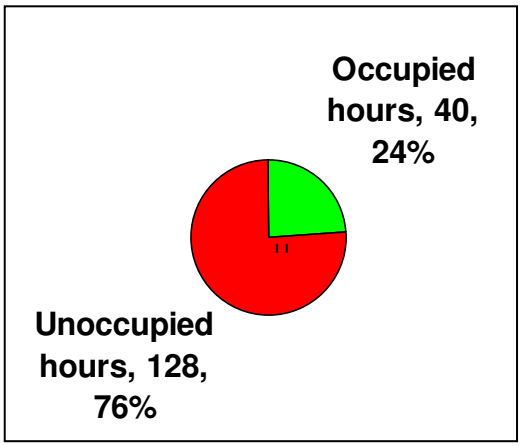


It is suggested that you consider a comprehensive assessment of your air conditioning and ventilation systems to determine if efficiency and energy savings may be obtained. There are prescriptive cash incentives specifically for upgrading any older HVAC units. Cash incentives for air conditioning can be found at the following web site: http://www.efficiencymaine.com/pdfs/Prescriptive-Cash-Incentives.pdf . One ton equals 12,000 Btu's.

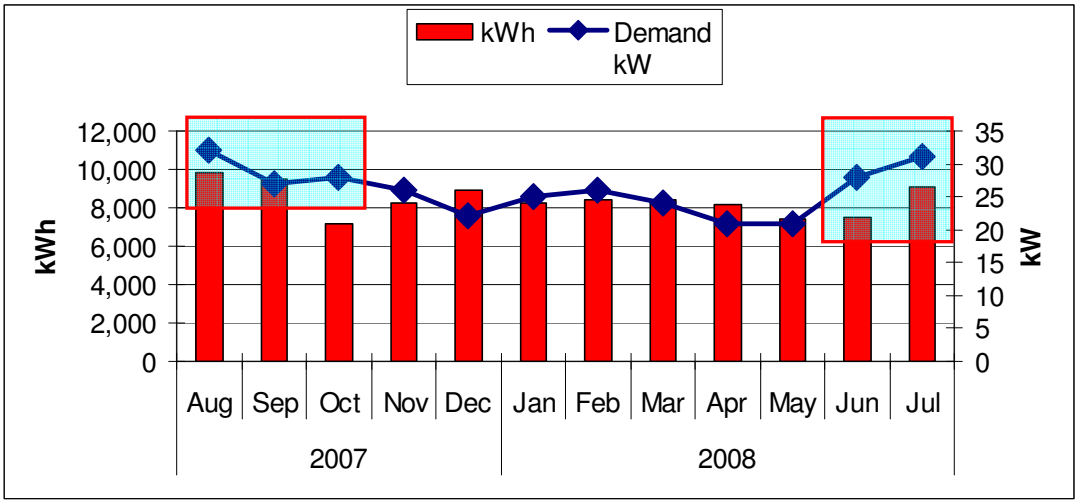
HVAC

Equipment Capacity (Tons)	Equipment Capacity (Btuh)		Minimum SEER or EER	Maximum Incentive ($/Ton)
Unitary AC and Split Systems				
< 5.4	< 65,000		14.0 SEER/12.0 EER	$125.00
≥ 5.4 to < 11.25	≥ 65,000 to < 135,000		11.5 EER	$ 80.00
≥ 11.25 to < 20	≥ 135,000 to < 240,000		11.5 EER	$ 80.00
≥ 20 to < 63	≥ 240,000 to < 760,000		10.5 EER	$ 50.00
≥ 63	≥ 760,000		9.7 EER	$ 50.00
Air-to-Air Heat Pump Systems				
< 5.4	< 65,000	Split	14.0 SEER & 8.5 HSPF	$125.00
< 5.4	< 65,000	Packaged	14.0 SEER & 8.0 HSPF	$125.00
≥ 5.4 to < 11.25	≥ 65,000 to < 135,000		11.5 EER	$ 80.00
≥ 11.25 to < 20	≥ 135,000 to < 240,000		11.5 EER	$ 80.00
≥ 20	≥ 240,000		10.5 EER	$ 50.00
Water Source Heat Pump Systems				
< 11.25	< 135,000		14.0 EER	$ 80.00
Dual Enthalpy Economizer Controls *(when installed with new, qualifying eligible equipment)*				$250.00/unit
Demand Control Ventilation *(when installed with new, qualifying eligible equipment)*				$200.00/unit

Newer AC units use scroll compressors which are approximately 30% more efficient than reciprocating compressors. Evaluate your existing system to determine compressor type. Also, it is important to review HVAC temperature controls to ensure that the system is not running during the unoccupied hours.



The blue shaded boxes represent the building's air conditioning load.



The air conditioning represents an estimated 20% of your electrical consumption.

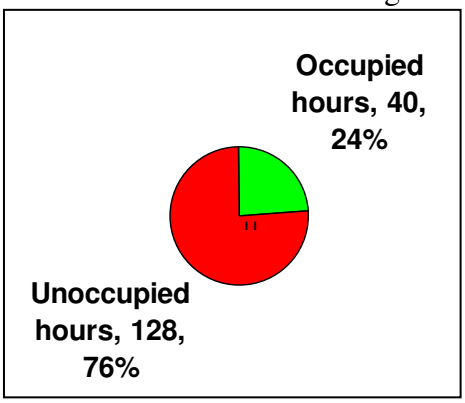
There is a general rule of thumb that is applicable to raising thermostats: for each degree you raise the thermostat during the cooling season, you can save between 1-3% of your energy bill.

VENTILATION

Do-It-Yourself Measures:

- ☐ **Clean outside air & return grilles**
- ☒ **Clean or replace air filters as needed**
- ☐ **Service Air Dampers**
- ☐ **Shut down ventilation system during**

Comments: Ventilation is provided by the heating, ventilation and air conditioning system. It was reported that the fans are on 24 hours a day all year. This should be reviewed with your HVAC technician to determine is this is resulting in additional heating and cooling cost during the building's unoccupied hours.



Exhaust Fans												
	Location	Fixture type	# of fixture	Watts per Fixture	Daily Total kWh	Hrs/ Day	# of Days	Annual Operating Hours	Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
Existing	Various	Various	6	30	0.18	24	365	8760	1,577	$237		
Retrofit	Various	Various	6	30	0.18	12	260	3120	562	$84	$152	1,015
									Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
									1,577	$237	$152	1,015
Estimated Carbon Dioxide (CO2) Savings Tons Per Year												0.8

The exhaust fans represent about 2.5% of the electric consumption.

There is a general rule of thumb that is applicable to reducing thermostats: for each degree you lower the thermostat, you can save between 1-3% of your energy bill.

REFRIGERATION

Do-It-Yourself Measures:

- ☐ Replace Door Gaskets
- ☐ Clean Condenser/Coil Surfaces
- ☒ Maintain Correct Temperature Settings
- ☐ Log System Performance Settings

Service Technician:

- ☐ Maintain Proper Refrigerant Levels/Press.
- ☐ Maintain Proper Operating Pressures
- ☐ Install Outside Economizer
- ☐ Install Glass Door Heater Control

Comments: There is no commercial refrigeration. It was reported that the dehumidifier runs 24 hours a day all year. The table below indicates the estimated annual cost to run the dehumidifier.

Dehumidifier												
	Location	Fixture type	# of fixture	Watts per Fixture	Daily Total kWh	Hrs/ Day	# of Days	Annual Operating Hours	Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
Existing	Various	Dehumidifier	1	450	0.45	24	365	8760	3,942	$591		
Retrofit	Various	Add Timer and reduce six hours a day	1	450	0.45	18	365	6570	2,957	$443	$148	986
									Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
									3,942	$591	$148	986
Estimated Carbon Dioxide (CO2) Savings Tons Per Year												0.8

The dehumidifier represents about 5% of the electric consumption.

MOTORS

Do-It-Yourself Measures:

☐ **Lubricate Bearings**
☒ **Check/Replace Belts**
☐ **Clean Motor Housing**

Service Technician:

☒ **Evaluate Motor Efficiency**
☐ **Match Motor Size to Loads**
☐ **Replace with More Efficient Model**
☐ **Consider Installing Variable Speed Drive**

Comments: Motors can consume a significant amount of energy which contributes to the electrical bill in two ways, by daily electrical consumption (kWh's) and the electrical demand (kW).

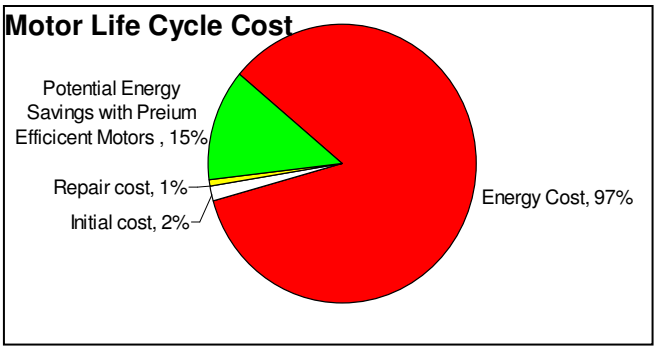
The sump pumps runs 12 hours a day all year.

Sump Pump

	Location	Fixture type	# of fixture	Watts per Fixture	Daily Total kWh	Hrs/ Day	# of Days	Annual Operating Hours	Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
Existing	Basement	Sump Pump	1	700	0.7	12	365	4380	3,066	$460		
Retrofit	Basement	No Change	1	700	0.7	12	365	4380	3,066	$460	$0	0
									Annual Total kWh	Annual Cost @ $.15kWh	Potential Annual Savings	Annual kWh Saved
									3,066	$460	$0	0
											Estimated Carbon Dioxide (CO2) Savings Tons Per Year	0.0

This represents about 5% of the electric consumption

General information on motors and Adjustable Speed Drives (ASD): Motors are designed to run at a constant speed. However, motor drive systems are often operated at part or variable load. In particular, fans and pumps can have highly irregular load profiles. This means, the motors on these systems either run at constant speed bypassing the excess capacity, or use some form of capacity regulation such as dampers, valves, or inlet guide vanes, all of which are very inefficient. Premium efficient motors can save up 15% of energy cost and up to 50% by controlling or adjusting the speed of the motor using one of five different types of Adjustable Speed Drives (ASDs):



- Variable Frequency Drives (VFDs)
- DC Adjustable Speed Drives
- Eddy Current Drives
- Hydraulic Drives
- Mechanical Drives

Typically, VFDs offer higher efficiencies, are easier to control, require less maintenance, and have become the drive of choice in the majority of applications. In addition, speed control is generally the most energy efficient flow control technique because it requires the least amount of energy to meet the given load.

Below are the cash incentives for replacement motors. Be sure your maintenance personnel or contractors are aware of these if they are replacing motors.

NEMA Premium® Efficiency Motors Open Drip-Proof Motor	
1 & 1.5HP	$ 45.00
2, 3 & 5HP	$ 54.00
7.5HP	$ 81.00
10HP	$ 90.00
15HP	$104.00
20HP	$113.00
25HP	$117.00
30HP	$135.00
40HP	$162.00
50HP	$198.00
60HP	$234.00
75HP	$270.00
100HP	$360.00
125HP	$540.00
150HP & 200HP	$630.00

NEMA Premium® Efficiency Motors Enclosed Fan-Cooled Motor	
1 & 1.5HP	$ 50.00
2, 3 & 5HP	$ 60.00
7.5HP	$ 90.00
10HP	$100.00
15HP	$115.00
20HP	$125.00
25HP	$130.00
30HP	$150.00
40HP	$180.00
50HP	$220.00
60HP	$260.00
75HP	$300.00
100HP	$400.00
125HP	$600.00
150HP & 200HP	$700.00

ELECTRONIC EQUIPMENT

Do-It-Yourself Measures:

☒ **Turn Off Equipment When Possible**
☐ **Adjust Settings to Improve Efficiency**
☐ **Upgrade to More Efficient (Energy Star) Model**

Comments: Most new office equipment is Energy Star compliant and has energy saving software installed. Consult your manual for activating this feature.

Simply shutting off the computer monitor when not in use saves the equivalent of turning off a 60 to 100 watt light bulb. "Screen Savers" require as much energy as leaving your monitor on. "Sleep" mode lowers energy consumption to about 25 watts or less. Establish an office policy to shut down all non-essential computers nightly (i.e., servers and computers that are not externally accessed after office hours). See table below for a typical desk top computer savings.

There is a potential annual savings from **$12-75 a year per computer** by simply shutting the computer off at the end of the work day and programming the sleep mode during the work day. See examples below:

The first example shows the savings of a computer left on 24/7 vs. a typical work day of eight hours for five day work week:

	Location	Fixture Type	Number of Fixtures	Watts per Fixture	Total kW	Hours/ day	# of Days	Annual Operating Hours	Total kWh	Annual Cost @ $.15/kWh	Potential Annual Savings	Annual kWh Saved
1. Existing	Office	Computers on 24 hrs /day/ 7 days	1	75	0.075	24	365	8760	657	$99		
1. Retrofit	Office	Computers on 8hrs /day /5 days	1	75	0.075	8	260	2080	156	$23	$75	501
										SAVINGS	$75	501

The second example shows the savings of a computer left on 24 hours a day for a typical five day work week vs. eight hours a day for a typical five day work week:

	Location	Fixture Type	Number of	Watts per Fixture	Total kW	Hours/ day	# of Days	Annual Operating	Total kWh	Annual Cost @ $.15/kWh	Potential Annual	Annual kWh
1. Existing	Office	Computers on 24 hrs /day/ 5 days	1	75	0.075	24	260	6240	468	$70		
1. Retrofit	Office	Computers on 8hrs /day/ 5 days	1	75	0.075	8	260	2080	156	$23	$47	312
										SAVINGS	$47	312

The last example shows the savings for a computer left on eight hours a day for a five day work week vs. a computer programmed for sleep mode with an average on time of four hours a day for a typical five day work week.

	Location	Fixture Type	Number of Fixtures	Watts per Fixture	Total kW	Hours/ day	# of Days	Annual Operating Hours	Total kWh	Annual Cost @ $.15/kWh	Potential Annual Savings	Annual kWh Saved
1. Existing	Office	Computers on 8 hrs /day/ 5 days	1	75	0.075	8	260	2080	156	$23		
1. Retrofit	Office	Computers sleep mode on 4hrs /day/ 5 days	1	75	0.075	4	260	1040	78	$12	$12	78
										SAVINGS	$12	78

As you can see, it is important to have an office policy regarding computers. Education is a key component in achieving savings with computers such as publishing the potential savings on the employee bulletin board. In a typical office, people attend meetings, take coffee and lunch breaks, etc. which are all opportunities for computer energy savings.

There are a number of measures that may be applicable to help you generate and sustain energy savings such as ensuring copy machines and other equipment are programmed for sleep modes. Below is an example of a typical large stand alone office copier.

- Example 1: The copier is left on 24/7/365 days. The retrofit configures the copier to be on eight hours a day for a five day work week without the energy savings setting selected.

	Location	Fixture Type	Number of Fixtures	Watts per Fixture	Total kW	Hours/ day	# of Days	Annual Operating Hours	Total kWh	Annual Cost @ $.15/kWh	Potential Annual Savings	Annual kWh Saved
1. Existing	Office	Copier 24/7	1	1440	1.44	12	365	4380	6,307	$946		
1. Retrofit	Office	Copier 8hrs for 5 days a day w/out energy savings selected	1	1440	1.44	8	260	2080	2,995	$449	$497	3,312

- Example 2: The copier is on 24/7/260 days. The retrofit configures the copier with the energy savings mode selected which results in an approximate “on time” of four hours per day (could be less) during a normal work week.

	Location	Fixture Type	Number of Fixtures	Watts per Fixture	Total kW	Hours/ day	# of Days	Annual Operating Hours	Total kWh	Annual Cost @ $.15/kWh	Potential Annual Savings	Annual kWh Saved
1. Existing	Office	Copier 8 hrs for 5 days	1	1440	1.44	8	260	2080	2,995	$449		
1. Retrofit	Office	Copier 8hrs for 5 days with energy savings selected	1	1440	1.44	4	260	1040	1,498	$225	$225	1,498

Therefore, standing by the copier waiting for the 30 second warm up period can result in energy savings and ensuring the copier machine is off or programmed for sleep mode after hours and weekends will result in significant savings.

MISCELLANEOUS

Another way to maximize overall energy efficiency is to consider employee involvement. They may have energy conservation suggestions for their area. Sometimes an employee incentive program provides helpful cost savings measures.

Delivered to you during the walk-through audit for your continued energy management plan were various resource materials such as "Energy Efficiency Pays – A Guide for the Small Business Owner". These resources will provide appropriate information on a variety of building systems.

There are a variety of valuable information and resources available from the "Efficiency Maine - Business Program". Information can be obtained by:

- Visiting the **www.efficiencyMAINE.com** website.
- Or calling 1-866-376-2463
- There are specific prescribed cash incentives for lighting, motors, air conditioning systems, etc. They can be found at the following web site:
  - **http://www.efficiencymaine.com/pdfs/Prescriptive-Cash-Incentives.pdf**.
- Should you need additional contractor/product information, please consult with an Efficiency Maine Participating Program Ally, listed under the "Business Section" which can viewed at the following web site:
  - **http://gdsit.gdsassociates.com/efficiencymainesearch/**
- The Small Business Low Interest Loan Program is to assist small commercial, non-profit, and manufacturing facilities (less than 50 FT employees or less than $5,000,000 in annual sales) with funding Efficiency Maine-approved energy conservation measures by providing loans up to $35,000 at 3% interest (current fixed rate). The Maine Public Utilities Commission's Efficiency Maine Program, administers this program. Additional information can be found at the following web site:
  - **http://efficiencymaine.com/business_programs_sblilp.htm**
- Other valuable resources for energy information can be located on the website **www.maineenergyinfo.com**. It is a cooperative project of nine state agencies to provide easy access to Maine energy information.

Eligibility for cash incentives:

Eligibility

- Incentives are available to all non-residential customers. That includes commercial businesses, as well as nonprofit organizations, public and private schools (K-12), colleges, local and county governments, state buildings, farms, airports, water and wastewater facilities, quasi-governmental and other regional systems.
- Products purchased with Efficiency Maine incentives must be installed in your place of business in Maine.
- *Pre-approval is NOT required for agriculture and motors applications. It is also NOT required for lighting and refrigeration projects when the incentive is under $1,000.*
- *Pre-approval IS required for lighting and refrigeration applications with incentive payments over $1,000. It also IS required for all HVAC, variable frequency drive and custom applications.*
- Incentives are available for retrofit applications or new construction, unless otherwise specified.

Guidelines and contact:

Guidelines

- Each business is eligible for Efficiency Maine incentives up to $100,000 per business, per calendar year or $200,000 over a two-year period.
- Measures that save electricity, but are not noted as a prescriptive incentive measure, may be eligible under our custom incentive program. Contact us for more information at 866-376-2463.
- Efficiency Maine may wish to inspect the installation and energy use of the products for which incentives are paid at your convenience.
- Efficiency Maine may publicize your participation in this program, unless otherwise requested.
- Please note that our specific incentives can change over time. Be sure you get the latest documents when you apply.

Efficiency Maine is a statewide effort to promote the more efficient use of electricity, help Maine residents and businesses reduce energy costs, and improve Maine's environment. Efficiency Maine is funded by electricity consumers and administered by the Maine Public Utilities Commission.

efficiencymaine.com • 866-376-2463

In summary, there are a number of energy reducing consumption opportunities identified for your building. We hope you take the opportunity to review and investigate these potential saving opportunities. For specific questions or comments regarding this report, you may contact:

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