Energy Audit Report

St. Lawrence University Canton, NY

58 Park St - Outing Club

Prepared By:

L&S Energy Services, Inc.
58 Clifton Country Road
Suite 101
Clifton Park, NY 12065

Community Energy Services, Inc.
101 Main Street
Canton, NY 13617

July 2008

Facility Name:	58 Park St - Outing Club
Facility Location:	St. Lawrence University

Facility Address:	58 Park St.
Facility City:	Canton
Facility State:	NY
Facility Zip:	13617
Facility County:	St. Lawrence

Contact Name:	Louise Gava
Contact Title:	Coordinator of Sustainability Projects
Contact Phone:	315-229-5825
Contact Fax:	
Contact Email:	lgava@stlawu.edu

Size of Facility:	4,416 Sq. Ft.

Total Annual Energy Costs	$7,446.31
Electric	$575.87
Natural Gas	$6,870.44
Water and Sewer	$2,431.17

Type of Facility (included in Abstract):

College Dormitory - Theme House

58 Park St - Outing Club

ABSTRACT

The purpose of this study was to investigate and report on the effects of installing various energy and water conservation measures for this building. An on-site visit was conducted by an experienced energy auditor from Community Energy Services, Inc. familiar with this type of facility. During a site survey conducted on June 4, 2008 data was gathered through visual inspections of the building shell and its equipment and through the use of diagnostic testing where appropriate. Data was used to produce a computer model of the facility using TREAT modeling software to predict potential energy savings from recommended improvements. Provided utility bills were reviewed to correlate the building model with actual usage. Results were compiled by L&S Energy Services, Inc. to produce this report.

SUMMARY

A summary of the recommended energy improvement measures is shown at the end of the report titled Improvement Packages. Projected savings are expressed in terms of simple payback and SIR (Savings to Investment ratio). Simple payback is calculated by dividing the estimated cost by the annual estimated savings. Simple payback is the estimated number of years it takes for energy saving to pay back your investment in the cost of improvements if interest and inflation rates are zero. SIR is a calculation that compares the return of investing capital in an interest bearing account versus in the improvements. An SIR greater than 1 means an investment in the projected measures has a better than projected return than an interest bearing account.

The estimate may include items that do not produce enough energy cost savings to justify implementation. However these measures can save significant energy in the building and/or improve the comfort and/or safety of the residence. The estimate may also include items that produce no savings but can improve the comfort and/or safety of the residence. These items have a negative impact on the payback and the SIR of the overall package.

If all the recommended energy improvement measures are implemented the total cost of the project is estimated at $34,040. The annual cost savings is estimated to be $3,250. The recommended measures are projected to save 34.2% of the buildings current energy use. The energy improvement measures have a combined SIR of 1.78. Annual emissions savings are listed in Table 1.

No water saving measures were identified for this building.

58 Park St - Outing Club

Description of Existing Building Systems

1.1 BUILDING ENVELOPE

58 Park Street, also known as the Outing Club, is a two story building with a partial basement reportedly built around 1940. The building is used as a student residence. It is occupied primarily during school sessions. Occupancy is reduced in the summer and during school breaks. The building contains a common kitchen facility and a common laundry facility.

There are three main sections of the building. These are: 1) An older two story wood-framed section over a full basement, 2) a newer two story section constructed of concrete block over a slab, 3) A one story section that is constructed over a crawlspace, connecting the other two sections. The 2-story sections house nearly all the living and sleeping space. The one story central section consists mostly of a hallway and a bathroom. The basement is entered from the kitchen in the older two-story section. The attic of the older 2 story section is accessible from a ladder on the exterior of the building. The two story concrete section has a flat roof and is assumed to have no attic space. The one story attic was not accessible during the site visit.

The walls of the older wood-framed two story section are believed to be insulated with rockwool. The one story section is newer and presumably insulated with 3.5 inches of fiberglass. The newer 2 story concrete block section is reportedly uninsulated block. The basement is unheated and uninsulated.

Windows are primarily double glazed with vinyl frames. There are two stained glass windows which are fitted with interior storm windows. There are some solid wood and some insulated steel doors. The front double doors have poor weatherstrip.

The unconditioned basement is used for mechanical systems and laundry. The walls of the basement are uninsulated masonry, and the rim joists are also uninsulated. The basement was found to be very warm at the time of the site visit. The floor of the basement is concrete slab. The walls of the crawlspace are insulated with 2 inches of foam.

The attic over the older two-story wood framed section of the structure has about 2-3 inches of rockwool in poor condition. Much of the attic has a wood floor. The newer 2 story block section is assumed to have 2" of rigid foam or its equivalent. The one story section, given its apparent age, is assumed to have 6" of fiberglass in the attic or its equivalent.

A blower door test performed on the building found substantial air leakage. The second floor of the newer concrete block section is approximately 675 square feet, and was not included in the blower door test because it has no interior door connecting it with the rest of the building.

1.2 HEATING AND COOLING SYSTEMS

The heat for this building is supplied by (2) Weil McLain 175,000 btuh natural gas boilers. The boilers are not original to the building. The boilers are sealed combustion units. Annual combustion efficiency is assumed to be 85% based on combustion efficiency tests performed on the units, manufacturer's specifications and the historical energy usage of the building. Heating hot water piping is uninsulated. The boilers have outdoor resets.

Winter temperature setting is assumed to average 70 degrees F.

1.3 LIGHTING SYSTEMS

Lighting for the common spaces for this building is provided by a combination of hardwired compact fluorescent (cfl) overhead fixtures, U-line fluorescent, T-12 and T-8 linear fluorescent fixtures, and relatively few incandescent bulbs. Common bathrooms have a combination of fluorescent lamps and incandescent bulbs. Common bathrooms do not contain occupancy sensors. Student fixtures are assumed to use incandescent lamps.

1.4 WATER HEATING SYSTEMS

Domestic hot water is provided by an indirect fired natural gas Weil Mclain 75 gallon "Plus 100 series 2" hot water heater. The hot water temperature was measured at 156F in the kitchen. This temperature is dangerous and can cause scalding. Domestic hot water piping in the unconditioned basement is uninsulated. The domestic hot water system includes a recirculation system that circulates water 24 hrs per day.

1.5 WATER USAGE

Water flow rates at nearly all locations were measured at between 1 and 1.6 gallons per minute (GPM) maximum. The sink in the downstairs bath ranged up to 2 GPM. All of the toilets contain Sloan Flushmate high efficiency inserts.

1.6 APPLIANCES

This building has a kitchen on the first floor of the older section, and a laundry area in the basement. The kitchen contains a reasonably efficient Whirlpool top freezer refrigerator, and also an electric range. There is a small dorm refrigerator in the living room. The front loading clothes washer and the electric dryer are both Maytag commercial units.

1.7 VENTILATION

Bathrooms contain bath fans, which operate when the lights are switched on. The bath fans appear to vent to the exterior. Installing humidistats or automatic fan controls can help to reduce humidity and improve indoor air quality. Any attic work should include verification that the bath vents exit to the exterior and do not vent into the attic.

1.8 OTHER OBSERVATIONS

1) Basement was found to be very warm.
2) Natural Gas lines were tested for leaks. No leaks found.
3) The basement contains a plug-in carbon monoxide alarm.

58 Park St - Outing Club

Description of Improvements

2.1 Increase Attic Insulation

Existing Conditions:
The attic over the older two-story wood framed section of the structure has about 2-3 inches of rockwool in poor condition. Much of the attic has a wood floor.

Improvement Specifications:
Increase attic insulation to a minimum of 16 inches by adding blown in cellulose above the existing insulation where possible. If the attic is needed for storage an insulated floor area can be installed consisting of 4 inches of foam board over the existing floor with a plywood surface. Install a sealable attic hatch over the existing stairwell. Insulate the attic hatch to a minimum of R20. Box the hatchway to prevent cellulose from falling into the hatchway as necessary. Weatherstrip the hatch to prevent infiltration. Conduct air sealing prior to insulating. Correct any electrical wiring issues prior to insulating.

2.2 Insulate Flat Roof when Reroofing

Existing Conditions:
The newer 2 story block section is assumed to have 2" of rigid foam or its equivalent.

Improvement Specifications:
Install an additional 4 inches of foam insulation when reroofing. Due to the expense of installing the roof assembly it is not cost effective to increase the insulation value prior to reroofing.

2.3 Insulate Heating Hot Water Piping

Existing Conditions:
Heating hot water piping is uninsulated. The walls of the basement are uninsulated masonry, and the rim joists are also uninsulated. The basement was found to be very warm at the time of the site visit.

Improvement Specifications:
Insulate the Heating Hot Water Piping to an average R-value of 5.0 using rigid foam or fiberglass wrap insulation.

2.4 Insulate Domestic Hot Water Piping

Existing Conditions:
Domestic Hot Water piping in the unheated space is uninsulated. Heat is lost to the mechanical room and basement unnecessarily.

Improvement Specifications:
Insulate the Domestic Hot Water Piping to an average R-value of 5.0 using rigid foam or fiberglass wrap insulation.

2.5 Install an Aquastat on Domestic Hot Water Recirculation Line

Existing Conditions:
The domestic hot water system includes a recirculation system that circulates water 24 hrs per day.

Improvement Specifications:
Install an aquastat on the circulation line to reduce runtime of the circulation pump. Control the pump to run when the return temperature falls below 110F.

2.6 Reduce Infiltration

Existing Conditions:
A blower door test performed on the building found substantial air leakage. The second floor of the newer concrete block section is approximately 675 square feet, and was not included in the blower door test because it has no interior door connecting it with the rest of the building.

Improvement Specifications:
Install weatherstripping on doors as needed. Conduct comprehensive air sealing in conjunction with a blower door to identify areas for sealing. Air leakage appears to be widespread and extensive and particular attention should be paid to air sealing.

2.7 Reduce Hot Water Temperature

Existing Conditions:
The hot water temperature was measured at 156F in the kitchen. This temperature is dangerous and can cause scalding.

Improvement Specifications:
Reduce Hot Water Temperature to 125F.

2.8 Insulate Exterior Block Walls

Existing Conditions:
The newer 2 story concrete block section is reportedly uninsulated block.

Improvement Specifications:
Insulate exterior block walls of the concrete block section. Install a minimum of 2" of foam insulation. Protect the foam insulation with siding.

2.9 Replace Incandescent Lighting with Compact Fluorescent Lamps

Existing Conditions:
Student fixtures are assumed to use incandescent lamps.

Improvement Specifications:
Replace all incandescent lighting with compact fluorescent lamps that provide equivalent light.

2.10 Replace Electric Clothes Dryer with Natural Gas fired Unit

Existing Conditions:
Laundry service is provided by (1) front load commercial washer and (1) electric dryer located in the basement.

Improvement Specifications:
Replace the existing electric dryer with natural gas fired dryer. Combustion gases should be vented to the exterior of the building through solid metal duct flue pipe.

IMPROVEMENT PACKAGES

58 Park Outing Club

For: St. Lawrence University

By: Scott Shipley

Date: 7/16/2008

Evaluated Packages:

Package Name	Cost $	Annual Savings, MMBtu	Annual Savings, $	Payback years	Cashflow $/year	SIR
Improvement Package 1	34,040	233.13	3,250	10.47	252	1.78

Package Description:

1. Improvement Package 1

Improvement Name	Cost ($)	Annual Savings MMBtu	Annual Savings ($)	Payback (years)	Cashflow ($/year)	Improve-ment Life (Years)	SIR in Package
Install Foam Roof insulation When Reroofing	6,760	9.12	114	59.3	-481	20	0.25
Insulate Exterior Block Walls	16,000	78.70	984	16.3	-425	40	1.44
Insulate Domestic Hot Water Pipe	500	3.56	44	11.2	0	20	1.33
Install Insulation on 2nd floor attic	2,400	20.17	252	9.5	41	40	2.46
Install Natural Gas Dryers	850	-3.91	108	7.8	34	15	1.53
Reduce Infiltration	5,000	66.41	830	6.0	390	20	2.49
Install Aquastat	250	2.85	53	4.7	31	10	1.81
Insulate Heating Piping	2,000	49.10	614	3.3	438	20	4.6
Replace incandescents	255	1.95	193	1.3	170	8	5.32

Reduce Domestic Hot Water Temp	25	5.19	58	0.4	55	10	19.72
Total for Package	34,040	233.13	3,250	10.47	252	N/A	1.78

Table 1

Annual Emissions Savings

Fuel Type	NOx (LBS)	SO2 (LBS)	CO2 (LBS)
Electricity	4	8	2,439
Natural Gas	12	0	13,935
Oil	0	0	0
Propane	0	0	0
Other: Other Fuel Type Name	0	0	0
Total	**16**	**8**	**16,373**

ENERGY BILLS

58 Park St - Outing Club

Electric Bills						
Utility:			National Grid/ Constellation Energy			
Rate Class:			SC2D			
Account Number:			Unknown			
Start Billing Date	End Billing Date	Days in Period	Usage (kWh)	Demand (kW)	Cost	Cost per kWh
05/02/06	6/1/06	30	2,524	11.3	$83.81	$0.03
06/01/06	7/3/06	32	1,163	3.8	$29.13	$0.03
07/03/06	8/1/06	29	800	5.7	$14.23	$0.02
08/01/06	8/31/06	30	1,192	10.3	$19.74	$0.02
08/31/06	9/29/06	29	3,344	11.9	$123.59	$0.04
09/29/06	10/31/06	32	3,726	11.4	$121.05	$0.03
10/31/06	12/1/06	31	2,992	15.6	$64.93	$0.02
12/01/06	1/2/07	32	3,233	12.1	$111.03	$0.03
01/02/07	1/31/07	29	2,045	12.2	$76.75	$0.04
01/31/07	3/1/07	29	3,849	12.8	$80.21	$0.02
03/01/07	4/2/07	32	3,432	13.0	$89.26	$0.03
04/02/07	5/1/07	29	3,367	11.5	$124.55	$0.04
Totals 2006			**31,667**		**$938.28**	**$0.03**
05/01/07	6/1/07	31	2,260	11.4	$73.70	$0.03
06/01/07	7/2/07	31	1,266	6.2	$32.76	$0.03
07/02/07	8/1/07	30	725	2.2	$19.63	$0.03
08/01/07	8/30/07	29	906	5.8	$18.81	$0.02
08/30/07	9/28/07	29	3,105	10.4	$81.34	$0.03
09/28/07	10/30/07	32	3,544	12.4	$83.40	$0.02
10/30/07	11/30/07	31	2,945	10.7	$78.19	$0.03
11/30/07	1/2/08	33	2,923	12.4	$32.05	$0.01
01/02/08	1/31/08	29	1,773	10.9	$24.94	$0.01
01/31/08	2/29/08	29	3,207	14.8	$46.71	$0.01
02/29/08	3/31/08	31	2,624	11.3	$42.77	$0.02
03/31/08	4/29/08	29	2,632	10.3	$41.57	$0.02
Totals 2007-2008			**27,910**		**$575.87**	
Average Cost Per kWh					$0.02	

58 Park St. is charged for demand. Though this is a significant part of the cost of electricity given the resident population and the unusual usage patterns it is difficult to assess what devices are leading to the demand charges. Consequently only the price per kWh for electricity is used and potential demand savings is ignored.

Additionally only delivery charges are represented in the above costs. Data for charges from Constellation Energy were not availabe.

58 Park St - Outing Club

Natural Gas Bills					
			St. Lawrence Gas		
Account Number:			Unknown		
Start Billing Date	End Billing Date	Days in Period	Usage (Therms)	Cost	Cost per Therm
3/22/06	4/20/06	29	691	$727.67	$1.05
4/20/06	5/19/06	29	561	$570.43	$1.02
5/22/06	6/20/06	29	132	$138.78	$1.05
6/21/06	7/23/06	32	0	$0.00	$0.00
7/24/06	8/23/06	30	40	$45.16	$1.13
8/22/06	11/22/06	92	66	$73.52	$1.11
9/21/06	10/23/06	32	400	$333.42	$0.83
10/23/06	11/21/06	29	452	$468.61	$1.04
Totals for 2006			**2,342**	**$2,357.59**	
11/21/06	12/21/06	30	667	$754.13	$1.13
12/21/06	1/23/07	33	798	$937.69	$1.18
1/23/07	2/21/07	29	1175	$1,398.37	$1.19
2/21/07	3/22/07	29	1076	$1,306.54	$1.21
3/22/07	4/20/07	29	581	$696.02	$1.20
4/20/07	5/22/07	32	452	$567.84	$1.26
5/22/07	6/21/07	30	107	$146.54	$1.37
6/21/07	7/23/07	32	17	$38.54	$2.27
7/23/07	8/22/07	30	90	$104.29	$1.16
8/22/07	9/20/07	29	17	$22.37	$1.32
9/20/07	10/22/07	32	232	$242.62	$1.05
10/22/07	11/21/07	30	530	$655.49	$1.24
Totals for 2007			**5,742**	**$6,870.44**	
Average Cost Per Therm				**$1.20**	

6/21/2005

58 Park St - Outing Club

Water and Sewer Cost

Begin	End	Gallons	Water $	Sewer $	Total	$Water/ 1000 gal	$Sewer/ 1000 gal
Jul-08	Sep-08	159,000	$743.71	$951.47	$1,695.18	$4.68	$5.98
Oct-06	Dec-06	179,000	$839.71	$1,075.87	$1,915.58	$4.69	$6.01
Jan-07	Mar-07	108,000	$498.91	$634.25	$1,133.16	$4.62	$5.87
Apr-07	Jun-07	43,000	$200.81	$249.83	$450.64	$4.67	$5.81
Jul-07	Sep-08	17,000	$79.39	$98.77	$178.16	$4.67	$5.81
Oct-08	Dec-08	63,000	$296.29	$372.92	$669.21	$4.70	$5.92
Total		**569,000**	**$2,658.82**	**$3,383.11**	**$2,431.17**	**$4.67**	$5.95