

saveONenergy Retrofit Program
Project Measurement and Verification Plan

Facility Overview	5-court Tennis Court 125 Treeline Avenue, Windsor, Onatrio
Objective of Project	Install tennis court lighting control with occupancy sensors to adjust the lighting levels and demand drawn by the tennis court lighting as per the purpose of use.
saveONenergy M&V Type	Lighting Control Basic (LC-B) - estimated participant incentive between \$10,000 and \$25,000 Note: Lighting Control is considered as "Non-Lighting" Custom Measure as per the OPA's RETROFIT Custom Worksheet.
Existing System Description	The facility consists of 5 tennis courts. The pre-project lighting system is 80 6-lamp T5HO fixtures and 20 10-lamp T5HO fixtures. The tennis courts are operated for 6,061 hours annually. The tennis courts are not equipped with automatic/programmable lighting control. All lights remain "on" during the operating hours with a total demand of 39.8kW.
Proposed Process Description	<p>The proposed lighting control will have four settings: off, maintenance, recreational and competitive. The total load for maintenance level is 2.81 kW per court; for recreational level is 5.15 kW per court; and for competitive level is 7.96 kW per court.</p> <p>All lighting will remain in the off position when not in use. Lighting sensors will be placed on each court to determine activity and activate the lighting. The system will be automated using a software program. When a court is booked for normal guest and member usage, and activity is detected, the lights will be set to the RECREATIONAL level. When a court is booked for LEAGUE play and for TOURNAMENTS, the lights will be set to the COMPETITIVE level. When a court is under maintenance, the lights will be set to the MAINTENANCE level.</p>
Variables Affecting Energy and Demand Savings	Variables that will affect energy savings: <ul style="list-style-type: none"> • Guest occupancy
Energy and Demand Savings Estimates	<p>The energy and demand saving estimates are used to determine the pre-approved incentive amount, subject to a pre-project and post-project review from a Project Evaluator. The Evaluator's review is outlined in the Advanced Evaluation & Incentive Report (AEIR) before the project and the Final Evaluation & Incentive Report (FEIR) after the project.</p> <p>The baseline demand and energy consumption is based on 80 6-lamp T5HO fixtures and 20 10-lamp T5HO fixtures, operated for 6,061 hours annually. All lights will remained on regardless of purpose of tennis court usage. The total</p>

	<p>baseline demand and energy consumption is 39.8 kW and 241,227 kWh, respectively.</p> <p>The proposed demand and energy consumption are estimated using booking/usage records from December 2011 to June 2012. Tennis court booking records include the total number of hours for each type of use (i.e. Recreational, Competitive, Maintenance, and Off hours). See attached for a full booking log from the Tennis court.</p> <p>The demand and energy savings are determined by the booking records from December 2011 to June 2012. The peak demand between 11am and 5pm is 17.8 kW. The consumption saving is calculated using the average kW per hour over both weekdays and weekends, which is 14.098 kW, or 155,660 kWh of energy savings annually.</p> <p>The estimated incentives based on the kWh metric are \$15,566. As per the OPA M&V plan LC-B the savings should be discounted by 25% therefore, total incentive is \$11,674.55.</p>
<p>Measurement Details</p>	<p>As per the OPA's RETROFIT Program M&V Procedure - Lighting Controls: Basic (LC-B), a detail log of the claimed operating condition is provided, see attached for the detail log of tennis court usage from December 2011 to June 2012. The demand for each court setting is also provided. Similar LOG can be provided once the project has been completed.</p>

Custom Lighting Controls Calculations

Competitive Demand/Court	7.956	kW	Highest Average kW during Peak	17.817	Average kW/hr	14.098	POTENTIAL INCENTIVE	\$	15,566.06
Recreational Demand/Court	5.148	kW	Max Peak	39.780	Max Peak	39.780	with 25% Discount	\$	11,674.55
Maintenance Demand/Court	2.808	kW	kW Saved	21.963	Annual Hours	6,061	with 50% Discount	\$	7,783.03
Number of Courts	5		Possible Demand Incentive	\$ 8,785.26	kWh Saved	155,660.62			
					Possible Consumption Incentive	\$15,566.06			

Month	Hour Breakdown	6-7am	7-8am	8-9am	9-10am	10-11am	11-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm	6-7pm	7-8pm	8-9pm	9-10pm	10-11pm	SUB-TOTAL	TOTAL
WEEKDAYS																				
December	Rec Hours	6	30	31	46	79	42	83	75	102	90	93	56	92	80	58	33	4	1000	2244
	Competitive Hours			9	44	38			20					2	27	3			143	
	Maintenance Hours																	32.5	32.5	
	Off Hours	126	102	92	42	15	90	49	37	30	42	39	76	38	25	71	99	95.5	1068.5	
January	Rec Hours	8	37	38	63	79	39	68	86	125	99	101	54	110	75	52	59	2	1095	2244
	Competitive Hours			12	44	39			24						26	6			151	
	Maintenance Hours																	0	0	
	Off Hours	124	95	82	25	14	93	64	22	7	33	31	78	22	31	74	73	130	998	
February	Rec Hours	16	51	42	61	85	39	61	59	90	82	117	66	96	77	35	47	1	1025	2142
	Competitive Hours			14	40	39			16						26	5			140	
	Maintenance Hours																	32.5	32.5	
	Off Hours	110	75	70	25	2	87	65	51	36	44	9	60	30	23	86	79	92.5	944.5	
March	Rec Hours	13	39	37	45	70	32	60	48	67	71	79	51	77	58	49	57	4	857	2244
	Competitive Hours			9	41	35			19					2	18	3			127	
	Maintenance Hours																	0	0	
	Off Hours	119	93	86	46	27	100	72	65	65	61	53	81	53	56	80	75	128	1260	
April	Rec Hours	15	19	21	53	87	35	57	54	65	62	77	47	73	97	46	39		847	2142
	Competitive Hours			12	28	26			24						9	3			102	
	Maintenance Hours																	32.5	32.5	
	Off Hours	111	107	93	45	13	91	69	48	61	64	49	79	53	20	77	87	93.5	1160.5	
May	Rec Hours	13	28	18	49	87	24	41	52	48	45	72	43	70	94	47	19		750	2344
	Competitive Hours			15	35	29			21				1		1				102	
	Maintenance Hours																	0	0	
	Off Hours	125	110	105	54	22	114	97	65	90	93	66	94	68	43	91	119	136	1492	
June	Rec Hours	11	24	21	37	84	14	37	44	39	40	63	36	47	81	26	10	1	615	2132
	Competitive Hours			12	23	21			14										70	
	Maintenance Hours																	32.5	32.5	
	Off Hours	115	102	93	66	21	112	89	68	87	86	63	90	79	45	100	111	87.5	1414.5	
TOTALS	Rec Hours	82	228	208	354	571	225	407	418	536	489	602	353	565	562	313	264	12	6189	15492
	Competitive Hours	0	0	83	255	227	0	0	138	0	0	0	1	4	107	20	0	0	835	
	Maintenance Hours	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130	130	
	Off Hours	830	684	621	303	114	687	505	356	376	423	310	558	343	243	579	643	763	8338	
AVERAGES	Rec Hours	8.99%	25.00%	22.81%	38.82%	62.61%	24.67%	44.63%	45.83%	58.77%	53.62%	66.01%	38.71%	61.95%	61.62%	34.32%	29.11%	1.33%	39.95%	100
	Competitive Hours	0.00%	0.00%	9.10%	27.96%	24.89%	0.00%	0.00%	15.13%	0.00%	0.00%	0.00%	0.11%	0.44%	11.73%	2.19%	0.00%	0.00%	5.39%	
	Maintenance Hours	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	14.36%	0.84%	
	Off Hours	91.01%	75.00%	68.09%	33.22%	12.50%	75.33%	55.37%	39.04%	41.23%	46.38%	33.99%	61.18%	37.61%	26.64%	63.49%	70.89%	84.31%	53.82%	
Average kW peak		2.31	6.44	9.49	21.11	26.02	6.35	11.49	17.82	15.13	13.80	16.99	10.01	16.12	20.53	9.71	7.49	2.36	15.05	Weekday hourly avg

Month	Hour Breakdown	6-7am	7-8am	8-9am	9-10am	10-11am	11-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm	6-7pm	7-8pm	8-9pm	9-10pm	10-11pm	SUB-TOTAL	TOTAL
WEEKENDS																				
December	Rec Hours		5	35	33	31	35	24	39	40	34	19	5	9	9	2			320	
	Competitive Hours																		0	806
	Maintenance Hours																		0	
	Off Hours	54	49	19	21	23	19	30	15	14	20	35	49	45	45	48			486	
January	Rec Hours		11	35	36	39	32	31	48	29	38	33	20	29	6	2			389	
	Competitive Hours																		0	805
	Maintenance Hours																		0	
	Off Hours	54	43	19	18	15	22	23	6	25	16	21	34	25	48	47			416	
February	Rec Hours		1	9	36	37	36	37	41	38	28	29	21	19	12	10	1		355	
	Competitive Hours																		0	716
	Maintenance Hours																		0	
	Off Hours	47	39	12	11	12	11	7	10	20	19	27	29	36	38	43			361	
March	Rec Hours		5	28	33	32	26	29	42	27	30	26	24	23	9	3			337	
	Competitive Hours																		0	806
	Maintenance Hours																		0	
	Off Hours	54	49	26	21	22	28	25	12	27	24	28	30	31	45	47			469	
April	Rec Hours		3	12	30	30	27	17	39	27	21	12	12	12	9	3			254	
	Competitive Hours																		0	805
	Maintenance Hours																		0	
	Off Hours	54	51	42	24	24	27	37	15	27	33	42	42	42	45	46			551	
May	Rec Hours		1	3	19	28	25	20	10	20	15	14	7	9	3	4	2		180	
	Competitive Hours																		0	806
	Maintenance Hours																		0	
	Off Hours	53	51	35	26	29	34	44	34	39	40	47	45	51	50	48			626	
June	Rec Hours		1	3	15	24	23	22	12	15	15	14	9	12	6				171	
	Competitive Hours																		0	702
	Maintenance Hours																		0	
	Off Hours	53	51	39	30	31	32	42	39	39	40	45	42	48					531	
TOTALS	Rec Hours	3	39	180	221	216	199	164	241	181	180	127	101	94	47	13			2006	
	Competitive Hours	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	5446
	Maintenance Hours	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			0	
	Off Hours	369	333	192	151	156	173	208	131	191	192	245	271	278	271	279			3440	
		372	372	372	372	372	372	372	372	372	372	372	372	372	318	292				
AVERAGES	Rec Hours	0.81%	10.48%	48.39%	59.41%	58.06%	53.49%	44.09%	64.78%	48.66%	48.39%	34.14%	27.15%	25.27%	14.78%	4.45%			36.83%	
	Competitive Hours	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			0.00%	100
	Maintenance Hours	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			0.00%	
	Off Hours	99.19%	89.52%	51.61%	40.59%	41.94%	46.51%	55.91%	35.22%	51.34%	51.61%	65.86%	72.85%	74.73%	85.22%	95.55%			63.17%	
Average kW peak		0.21	2.70	12.45	15.29	14.95	13.77	11.35	16.68	12.52	12.45	8.79	6.99	6.50	3.80	1.15			11.38	Weekend hourly avg
GRAND TOTALS	Rec Hours	85	267	388	575	787	424	571	659	717	669	729	454	659	609	326	264	12	8195	
	Competitive Hours	0	0	83	255	227	0	0	138	0	0	0	1	4	107	20	0	0	835	20938
	Maintenance Hours	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130	130	
	Off Hours	1199	1017	813	454	270	860	713	487	567	615	555	829	621	514	858	643	763	11778	
		1284	1284	1284	1284	1284	1284	1284	1284	1284	1284	1284	1284	1284	1230	1204	907	905		
AVERAGES	Rec Hours	6.62%	20.79%	30.22%	44.78%	61.29%	33.02%	44.47%	51.32%	55.84%	52.10%	56.78%	35.36%	51.32%	49.51%	27.08%	29.11%	1.33%	39.14%	
	Competitive Hours	0.00%	0.00%	6.46%	19.86%	17.68%	0.00%	0.00%	10.75%	0.00%	0.00%	0.00%	0.08%	0.31%	8.70%	1.66%	0.00%	0.00%	3.99%	100%
	Maintenance Hours	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	14.36%	0.62%	
	Off Hours	93.38%	79.21%	63.32%	35.36%	21.03%	66.98%	55.53%	37.93%	44.16%	47.90%	43.22%	64.56%	48.36%	41.79%	71.26%	70.89%	84.31%	56.25%	
Average kW peak		1.70	5.35	10.35	19.43	22.81	8.50	11.45	17.49	14.37	13.41	14.61	9.13	13.33	16.20	7.63	7.49	2.36	14.10	Overall Avg