

Oland Centre Energy Project

SP4990 – Gymnasium Lighting Upgrade June 2011

SP5080A – Building HVAC/DDC/Lighting Upgrade Sept. 2014



Measuring Energy Use in Buildings

Energy use intensity (EUI) is the measurement used to size up a building's energy performance. It represents the energy consumed by a building relative to its size and is expressed in gigajoules (GJ) per square meter (m²) per year.

A building's EUI is calculated as follows:

$$\text{total energy consumed in one year (GJ)} / \text{total floor space of the building (m}^2\text{)} = \text{GJ/m}^2$$

This equation does not account for the effects that weather has on energy consumption.

The equation can be modified to show the effects of weather as follows:

$$\text{total energy consumed in one year (GJ)} / \text{total floor space of the building (m}^2\text{)} / 1000\text{HDD} = \text{GJ/m}^2\text{/HDD}/1000$$

This second equation uses a factor of 1000 HDD so the the EUI ratio is not a small number.

Energy Use Intensity without Temperature

FY	Electricity	Steam	Area M2	Energy Intensity	
	GJ	GJ		GJ/M2	% Reduction
2010/11	3762.8	7865.1	9,253	1.26	
2011/12	3022.7	7206.7	9,253	1.11	-12.03%
2012/13	3066.0	7863.2	9,253	1.18	-6.01%
2013/14	2931.4	9177.9	9,253	1.31	4.14%
2014/15	2116.1	6806.0	9,253	0.96	-23.27%
2015/16	2024.3	6172.4	9,253	0.89	-29.51%

Energy Use Intensity with Temperature Factored

FY	Electricity GJ	Steam GJ	Area M2	Energy Intensity		Energy Intensity with Temperature		
				GJ/M2	% Reduction	HDD	GJ/M2/1,000HDD	Reduction %
2010/11	3762.8	7865.1	9,253	1.26		3,998	0.31433	
2011/12	3022.7	7206.7	9,253	1.11	-12.03%	3,782	0.29231	-7.0%
2012/13	3066.0	7863.2	9,253	1.18	-6.01%	3,836	0.30792	-2.0%
2013/14	2931.4	9177.9	9,253	1.31	4.14%	4,167	0.31409	-0.1%
2014/15	2116.1	6806.0	9,253	0.96	-23.27%	4,037	0.23888	-24.0%
2015/16	2024.3	6172.4	9,253	0.89	-29.51%	4,038	0.21940	-30.2%

SP4990 – Gymnasium Lighting Upgrades

The scope of this project was based on a study of the efficiency of the existing lighting systems by FM and going out for recommendations for new lighting systems from lighting manufacturers. The best system for the gyms was selected and installed. Efficiency NS was involved in the process and after providing project estimated energy savings, a financial incentive of \$24,410 was received upon completion of the project.

Project scope included:

- Replacement of the 1960s vintage lighting systems which consisted of a combination of 400W Mercury Vapour, High Intensity Discharge (HID), light fixtures and incandescent fixtures in both the main and auxiliary gym.
- The new lighting system consists of T5 High Bay fluorescent fixtures, six button scene controllers for greater flexibility of lighting system, occupancy sensors, and a central controller with connection for remote programming.

This project was completed in June of 2011 and had a total cost of \$73,970 - \$24,410 (ENS incentive) = \$49,560

SP5080A – HVAC/DDC/Lighting Upgrades

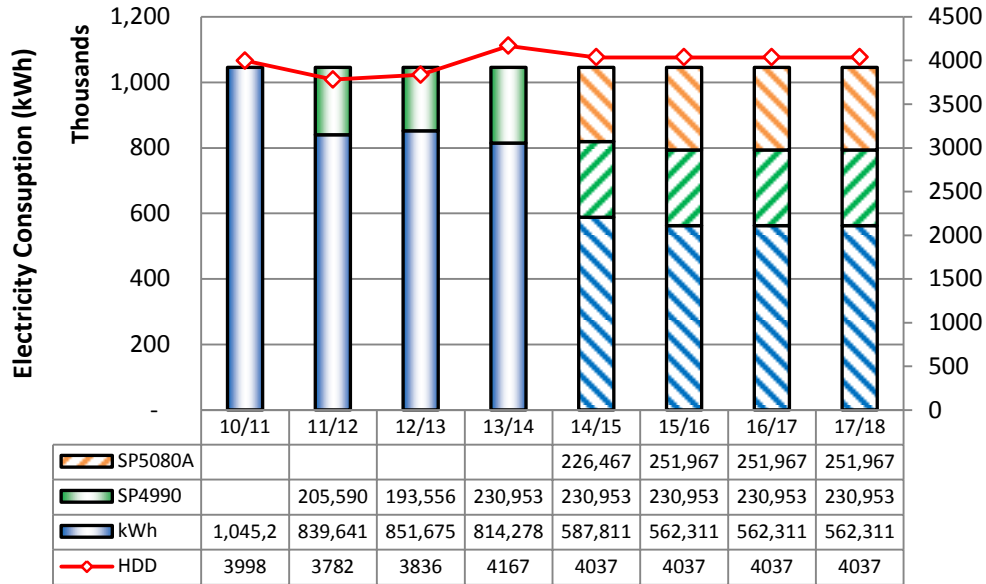
The scope of this project was based on the recommendations of the Detailed Energy Retrofit Feasibility Study that was performed by Siemens Canada Building Technologies and was delivered to St.F.X. Facilities Management in June 2011.

Project scope included:

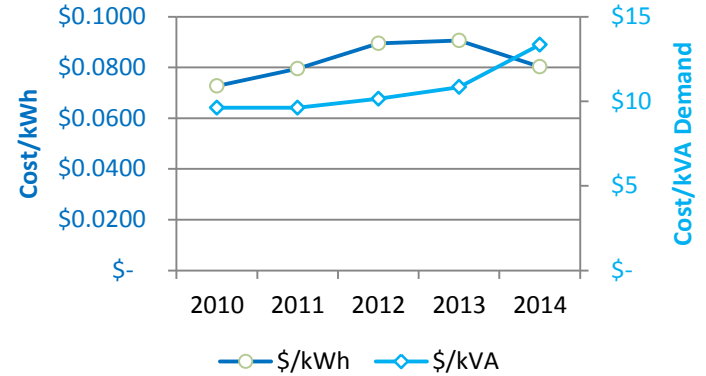
- Installation of building management system components; controllers, occupancy and air quality sensors to take control of all HVAC components (AHUs, Exhaust Fans, Re-heat valves...etc.).
- This project included the upgrading of building air handling units (AHUs), which in some cases involved refurbishing existing units with new dampers, actuators, motors, installation of variable speed drives (VSDs), and air quality sensors. Some of the AHUs were removed and replaced with new units. Of the fourteen (14) AHUs in the building, six of them were refurbished, and there were six new units installed. There were a couple of areas that multiple units were removed and replaced with a single, larger, unit.
- There was a widespread asbestos abatement program as part of this project. Once we started to remove/refurbish AHUs, we had to remove all asbestos found in all of the mechanical rooms.
- Two old domestic hot water tanks were removed and replaced with a single instantaneous “on demand” water heater. This unit utilizes 100PSI steam.
- Installation of new LED outside lighting on the entire building, totaling 18 new fixtures.
- Installation of new LED lighting systems in the four classrooms, main entrance, 1st floor corridors, and racquetball courts. These systems included occupancy sensors and light scene controls.

This project was completed in September of 2014 and had a total cost of \$1,223,215 - \$46,000 (ENS incentive) = \$1,177,215

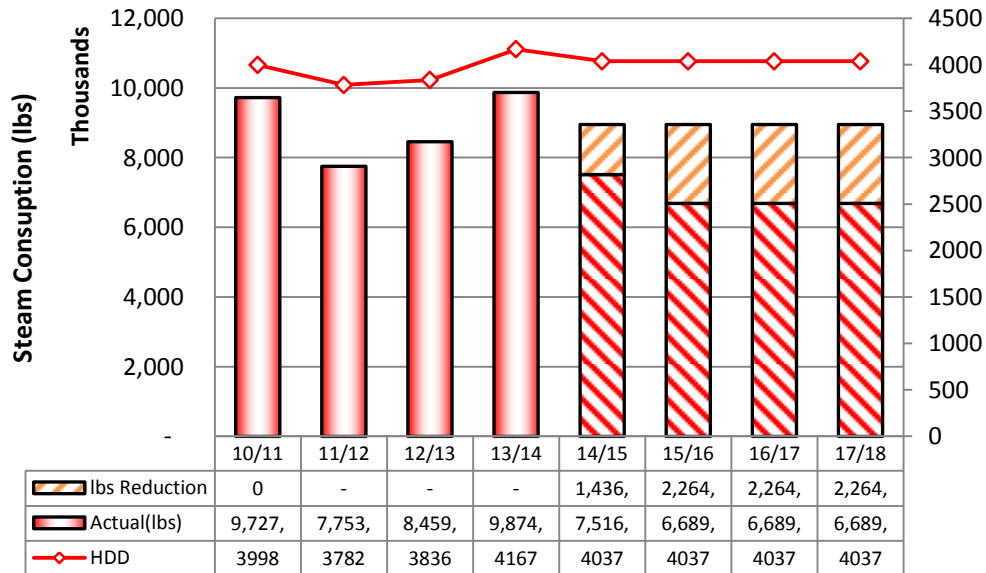
Oland Centre - Energy Project Results/Projections



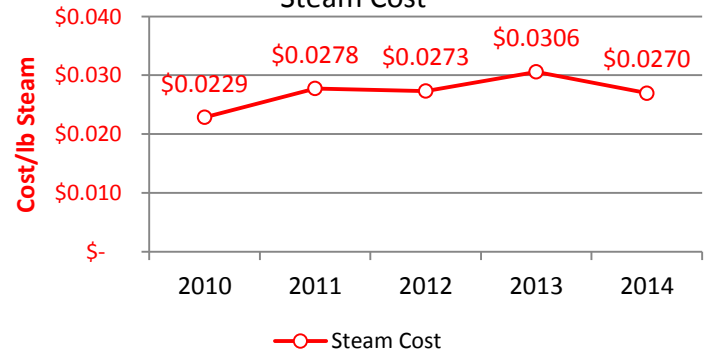
Electricity Cost



Oland Centre - Energy Project Results/Projections



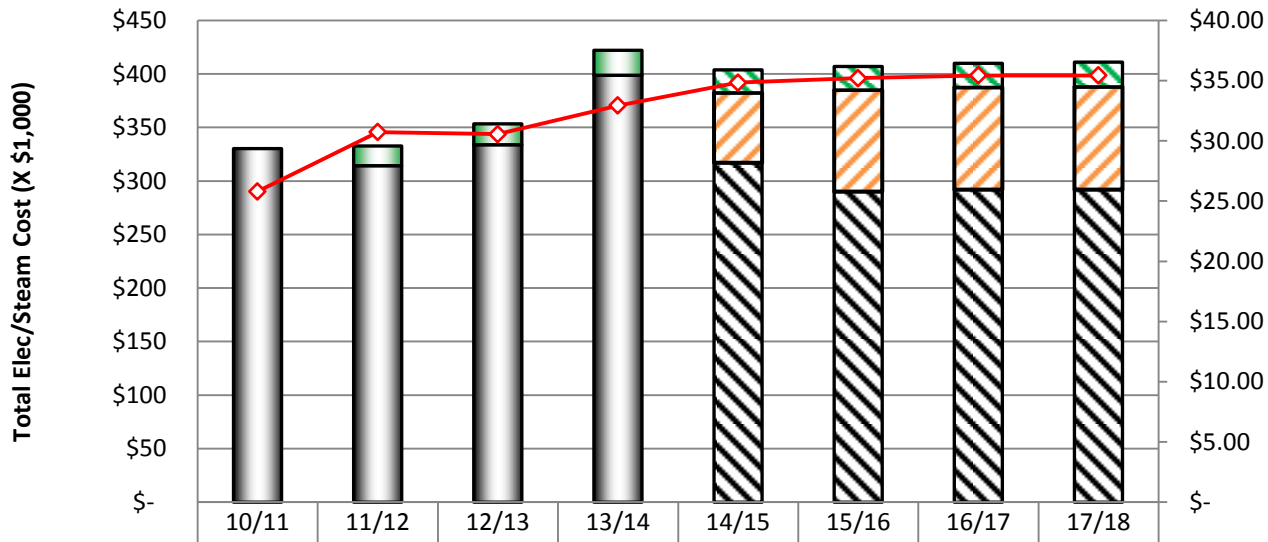
Steam Cost



NOTE

The columns of data that are hatched are estimated based on historical energy data and using the average weather data for the past five years to predict future energy consumption. There is also an estimated energy cost/unit for future years.

Oland Centre - Energy Project Results/Projections

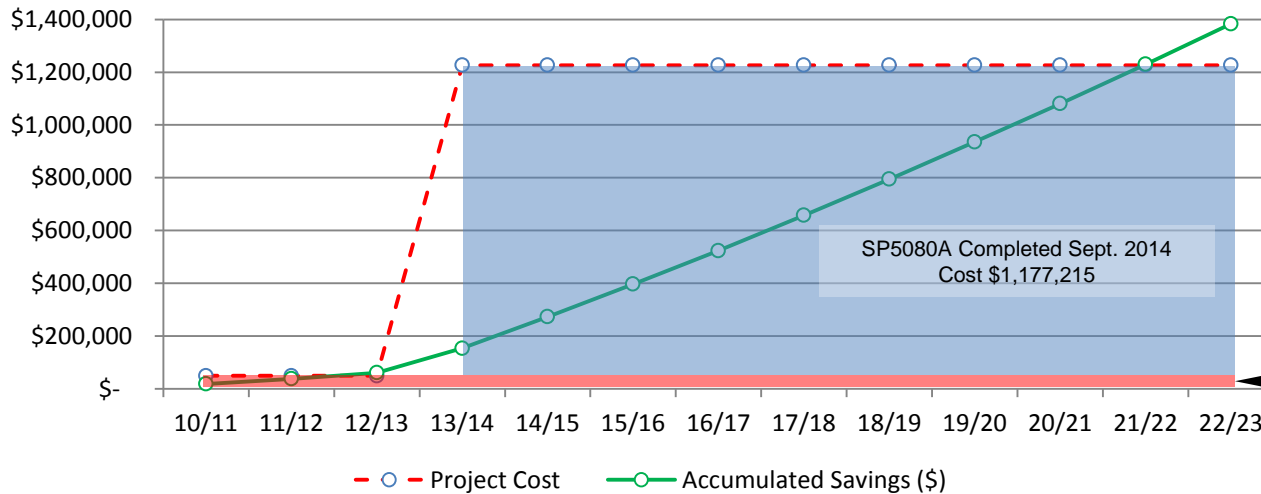


	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18
SP4990		\$18,422	\$19,516	\$23,278	\$21,426	\$21,961	\$22,510	\$23,073
SP5080A		\$-	\$-	\$-	\$65,369	\$94,911	\$95,460	\$96,022
Total Cost	\$330,337	\$314,376	\$333,965	\$398,910	\$317,130	\$290,195	\$292,062	\$292,062
\$/GJ	\$25.80	\$30.73	\$30.56	\$32.94	\$34.84	\$35.21	\$35.44	\$35.44

NOTE

The columns of data that are hatched are estimated based on historical energy data and using the average weather data for the past five years to predict future energy consumption. The per unit energy costs for future years are also estimated at 2.5% increase per year.

SP4990 & SP5080A Projected Savings (\$)



NOTE

This graph shows the project costs and accumulated savings to show the project return on investment.

SP4990, Completed July 2011
Cost \$49,560

SP5080A Completed Sept. 2014
Cost \$1,177,215