Recreation Oak Bay

2014

Strategic Energy Management Plan

DISTRICT OF OAK BAY

District of Oak Bay

6/5/2014

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1. BC Hydro: Energy Manager 4th Quarter Assessment from - SEMP Self - Evaluation

SEMP Evaluation

For BC Hydro to complete

Company Name		Energy Manager	
File Number			
Quarter			
PSE Signature: SEMP Completed			Date:

Projects that used PS incentives:

PS Program Incentive	kWh
PSP	
PSP Express	
New Construction	
Total	
Behavioural Program (2%)	

Turn around time for 4th Q review: _____days

Energy Manager: Please complete appropriate year below

- Note: All areas (in your contract Year) must be covered in order to receive 4th quarter payment

Year 2 +: Strategic Energy Management Plan requirements

6 Critical Elements must be included in the Strategic Energy Management Plan	**Page number where the element is addressed in the SEMP**	**Energy Manager evaluation**	**PSE Agrees**
1) A purpose statement which answers the following questions:		☐	☐
☒ a) What is your kWh reduction target?	11		
☒ b) What is the Key Performance Indicator for your organization?	5		
☒ c) Who do you need to engage to make you plan successful?	5 & 31		
2) A table that compares all your building in your portfolio		☐	☐
☒ a) BEPI- updated to the current year	21		
☒ b) Explanation of Top 10 worst performing buildings	21		
3) Explain what the opportunities are to become more efficient.		☐	☐
☒ a) Project List	26,27 & 28		
☒ b) Initiative List: Behavioural and Organisational	25		
☒ c) Studies: Outline which buildings have had studies completed.	26		
4) Outline the budget to implement projects		☐	☐
☒ a) If No Budget? Can't forecast your budget? You must explain why not and what you intend to do about getting a budget.	13		
5) Conclusion: How is your plan doing?		☐	☐
☒ a) Outlined kWh saved	19 & 22		
☒ b) Outlined GHG tons saved	10 & 22		
☒ c) Outlined total dollars saved to the organisation	22 & 23		
☒ d) Outlined avoided cost	22 & 23		
☒ e) Outlined total dollars saved	22 & 23		
6) Senior Management Support		☐	☐
☐ a) Approval of the SEMP : Signature on the SEMP	30		

2. OUR ORGANIZATION

2.1 Purpose

The Municipality of Oak Bay plans to continue the quest for energy efficiency and work toward a more sustainable future.

The Strategic Energy Management Plan (SEMP) is a living document that will act as a template and a realistic plan for a more sustainable future. It will also help track progress as the municipality moves toward the energy reduction goal of lowering our electrical consumption by 1,600,000 kWh by the year 2020, based on 2011 as a benchmark.

This SEMP provides a current picture of the energy consumption and Green House Gas (GHG) emissions and will also show where we want to be in the future, as well as our plan to get there.

Reviews will be done periodically to compare the plans with achievements and to determine if adjustments need to be made to the approach.

Through a stronger commitment to Energy Management, we hope to heighten awareness of sustainability issues and inspire the community to follow our lead. Energy Management is also seen as an important positive step towards our GHG targets and is a vital part in maintaining a high user pay ratio; this is seen as the parks and recreation department's key performance indicator.

For this to be successful we will need to engage the Oak Bay Council, Commission, Staff and the Community.

2.2 Key Performance Indicator

Key Performance Indicator for Parks and Recreation

	Totals						
User Pay Ratio	**2009**	**2010**	**2011**	**2012**	**2013**	**Area m2**	**2013 Intensity ekWh/m2**
Recreation Centre	87%	91%	86%	87%	85%	8112	534.2
Monterey Centre	74%	70%	66%	69%	66%	2091	171.26
Henderson Centre	94%	93%	92%	94%	92%	1524	191.96

As Oak Bay is a relatively small municipality, it is crucial that the Parks and Recreation department continue to maintain a high User Pay Ratio (UPR) in order to minimize the tax burden on its residents. The key performance indicator for the Parks and Recreation department is our UPR. We see reducing energy consumption as a very important part of keeping our operational costs as low as possible and a huge part in maintaining our high (UPR).

2.3 Organizational Profile

Organization Profile								
PEOPLE	Sector	☒ Government ☐ Commercial ☐ Other						
	Number of Employees	187 Full Time		Number of Sites		9		
	Number of stakeholders	5		Energy Manager		Ken Olson		
	Executive Support	Council and Executive Management		Energy Committee		Ray Herman, Grant Brown, Mary Kucera, Caroline Lawrence, Barry Russell, Janette Sproston, Ken Olson		
	Energy Volunteers	Mandi Krieger, Bryon Ewart, Jim Pearson, Patricia Walker, Bill Cliff, Brian Gray						
OPERATIONS	Energy Management Issues / Obstacles	▪ Diversity of buildings ▪ Aging Buildings ▪ Timing ▪ Funding						
	Core Business Metrics	▪ Municipal, Parks and Recreation, Public Works						
	Business Year	January 1st			December 31st			
	Budget Cycle	January 1st			December 31st			
	Maintenance Cycle	January 1st			December 31st			
	Maintenance Budget	2012	$1,954,643	2013	$2,039,220	2014	$2,089,202	2015	TBD
	Energy Efficiency Projects Budget	2012	$86,639	2013	$84,113	2014	$170,000	2015	TBD
	Operations Budget	2012	$3,571,607	2013	$3,676,528	2014	$3,723,083	2015	TBD
	Utilities budget	2012	$378,654	2013	$540,425	2014	$541,444	2015	TBD
	Incentives	2012	$37,395	2013		2014	TBD	2015	TBD
	Capital Budget	2012	$138,399	2013	$160,233	2014	$202,500	2015	TBD

*** Budget numbers** - are for the Parks and Recreation department only.

2.4 Facility Profile

Municipal buildings vary considerably in size, function, and occupancy. Generally, they are multi-use and have a broad range of operating hours and number of users depending on the function and activity. In a number of cases, buildings are not staffed but have energy consumption (e.g. Tennis Bubbles and the Windsor Pavilion). The Monterey Centre has a large square footage to employee metric. The Recreation Centre, our largest multi-use facility, has approximately 40 full time staff, a large number of auxiliary staff and averages over 2500 visitors per day.

A challenge in establishing meaningful metrics in terms of "employee" density is the fact that the facilities can be occupied by many different categories of users through a range of operating hours - volunteers, auxiliary employees, patrons and visitors. These all impact the density metric in an inconsistent, non-comparative manner.

Facility Profile *(Jan – Dec 2013)* *Hydro and Natural Gas* *2013*						
Site	**Number of full time Employees**	**Area (M^2)**	**Annual Energy Consumption ekWh**	**Annual Energy Cost**	**Energy Intensity**	**Energy Intensity per Employee**
Recreation Centre	40	16556	4,333,206	$244,825	262	108330
Monterey	8	2091	358,098	$ 32,881	171	44762
Henderson	7	1524	292,551	$ 25,569	192	41793
Tennis Bubbles	0	4300	851,733	$ 54,053	622	n/a
Municipal Hall	21	1370	307,911	$30,418	225	14662
Public Works	41	1215	184,980	$10,170	152	4512
Police/Fire	57	920	255,848	$29,156	278	4489
Windsor Pavilion	0	772	79,607	$ 16,575	103	n/a
Parks	13	0	56,038	$ 7,226	n/a	4311
TOTAL	**187**	**28748**	**6719972**	**$450,873**	**Ave 234**	**Ave 35935**

Note- Carnarvon Park Centre and the Teen Centre have not been included as both Centre's will be decommissioned within the next two years and their functions will be moved to the new Neighborhood Learning Centre (NLC).

The NLC will be built to LEEDS standards and is planned to be completed in 2014/15.

- Consumption numbers for the Carnarvon Centre are included with Parks.
- Consumption numbers for the Teen Centre are included with Tennis Bubbles.

3. Our Commitment

3.1 Energy Policy

Purpose:

To provide broad corporate guidance in the development, implementation and review of programs, procedures and initiatives for energy conservation and greenhouse gas emissions in Oak Bay.

Policy:

The District of Oak Bay is committed to using energy resources to their highest economic efficiency while reducing consumption through wise and cost-effective energy management and the introduction of appropriate energy efficiency and renewable energy procedures and technologies.

The District has been successful in achieving significant reductions in energy consumption over the last twenty years, laying the groundwork for further work in this regard.

The objective of this policy is to incorporate both efficient use of energy and a culture of energy conservation in the planning and operation of municipal facilities and infrastructure. In achieving this objective, the District will:

- Develop and implement strategies to reduce energy use and greenhouse gas emissions thereby lowering operating costs and demonstrating the District's responsible use of energy.
- Continually seek out new and innovative technologies for energy efficiency for consideration.
- Monitor patterns of energy use within the District and energy savings from conservation initiatives, with the intent to continually optimize efficiencies.
- Collaborate in cross-departmental efforts to establish, monitor and achieve energy conservation goals.
- Empower employees to suggest, initiate and take part in energy conservation practices. Employees will be provided with information to help them better understand energy consumption and the means by which they can influence reductions through prudent use of resources.
- Track and communicate energy conservation results.
- Strive to achieve energy use reductions while maintaining a comfortable environment for facility occupants and customers.

3.2 Sustainability

Although at this time the Municipality does not have an official Sustainability Policy, we are working towards that end.

The Environmental Advisory Committee has been recently formed to advance sustainability issues. This committee will advance environmental sustainability through recommendations on legislation, regulation, tools, education, and strategic polices that support effective environmental management practices. Their mandate includes working to improve energy efficiency, reduce GHG emissions and encourage sustainable development.

From the Mayors' welcome message:

"Oak Bay will continue towards the goal to become a green and sustainable community. We will look at ways to further reduce our municipal carbon footprint and we will strive to ensure that our infrastructure supports active transportation modes that reduce motor vehicle dependency, while promoting physical wellness and mobility."

3.3 Importance of Energy Management to the Municipality

As a municipality, Oak Bay has a long history of understanding the importance of energy management. The energy improvements that have been made over the last two decades have helped to reduce our energy consumption of the Recreation Centre to less than half of what was used in 1993. The entire Municipality now uses less than what the Recreation Centre used in 1993.

Through conservation, we are now paying $324,000 per year less than what we would have been paying if we had not been involved in energy management. For our Recreation department this is a crucial part in managing our bottom line and is a major key to keep taxes and our admissions cost as low as possible.

In regards to GHG emissions, GHG output was reduced by 10,398 tonnes since we started doing conservation initiatives and are now saving 802 tonnes annually. This momentum has been a crucial step in working towards our municipal reduction targets of 33% by 2020, based on a 2007 benchmark.

We believe that leading by example will have a positive impact on the community and help to develop a culture of change in regards to energy conservation and sustainability issues.

3.4 Green House Gas Reduction Targets

Oak Bay has signed on to the Climate Action Charter and has adopted an aspirational target of 33% for GHG reductions by 2020 from our 2007 levels.

The chart below shows the reductions levels needed to achieve this goal and compares that to actual year end levels.

Calendar Year	Target GHG Emissions (tCO_2e)	% Reduction Needed from Baseline	Targeted Tonnes Per Year	Targeted Tonnes saved	Actual GHG Emissions (tCO_2e)	Actual % Reduced from Baseline	Actual Tonnes Per Year	Tonnes Reduced from Baseline	Tonnes Reduced to Date
2007	1,514	Baseline	0	0	1,516	0	0	0	0
2008	1,476	2.54	38.4556	38.4556	1469	3.1	47	47	47
2009	1,437	5.08	38.46	76.91	1426	5.9	43	90	137
2010	1,399	7.62	38.46	115.37	1372	9.5	54	144	281
2011	1,360	10.16	38.46	153.82	1374	9.4	-1.1	142	424
2012	1,322	12.7	38.46	192.3	1157	23.7	217	359	817
2013	1,283	15.24	38.46	230.73	1110	26.8	47	406	1191
2014	1,245	17.78	38.46	269.19					
2015	1,206	20.32	38.46	307.64					
2016	1,173	22.86	38.46	340.65					
2017	1,129	25.4	38.46	384.56					
2018	1,091	27.94	38.46	423.01					
2019	1,053	30.48	38.46	461.47					
2020	1,014	33.02	38.46	499.92					
2030	630	58.42		884.48					
2040	245	83.82		1269.03					
2050	0	100		1514					

- Emissions need to be reduced by 2.54% per year to make our municipal targets.
- Police department GHG emissions are exempt under the climate action charter.

3.5 GHG and Carbon Neutrality

Oak Bay has now adopted a working towards approach with regards to being carbon neutral. This means instead of the municipality buying carbon offsets and being able to declare we are carbon neutral, the funds are kept by the municipality to work on their own carbon reduction projects.

We know that it is very unlikely that we will ever be able to eliminate of every GHG producing process within the municipality. But what we can do is balance our emissions by taking part in projects that help reduce GHG elsewhere in the municipality. This way we can eventually become carbon neutral or better, even though we may still emit GHG.

This is where our household organic waste composting program comes into the GHG equation. When organic waste is placed in the land fill it decomposes gradually over decades and creates a significant amount of methane due to the absence of oxygen. Because methane is 21 times more potent than carbon dioxide on a 100-year global warming potential basis, composting can reduce GHG emissions by over 90% in contrast to sending the same waste to the landfill.

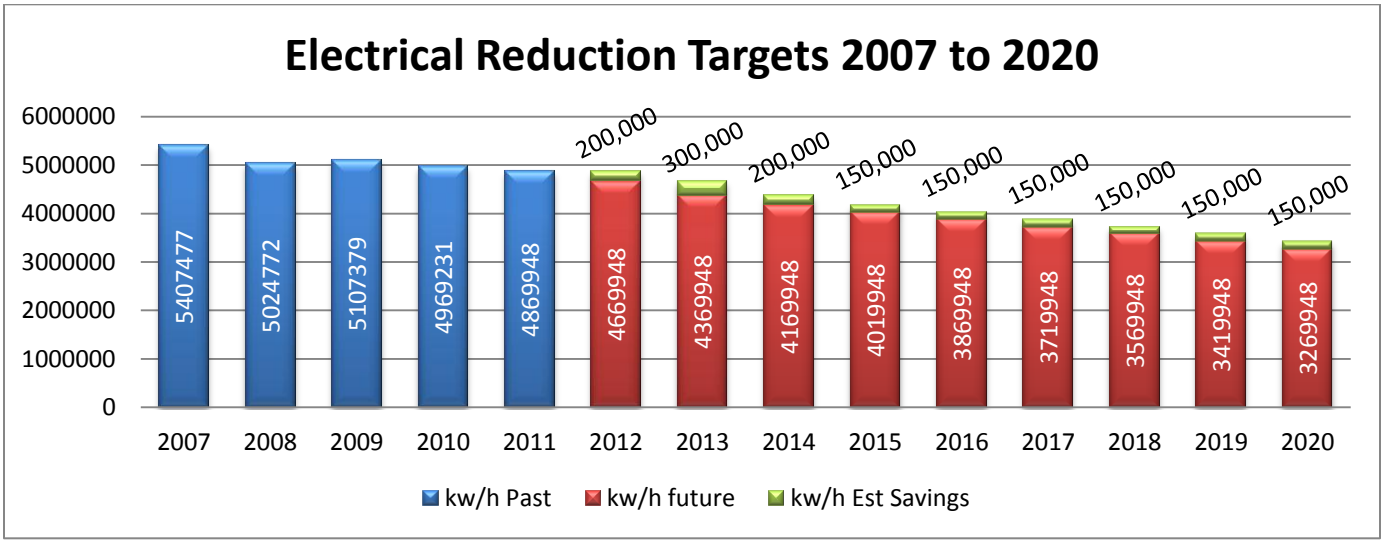
We have been involved in our pilot organics program for several years now and have removed an average of 200 tonnes per year. After the conversion math, this equates to 104 tonnes less GHG per year since we started the program. This is credited against our emissions and towards becoming carbon neutral. At the end of 2013 we were 33.6% closer to becoming carbon neutral.

In 2014 this will change with the expansion of our organics program to include the entire municipality. It is estimated that we will be removing between 800 and 1000 tonnes of organics this year, this means we are looking at numbers between 416 and 520 tonnes of carbon credit for this program. The down side is we will need to add the carbon released from the trucks to our GHG inventory. We estimate that this will add 35 to 45 tonnes. All these numbers at this point are just estimates.

There are two parts to what we are trying to achieve, reduce carbon emissions and become carbon neutral. What we can expect for 2014 is a jump in our carbon emission numbers but at the same time see huge gains towards becoming carbon neutral. If our estimates are in the ball park, we can expect that at the end of 2014 we could be 51% to 59% on our way to becoming carbon neutral.

3.6 Electrical Reduction Targets

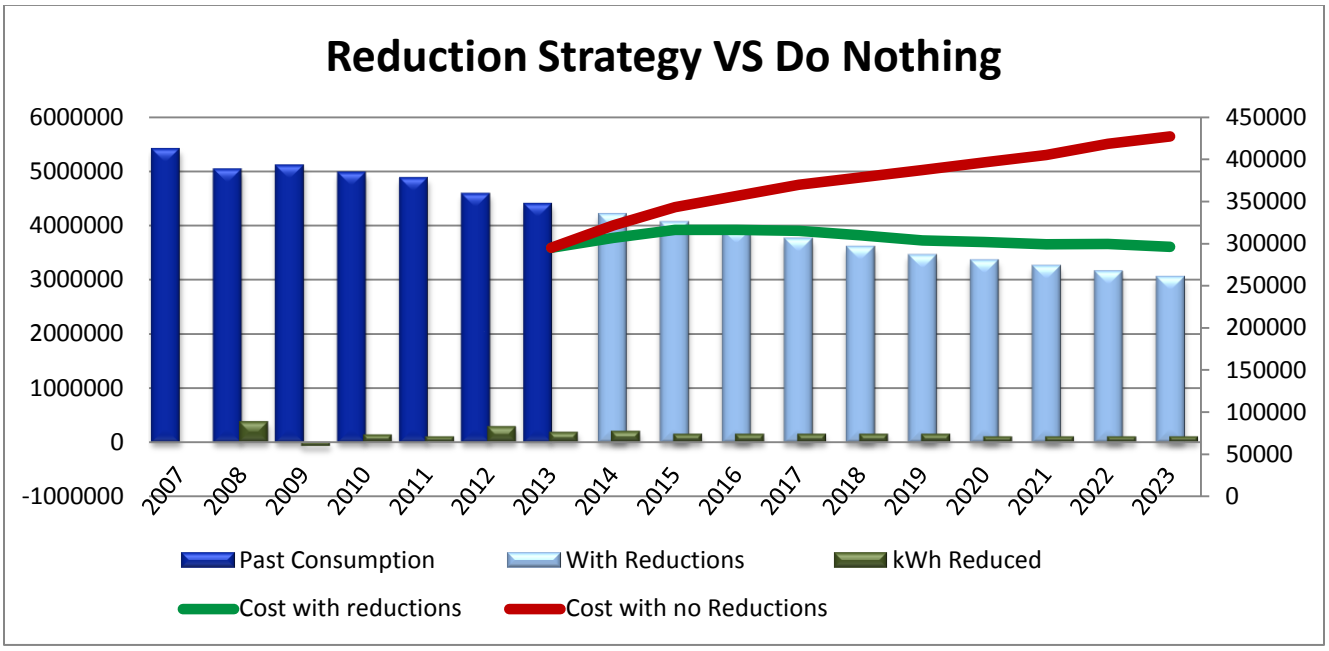
In 2012 electrical reduction targets were established. The goal is to lower consumption by 1,600,000 kWh by 2020 and in doing so, protect the municipality from the burden of future hydro increases. Reducing electrical consumption also plays a key role in achieving our GHG reduction targets and together these targets will play an important role in Oak Bay's path to shrinking its carbon footprint.



This strategy would serve only to keep our Hydro bills at today's levels. This was based on estimated increases from BC Hydro as of early 2012. More recent increase estimates underline the importance of taking action and ensuring that we continue to work towards these targets and goals.

This graph shows Oak Bay's progress since 2007 and shows where consumption will be in the future if the targets are achieved. The green line shows the cost of hydro levelling out as targets are met (based on current estimates in April 2014). The red line shows how the cost will increase over the years if we abandon the pursuit of energy conservation.

Save now or Pay later



With this strategy, Oak Bay will save $740,000 over the next 10 years, reducing the annual bill by $131,000 by 2023. This is based on recent estimated price increases as of April 1st 2014.

It's important to note that in this scenario no plug load growth has been included, therefore future load growth will need to be controlled or balanced with additional savings for us to meet these targets.

- If we are able to achieve these goals, by 2020 we will have saved $740,000 or more in actual and avoided cost.
- $740,000 represents the future saved dollar value. If we can achieve the reductions needed with in that amount, we will have accomplished our goals using our future savings. This may seem too good to be true; however when you consider incentive, grants and credits/savings with the new conservation rates, this number will grow substantially and could give us the funds needed to meet our goals.
- In the first two years (2012, 2013) consumption was reduced by 470,723 kWh. As we move forward, work will continue on items identified on the projects list. The hope is that future savings will continue to revel themselves as emerging technologies develop. What is clear is that we have captured savings from most of the "low hanging fruit" and in order to continue to lower consumption projects with longer paybacks will need to be considered.
- By making energy conservation part of our business strategy, we can keep energy costs at a manageable level while playing a responsible role toward protecting the environment.

3.7 Budget

We have to date, identified energy reducing projects and found funding as a capital project or with financing. The municipality has in most cases, permitted the incentives received from these projects to be reinvested in other energy efficient projects. A portion of the funds we received from BC Hydro to help fund the energy manager position, also goes to what we have to work with for conservation. As of June 2014 we have approximately $72,000 from this funding source.

Oak Bay has now adopted a working toward approach with regards to carbon neutrality. This now diverts the funds that would have gone towards being carbon neutral to our own GHG reduction projects. In 2012 and 2013 $35,000 for each year was put into a reserve fund.

Beginning with the 2013 reporting year, Council has approved the creation of a reserve account to fund future projects that will assist in reducing GHG throughout the District. In 2013, the District received a CARIP grant of $29,290.

With these funds and other possible sources Oak Bay is presently looking at creating a Green revolving Fund. If this does in fact happen, the municipality will put itself in a great position to turn energy conservation into the business as usual approach that it will need to be, if we intend to reach our goals and targets.

All together we have just over $171,375 set aside for conservation initiatives.

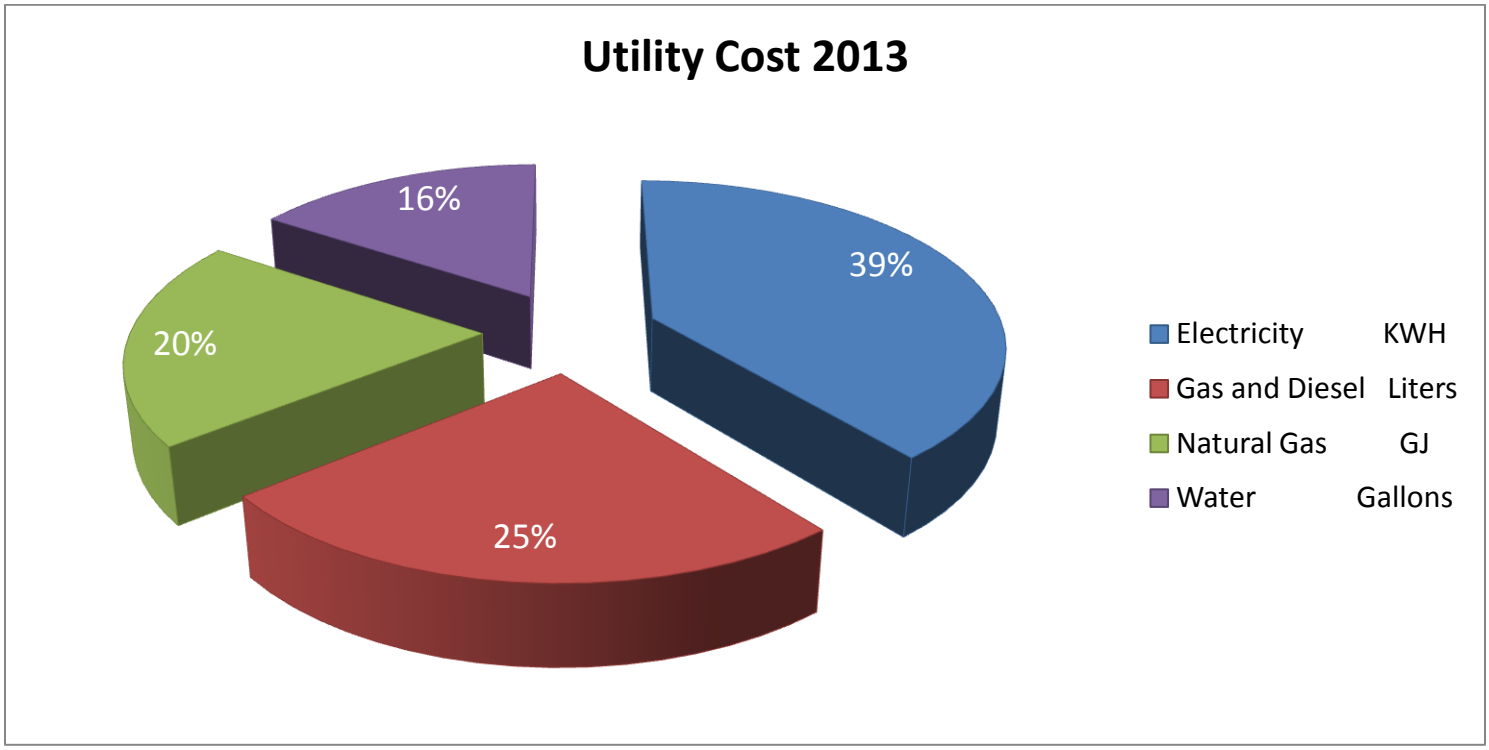
Henderson Recreation Centre

4. Understanding Our Situation

4.1 Utility Consumption and Cost

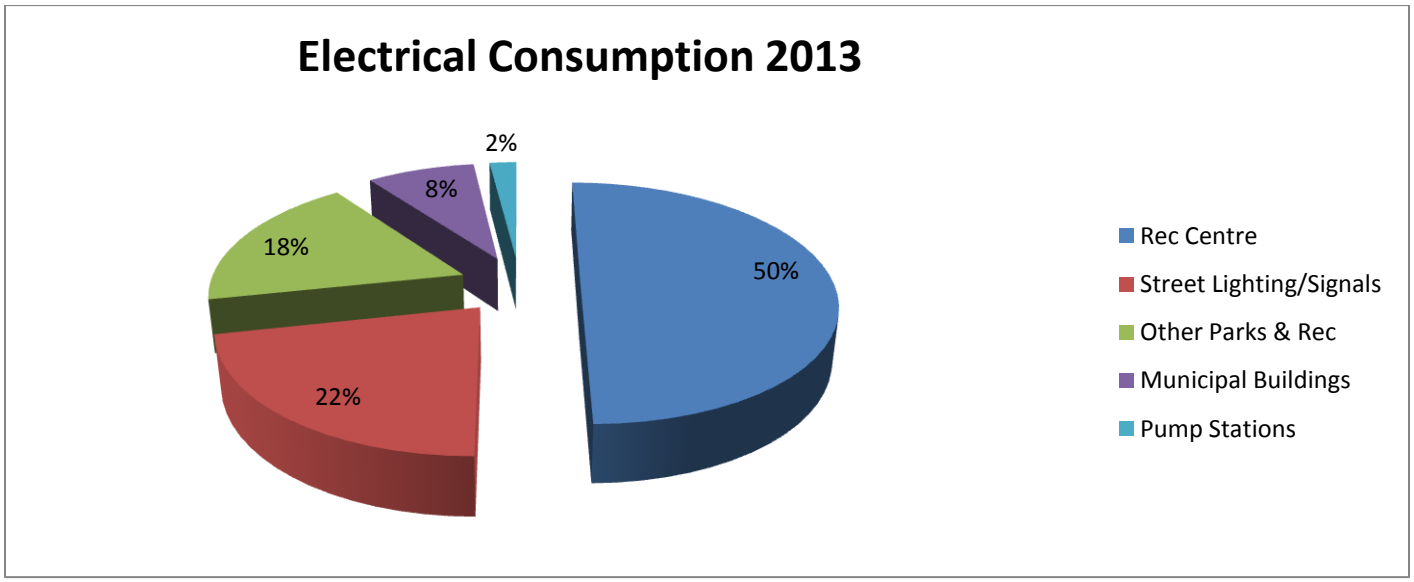
Utility (Jan – Dec 2013)	Consumption Unit	Costs $	Percent %	GHG Tons
Electricity KWH	4,403,715	$ 370,630.00	40	110.09
Gas and Diesel Liters	197,217	$ 236,820.00	26	443.99
Natural Gas GJ	12,023.80	$ 190,378.00	20	604.8
Water Gallons		$ 148,400.00	14	
Total		$ 946,228.00	100	1158.88

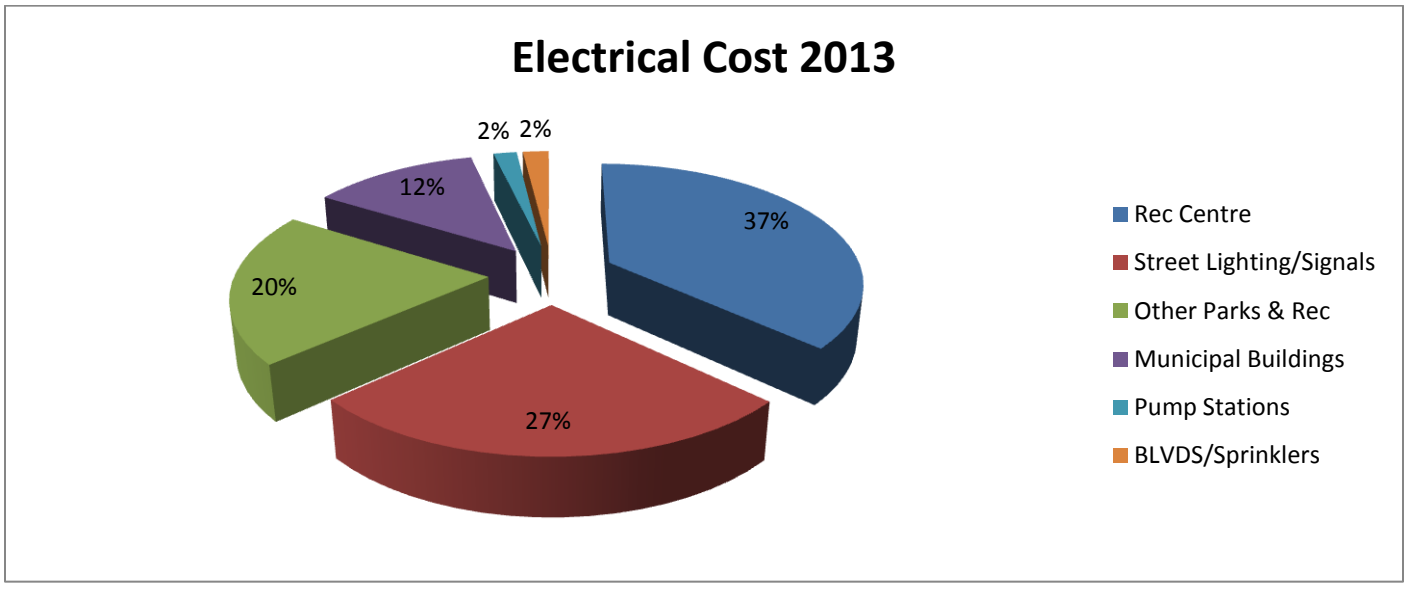
- GHG totals include police department related emission.



4.2 Electrical Consumption & Cost 2013

Sites	Consumption kW/h	%	Cost	%
Rec Centre	2188651	50	$ 136,512.00	37
Street Lighting/Signals	953187	22	$ 98,500.00	27
Other Parks & Rec	798588	18	$ 75,599.00	20
Municipal Buildings	356175	8	$ 46,294.00	12
Pump Stations	88065	2	$ 6,499.00	2
BLVDS/Sprinklers	19049		$ 7,226.00	2
Totals	4403715	100	$ 370,630.00	100

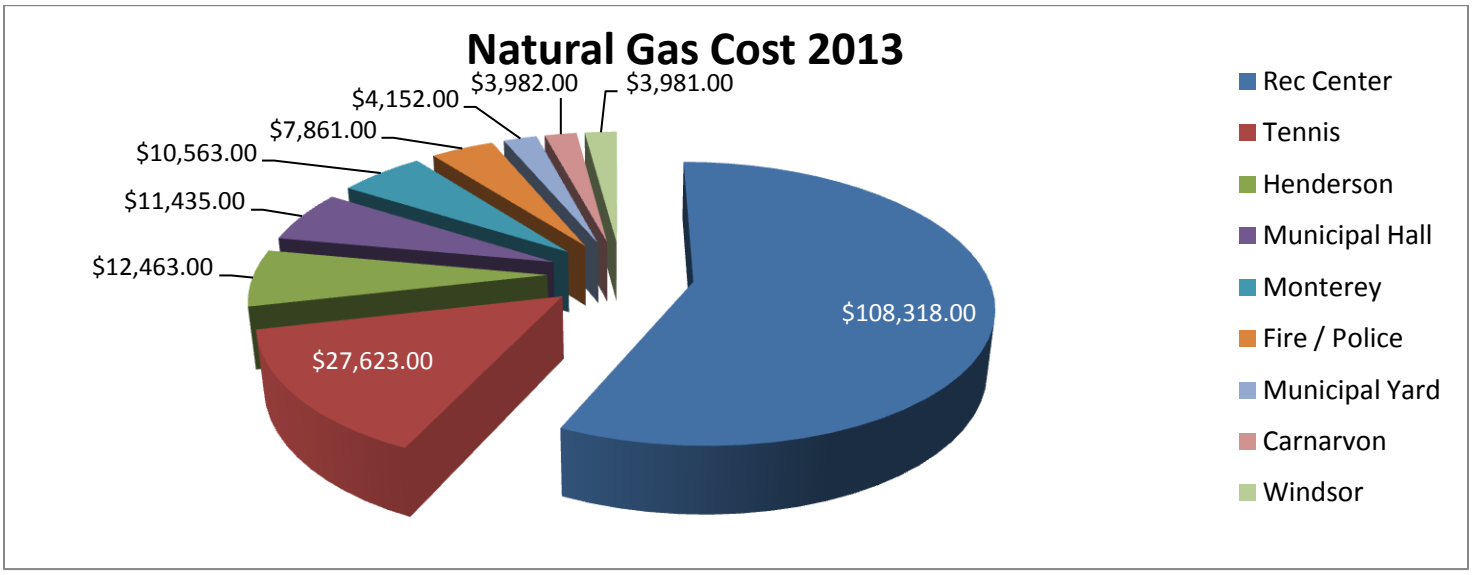


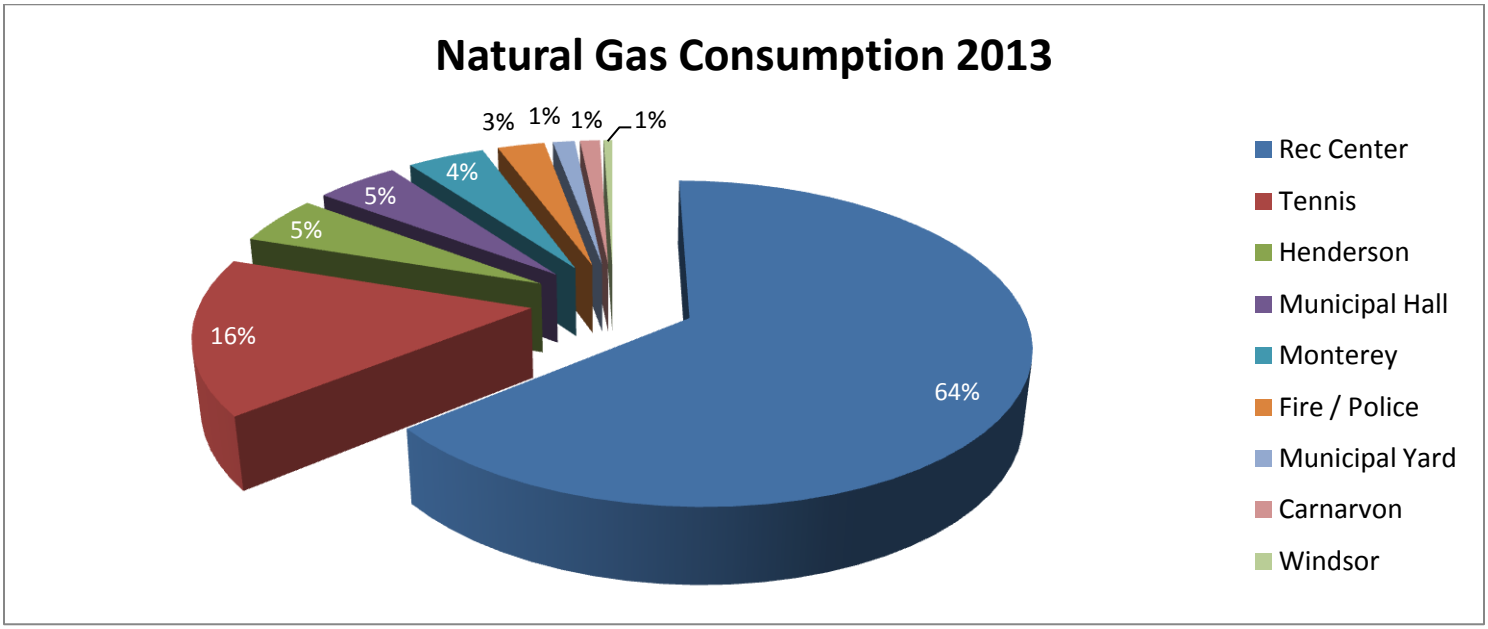


- For 2013, $29,953.90 in conservation rate credits helped to reduce the overall cost to the Rec Centre.
- Monthly charges for the 49 accounts associated with the boulevard/sprinkler account for the high cost to consumption ratio.

4.3 Natural Gas Consumption & Cost 2013

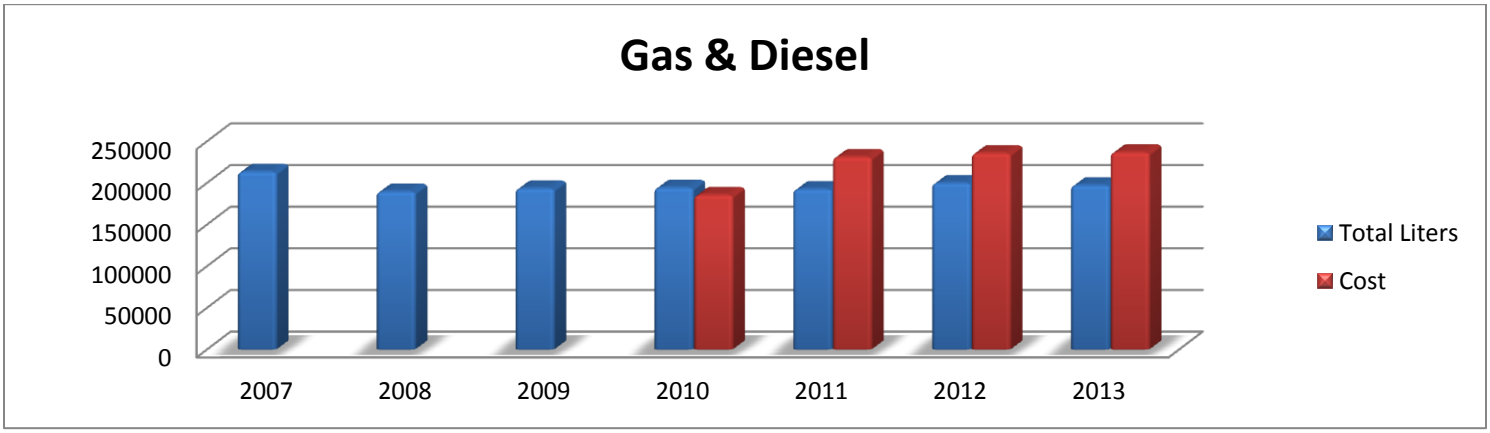
Site	Consumption GJ	Cost 2013
Recreation Center	7720.4	$ 108,318.00
Tennis	1912.8	$ 27,623.00
Henderson	602.7	$ 12,463.00
Municipal Hall	572.8	$ 11,435.00
Monterey	536.9	$ 10,563.00
Fire / Police	327.2	$ 7,861.00
Municipal Yard	151.6	$ 4,152.00
Carnarvon	138.1	$ 3,982.00
Windsor	61.3	$ 3,981.00
Total	**12023.8**	**$ 190,378.00**





4.4 Gas and Diesel usage 2007 to 2013

Gas and Diesel				
Year	Gas Liters	Diesel Liters	Total Liters	Cost
2007	118858	94615	213472	
2008	114360	75294	189633	
2009	108278	85074	193352	
2010	111969	82333	194302	$ 185,558
2011	102044	90401	192445	$ 231,195
2012	103697	96146	199843	$ 235,836
2013	99564	97653	197217	$ 236,820

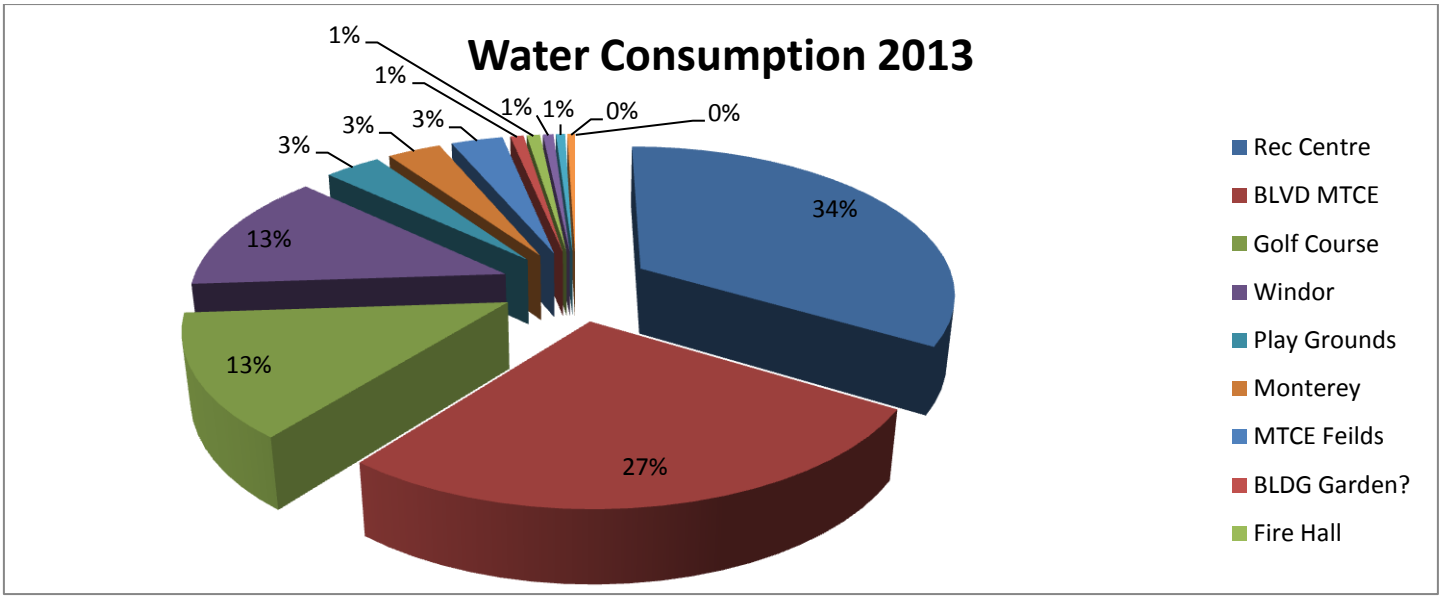


In 2011 we used 1857 less liters of fuel than in 2010 but with price increases the cost was $45,637 more. This shows just how vulnerable we are to price fluctuations in this area.

The Carbon tax was increased 20% in July 2012; this has again added a significant increase to the gas and diesel costs for 2012 and beyond.

The Carbon tax that the Municipality pays during the year comes back to us in the form of a Carbon Credit. In 2013 the amount was $29,290.

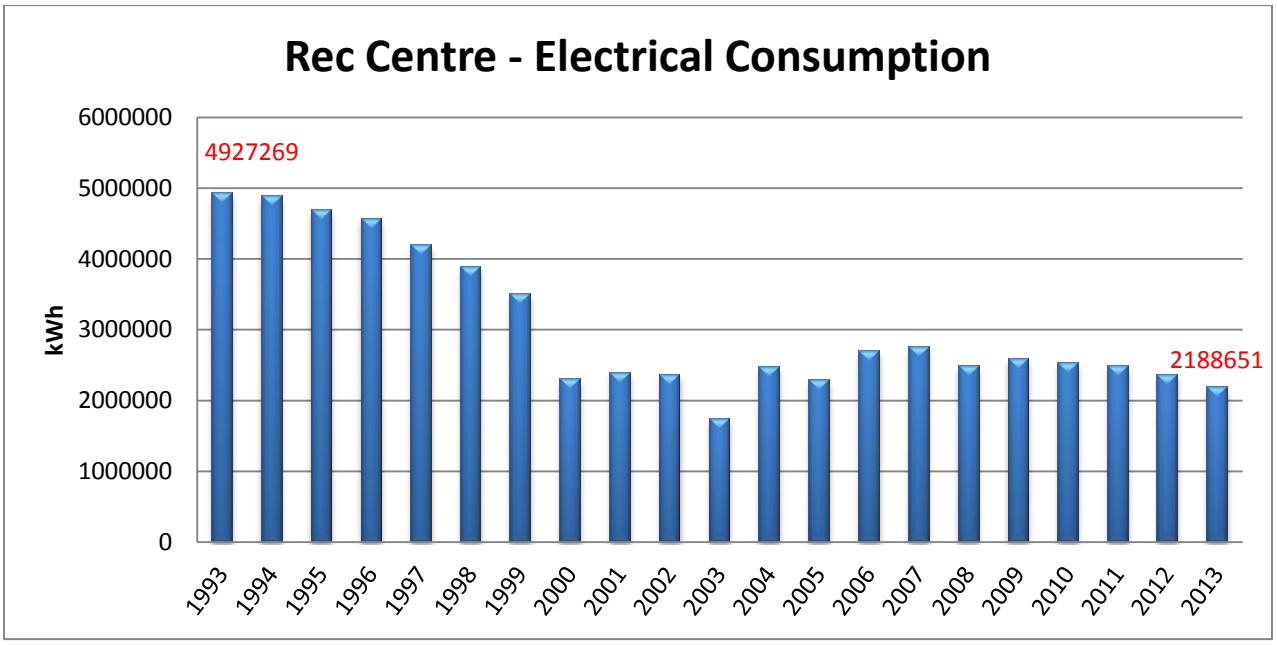
4.5 Water consumption



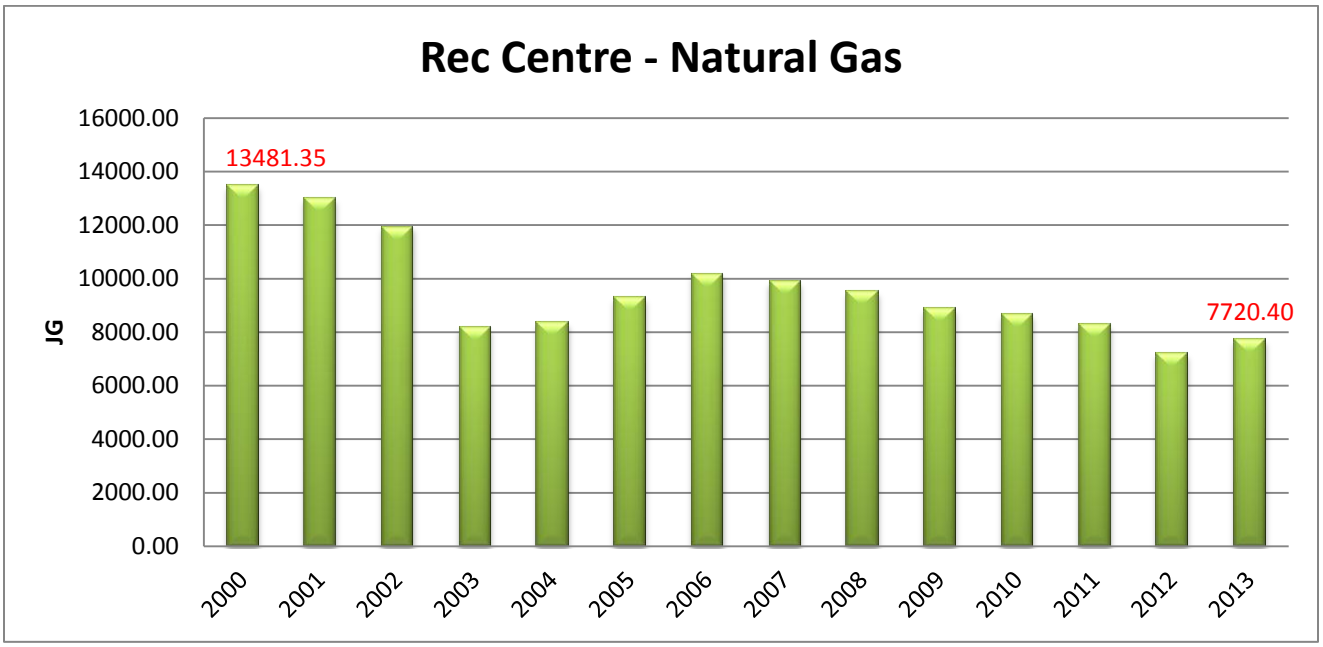
4.6 Recreation Centre Consumption History

The Recreation Centre represents the largest user of hydro and natural gas in the municipality.

The following chart shows the drop in electrical consumption over the last 20 years. The Recreation Centre now consumes **57% less** than what it did in 1993.



The Recreation Centre Natural Gas bill has been reduced by 43% over the last 13 years.



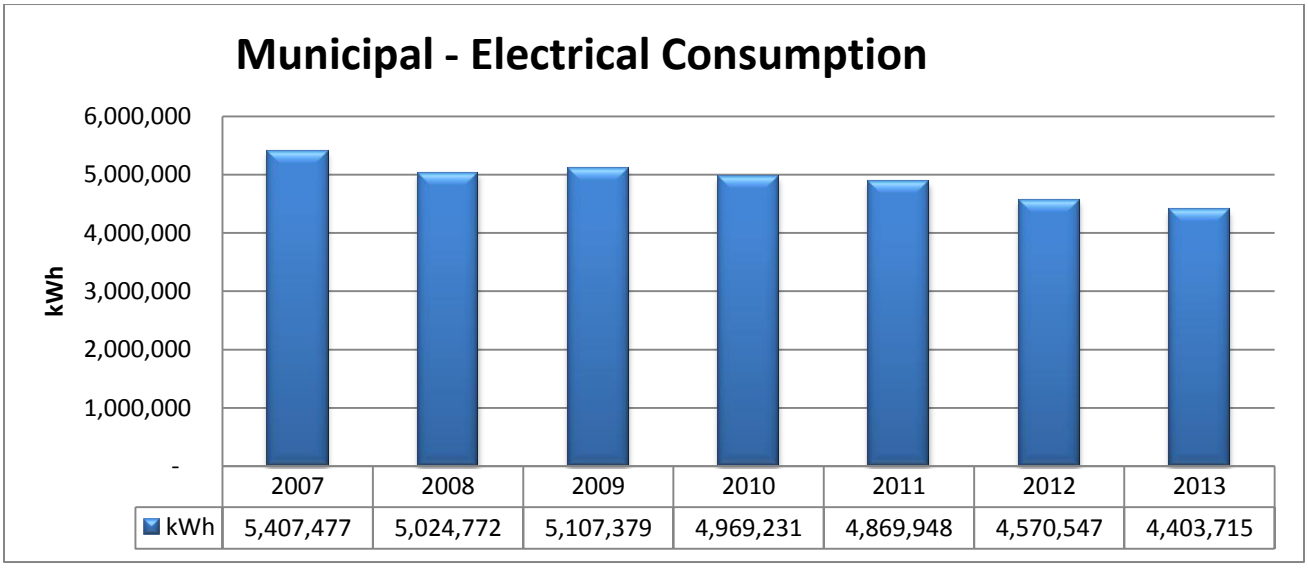
* In 2003 the heat load for the main pool was changed from natural gas to an electrical process that uses waste heat from the new pool dehumidifier.

* Recreation Centre renovations and no summer ice due to sub floor heating problems account for dip in consumption for 2000 to 2005.

- **Oak Bay Recreation Centre hits the 50% reduction mark for energy savings.**

When we add the 57% electrical savings, with the 43% Natural Gas savings, and convert to ekWh, we are now saving more than 50% over our historical energy consumption levels. This does not include the $10,000 propane bill we eliminated when we converted to an electric Zamboni.

4.7 Municipal Yearly Energy Consumption

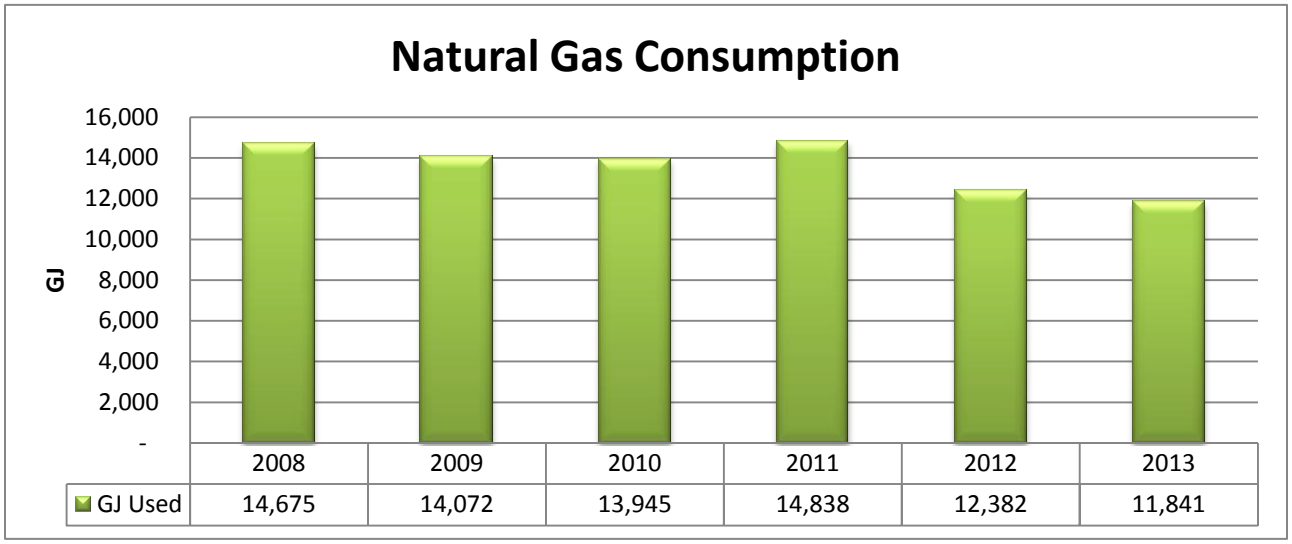


	2007	2008	2009	2010	2011	2012	2013
kWh	5,407,477	5,024,772	5,107,379	4,969,231	4,869,948	4,570,547	4,403,715

The Municipality has reduced consumption by 1,003,762 kWh over the last 6 years, an 18.6% drop.

The entire municipality now uses 523,554 kWh less Electricity than what the Rec Centre did in 1993.

In 2013 Oak Bay used 2834 GJ less than 2008, a 19.3 drop.

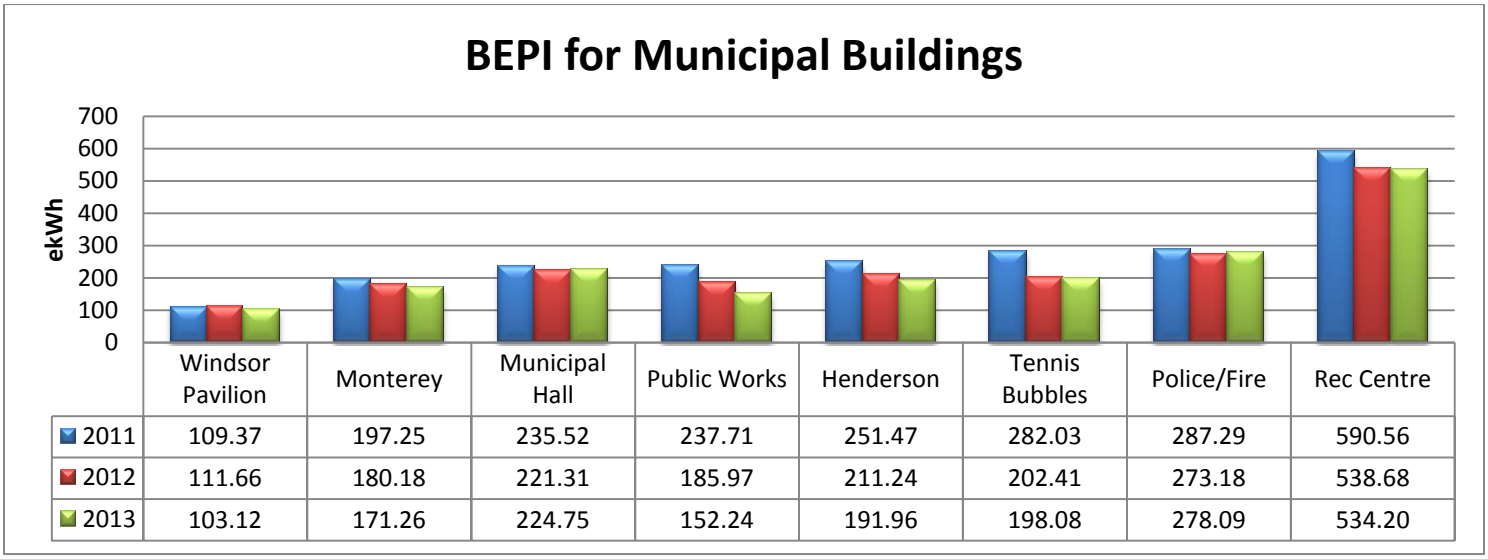


In November 2010 Henderson Centre changed its heating load from oil to natural gas by adding a new high efficient boiler. With this change and a colder than normal year, we see a spike in consumption for 2011.

In 2012 a tank-less hot water system was installed at Henderson Centre removing the need for the new boiler to run during the summer months.

2012 marks the beginning of our energy awareness campaign. Although the weather was slightly warmer and we did do a few capital projects, the savings were far beyond what can be attributed to just those items. The remaining savings were clearly from staff changes in attitudes towards energy usage.

4.8 Facility Energy Intensity



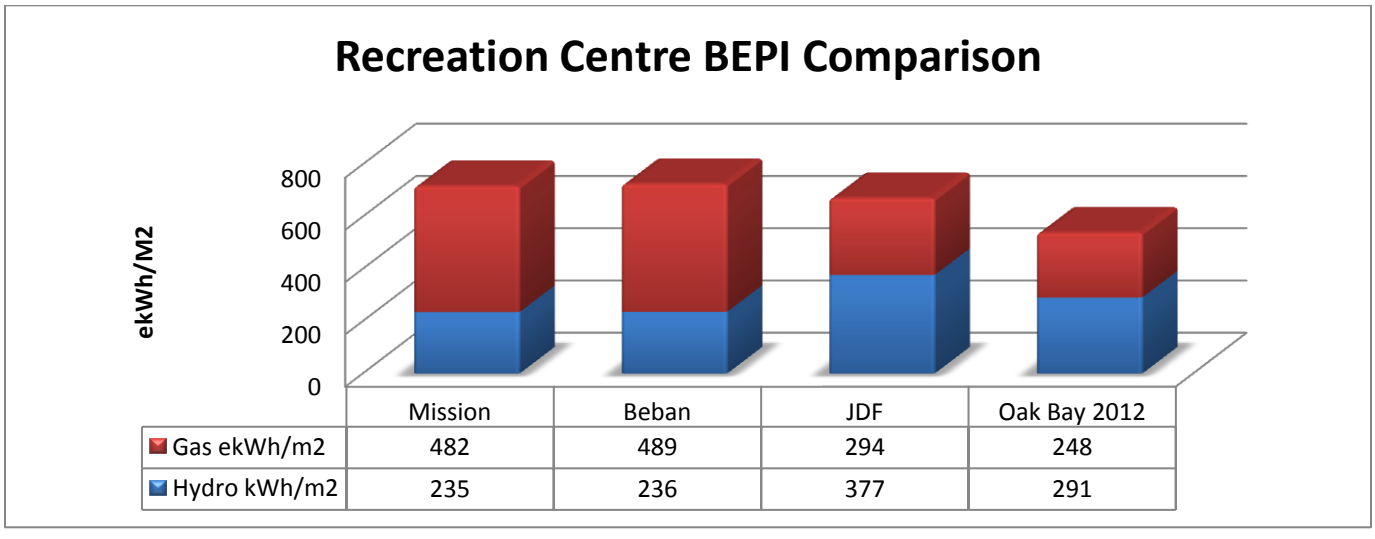
	Windsor Pavilion	Monterey	Municipal Hall	Public Works	Henderson	Tennis Bubbles	Police/Fire	Rec Centre
2011	109.37	197.25	235.52	237.71	251.47	282.03	287.29	590.56
2012	111.66	180.18	221.31	185.97	211.24	202.41	273.18	538.68
2013	103.12	171.26	224.75	152.24	191.96	198.08	278.09	534.20

These charts show the Building Energy Performance Index (BEPI). The area of each of our buildings is compared to its energy consumption; we can then see how their performance compares to each other and how they compare to other similar buildings.

At this point other Energy Managers in the municipal sector are compiling comparable information on their buildings. When this is compiled we will be able to establish benchmarks for these unique buildings. Once these benchmarks are in place, we will be able to better compare our buildings energy performance with other similar buildings.

It's important to note that buildings with indoor pools are generally considered to be five times more energy intensive than conventional buildings. This along with the Arena and other high energy intensive equipment, tend to push Recreation Centre's into a class of their own.

4.9 Recreation Centre Total Energy BEPI Comparison



	Mission	Beban	JDF	Oak Bay 2012
Gas ekWh/m2	482	489	294	248
Hydro kWh/m2	235	236	377	291

This chart shows how the Oak Bay Recreation Centre compares to other multiplexes with similar functions in the region. The chart indicates the positive results of energy conservation over the years. Data for other buildings is from 2011.

5 Our Actions

5.1 Previous Actions

Over the years Oak Bay has been involved in many energy saving projects resulting in impressive conservation numbers. The project list on the next page identifies the projects, estimated savings and an adjustment for the price increase to show actual savings.

From this project list we can account for the following in savings:

- $1,666,714 in actual savings and $903,790 in avoided cost for a total savings of $2,570,504.
- $323,492 in yearly savings.
- 10,397.7 tonnes of GHG reduced to date and 802.31 tonnes of GHG per year.
- 2,161,669 kWh of electricity and 6,161 GJ of natural gas.

It's important to note that the actual savings are beyond what can be accounted for on the project list. The Recreation Centre alone has lowered its electrical consumption by 2,738,618. over the last 20 years. The remaining savings can be attributed to behavioral and procedural changes; also many of these projects exceeded their estimated savings.

In 1993 the Rec Centre used 4,927,269 KWH of hydro at a cost of $157,645 and paid .032 cent per KWH. If no changes were made that consumption would have cost us $349,836 in 2013. Instead of the actual amount of $136,511 paid, this created a yearly savings of $213,325.

Windsor Pavilion

5.2 Energy **Projects to Date**

Project	Year	Cost	Incentives	KWH Saved	GJ Saved	GHG Saved	Yearly Savings	Adjusted Savings	Comment	Savings to date	Savings with cost increases inc	GHG saved to date
Solar Heating System	1985				795	40	$4,000	$11,217	Federal Grant	$116,000	$149,659	1160
Pool underwater Lights	1985			109,500		2.73	$1,083	$7,775	1000W to 500W	$31,407	$134,105	79.17
Natural Gas conversion	1994	$53,700				350	$25,952	$73,824	From Oil at 4.96 GJ in 94	$519,040	$988,741	7000
Energy upgrade	1996	$161,013	$51,158	569,177	1,000	50.3	$23,779	$54,522	Inc. Mont & Hend	$428,022	$672,873	905.4
Low E ceiling Arena	2002	$2,000		142,857		3.57	$7,000	$10,143	Used from Memorial Arena	$84,000	$88,857	42.8
Pony Pump	2002	$2,700		91,836		2.3	$4,555	$6,520		$54,660	$57,122	27.6
Power Factor Correction	2004						$1,524	$1,524		$15,240	$15,240	
Subfloor Heat Project	2006			89,686		2.24	$4,000	$5,919	Electric to Waste	$32,000	$38,377	17.92
Lighting Fire/police	2009		$3,637	52,344		1.3	$2,690	$3,716	Lighting retrofit	$12,107	$14,693	6.5
Condenser Project	2009			33,074		0.83	$1,700	$2,348		$7,650	$9,284	4.15
Work truck 4 cyl	2009					0.9	$500	$500		$2,250	$2,250	4.5
Lighting Public Works	2009		$4,078	31,558		0.79	$1,893	$2,241		$8,519	$8,858	3.95
Energy Upgrade	2010	$351,674	$155,603	492,529	2,435	185.24	$63,406	$69,327	Mont, Hend, & Rec Centre	$221,921	$247,772	740.96
Boiler Henderson	2010	$83,000	$7,422		364	49.6	$5,282	$5,136		$21,128	$20,362	198.4
Electric Zamboni	2011	$128,075				19.6	$10,000	$10,000	Include Trade in	$30,000	$30,000	58.8
Tennis Lights	2011	$41,199	$25,388	161,000		3.54	$8,372	$11,431	From 1000W to 575W	$25,116	$29,423	10.62
Lighting Municipal Hall	2011		$6,109	43,970		1.1	$2,286	$3,122		$6,858	$7,365	3.3
Insulation 3 Court Bubble	2011	$30,140			647	33	$8,100	$9,129	3 Court	$20,250	$22,467	99
LED Lights Bleachers	2011	$2,100	$1,263	10,687		0.23	$556	$759		$1,390	$1,790	0.58
Other lighting projects	2011	$856	$642	13,905		0.31	$723	$987	Kitchen, washrooms etc	$1,808	$2,329	0.78
DHW Henderson	2012	$9,762			150	7.55	$2,250	$2,117	Boiler is now off all summer	$3,375	$3,176	11.33
Energy Study	2012	$5,000							Projects for 2013 and future			
Compressor upgrade	2012	$35,740		83,300		1.8	$5,498	$5,914	M Series	$8,247	$8,663	2.7
Lighting Arena & ISF	2012	$49,655	$37,395	98,039		2.44	$5,883	$6,961	Lighting was increased	$8,825	$10,196	3.66
LED Pool Lights	2013	$10,500	$3,000	89,177		2.25	$6,332	$6,332	Jun-13	$3,166	$3,166	1.13
Occupancy & Mezz	2013	$3,200	$1,000	27,824		0.69	$348	$348	Jun-13	$174	$174	0.35
LED Windsor & Mont	2013	$1,259		21,206		0.4	$1,980	$1,980	Nov-13	$330	$330	0.1
4 Court Insulation	2013	$40,000			776	39.6	$9,700	$9,700	Sep-13	$3,233	$3,233	14
Totals		**$1,011,573**	**$296,695**	**2,161,669**	**6,167**	**802.31**	**$209,393**	**$323,492**		**$1,666,714**	**$2,570,504**	**10397.7**

5.3 Actions in 2013

Projects - In 2013, the following projects were completed saving $20,233 dollars, 140,837 kWh of electricity, 776 GJ of natural gas and 42.94 tonnes of GHG per year.

Projects Done in 2013							
	Projects for 2013			Annual Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
Tennis	4 Court Insulation	$40,000	4.1	$9,700	776		39.6
Rec Centre	Pool LED Lights	$10,500	0.71	$6,332		89177	2.25
Rec Centre	Motion Sensors 10 rooms	$1,200	0.32	$1,627		22,919	0.57
Rec Centre	Atrium HID Replace with LED	$2,000	2.47	$348		4,905	0.12
Monterey	Cedar Room Programmable Thermostat	$125	1.08	$44		756	0
Monterey	Lighting Upgrades	$1,900	0.73	$1,160		15,400	0.3
Monterey	Washroom OS	$200	7.1	$20		306	0
Windsor	LED screw-in/snap-in lamps	$3,400	2.95	$800		5,500	0.1
Henderson	Hallway Photocell	$250	4	$62		574	0
Henderson	OS Lighting Control	$620	4.4	$140		1,300	0
	Total	$60,195	2.97	$20,233	776	140837	42.94

5.4 Behavioral Changes

- **Energy Team** – Our 7 member energy team helps guide energy related decisions, motivates staff and are ambassadors for energy conservation.
- **News Letters** –Staff are now informed of upcoming events, energy improvements, tips to save energy at work and home, links to energy related web sites and much more.
- **Energy Reports** – Reports are sent out quarterly to building managers that compare each buildings consumption with previous years and show how they are doing in relation to average temperature and the trends of the other buildings. Other energy related information is passed on in these reports.
- **Attitude** – It's clear from the energy reports that we are seeing the results of a changing attitude towards energy use. Almost all areas have seen improvement in their consumption.
- **Employee Awareness** – We continue to work on our employee awareness. In 2013 this will be greatly assisted by the help of BC Hydro's Out Reach program. This program worked with us in 2013 to help us with our awareness campaign.
- **Programming and controls** – There has been a long list of changes and improvements to controls and programming. Examples are refinements to heating controls, lighting timers and motion sensors in many areas, exhaust fans now on a timer in the pool area, humidity set point changes and many more.

5.5 Actions for 2014

- **Continual Optimization Program** – The Recreation Centre is now in the COPs program. This program will search for improvements in efficiencies with our building management system. Buildings that are involved in this program normally see substantial savings in gas and hydro. As the first part of this program involves a one year monitoring stage, we are unable to be involved in energy upgrades to this building during this time.
- **Projects** – Our biggest opportunities will be to continue to implement the remaining projects identified in the recent energy study in buildings other than the Recreation Centre. Highlights of this study are included below. Current funding will limit how many of these projects can be done in 2014.
- **5 Year Plan** – Work has started on a five year plan to improve energy efficiency and to continue reducing our GHG emissions. This will include heat recovery from the refrigeration plant to help with space heating and humidification for the arena.
- **CRD Water Audit –** We have signed up for a water audit to be completed at the Rec. Centre. The audit will look at all our water usage in the building and give us feedback on possible improvements.

5.6 Action for 2014- Project List

In 2009 an in-depth energy study was done on the Oak Bay Recreation Centre, Monterey Centre, Henderson Centre and the Municipal Hall. This study was funded 100% by BC Hydro as part of a Power Smart initiative. This study pointed out many of the energy saving projects that were completed over the next few years. In 2012 a walk through energy study was completed on all of Oak Bay's main buildings. This gave us a list of projects for the remaining buildings and also revisited the progress made from the original study, while offering updated solutions. From those studies, the following projects are planned for 2014. Priority will be dependent on funding, payback and operational considerations.

Projects for 2014							
	Projects for 2014			Annual Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
Henderson	Change Room Exhaust Fan Downsizing	$2,000		$303		2,810	0.1
Henderson	New DDC System	$23,000	4.8	$5,155	248	7889	12.7
Monterey	Underground parking lights	$4,500	5.4	$822		11266	0.3
Library	LED Lighting	$648	2.4	$273		3695	0.1
Municipal Hall	Electric Heaters Addition to DDC	$3,169	4.9	$643		17,200	0.4
Municipal Hall	Ventilation Optimization	$2,580	3.8	$681	37.7	992	1.9
Police / Fire	Thermostatic radiator valves	$4,900	6.3	$800	40		1.9
Police / Fire	Turn off radiator in police reception	$100	0.5	$100			0.2
Police / Fire	Programmable thermostats	$1,600	3.8	$400		4,000	0.1
Police / Fire	Police programmable thermostat upgrade	$700	6.3	$100		1,000	
Police / Fire	LED screw-in/snap-in lamps	$2,300	1.4	$1,100		9,300	0.2
	Total	**$45,497**	**4.4**	**$10,377**	**325.7**	**58,152**	**17.9**

5.7 Actions for 2015 and the Future- Project List

- From the 2012 energy study, the following projects are being considered for 2015 and beyond;

	Rec Centre			Annual Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
2.1.5	CT Heat Recovery	$35,000	7.7	$4,600	293	-10,351	14.7
2.1.7	Arena Glass Insulation	$7,500	2.9	$2,600	128	7,130	6.7
2.1.11	Fitness Gym Lighting	$10,500	6.3	$1,700		23,700	0.5
	Continuous optimization Implementation	$11,000	1.0	$11,150	400	75,000	22
	Real Ice	$32,000	2.0	$11,440	500	60,000	27
		$96,000	**3.0**	**$31,490**	**1,321**	**155,479**	**70.9**

	Henderson			Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
2.2.1	New DDC System	$20,000					
2.2.2	Condensing Boiler SWT Optimization	$500		$1,340	77		3.9
2.2.3	Boiler Night Setback/Pump Control	$500		$1,960	109	619	5.6
2.2.4	OA Lockout/Weather Predictor	$500		$1,080	62	79	3.1
2.2.5	EF Humidistat	$500		$605		5,620	0.1
2.2.6	Ventilation Units Schedule Optimization	$500		$92		850	0
2.2.7	Change Room Exhaust Fan Downsizing	$2,000		$303		2,810	0.1
2.2.8	Tennis Court Lighting Schedule Optimization	$500		$78		721	0
Hend	**Total DDC**	**$ 25,000**	**4.8**	**$ 5,458**	**248**	**10,699**	**12.8**

	Monterey			Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
2.3.1	ASHP for AHU	$ 18,000	11.46	$ 1,570		23,500	0.0
2.3.2	High Efficiency Gas Furnace	$20,000	8.7	$2,290	131		6.7
	Parking Garage Lighting	$6,000	6.6	908		12,267	0.3
Mont	**Total DDC**	**$ 44,000**	**9.2**	**$ 4,768**	**131**	**35,767**	**7.0**

	Municipal Hall			Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
2.4.2	Electric Heaters Addition to DDC	$3,200	4.9	$643		17,200	0.4
2.4.3	Ventilation Optimization	$2,500	3.7	$681	37.7	992	1.9
Hall	**Total DDC**	**$ 5,700**	**4.3**	**$ 1,324**	**37.7**	**18,192**	**2.3**

	Public Works			Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
2.1.1	Turn off HRV	$200	0.3	$500	10	2,100	0.7
2.1.2	Adjust compactor timing	$600	6.8	$100		800	
2.1.3	Locker room EF timer	$500	1.6	$300		2,700	0.1
2.1.4	Washroom EF timer	$500	1.7	$300		2,500	0.1
2.1.5	Sign shop furnace timer	$500	1.3	$400	20	100	0.9
2.1.6	Shop lighting upgrade	$8,700	8.3	$800		7,900	0.17
2.1.7	New lighting control	$4,200	10.5	$400		3,700	0.08
PW	**Total DDC**	**$ 15,200**	**5.4**	**$ 2,800**	**30.0**	**19,800**	**2.05**

	Windsor			Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
2.2.1	Basement EF humidistat	$500	4.3	$110		1,000	
2.2.2	Vending miser	$500	5.5	$90		900	
2.2.3	Lobby programmable thermostats	$700	2.6	$280		2,600	0.1
2.2.4	Washroom programmable thermostats	$1,200	2.3	$510		4,800	0.1
2.2.5	Washroom exhaust fan timers	$800	2.6	$290		2,800	0.1
2.2.7	New lighting control	$1,200	6	$200		1,700	
Wind	**Total DDC**	**$ 4,900**	**3.3**	**$ 1,480**		**13,800**	**.3**

	Police and Fire			Savings			
Item	Description	Cost	Payback	$	GJ	kWh	GHG
2.3.1	Thermostatic radiator valves	$4,900	6.3	$800	40		1.9
2.3.2	Turn off radiator in police reception	$100	0.5	$100			0.2
2.3.3	Programmable thermostats	$1,600	3.8	$400		4,000	0.1
2.3.4	Police programmable thermostat upgrade	$700	6.3	$100		1,000	
2.3.5	Police washroom EF Timer	$500	3.3	$200		700	0.2
2.3.6	Police holding cells EF lighting interlock	$900	6.2	$100		1,000	0.1
2.3.7	Building envelope weatherproofing	$600	6.2	$100		1,000	
2.3.8	Fire hall washroom EF installation	$1,000	8.7	$100	10	-300	0.4
2.3.9	T12 to T8 h/w retro fit	$100	0.8	$100		500	
2.3.10	LED screw-in/snap-in lamps	$2,300	1.4	$1,100		9,300	0.2
2.3.11	New lighting control	$700	3.6	$200		1,900	
Fire	**Total DDC**	**$ 13,400**	**4.1**	**$ 3,300**	**50.0**	**19,100**	**3.1**

5.8 Future Project Totals

Site		Cost	Pay back	$	GJ	kWh	GHG
Rec	**Total**	**$185,300**	**3.0**	**$32,854**	**990**	**166,333**	**53.75**
Hend	**Total**	**$ 25,000**	**4.8**	**$ 5,458**	**248**	**10,699**	**12.8**
Mont	**Total**	**$ 44,000**	**9.2**	**$ 4,768**	**131**	**35,767**	**7.0**
Hall	**Total**	**$ 5,700**	**4.3**	**$ 1,324**	**38.0**	**18,192**	**2.3**
PW	**Total**	**$ 15,200**	**5.4**	**$ 2,800**	**30.0**	**19,800**	**2.05**
Wind	**Total**	**$ 4,900**	**3.3**	**$ 1,480**		**13,800**	**.3**
Fire	**Total**	**$ 13,400**	**4.1**	**$ 3,300**	**50.0**	**19,100**	**3.1**
	Total	**$ 293,500**	**5.6**	**$ 51,984**	**1,487**	**283,691**	**81.3**

5.9 Looking to the Future

As we look for future energy saving, it's clear that the more you look the more you see. Since the 2012 walk through energy study many exciting energy saving opportunities have come to light. Some of these opportunities are listed below however cost and payback are not listed yet, as they require more investigation and some engineering will be required.

- **LED Street Lights** – The cost of fixtures is decreasing and now it makes economic sense to start converting. Several municipalities have been testing fixtures (including Oak Bay) and with BC Hydro's help, information will be shared and business plans can be formed. This future project is seen as the best electrical saving opportunity we presently have on the radar. In 2012 street lighting consumed 976657 kWh of electricity, costing us $92,000 and added 25 tonnes of GHG. Most areas that have already made the change have seen savings of 50% to 65%. These savings would be a big step towards our electrical reduction targets, help with our GHG reduction goals and save the municipality a lot of money.
- **Continual optimization** – The findings from this program will be implemented in 2015; we hope that there will be significant saving opportunities identified. All findings with less than a two year payback are expected to be completed as soon as possible and without incentives. Those projects identified with longer pay back will then become part of our project list and are eligible for incentives.
- **REALice** – This is a new ice making process, it removes air from the ice making process, and this makes the ice denser and enables ice making with cold water. Fortis has just finished a test with 10 BC rinks. So far the results have been excellent with savings beyond what the manufactures claim. We expect savings of 500 GJ, 60,000 kWh, 27 tonnes of GHG and about $11,440. This can't be implemented until after the continuous optimization monitoring period is completed. By that time we should know about any incentives being offered.
- **5 year plan** – We are presently putting together a five year plan for improving the ice plant operation and to better use the waste heat associated with its function. The key to this plan is to first capture as much waste heat as possible and use that heat for the heat pump for the arena dehumidification, heating the lounge and change rooms, snow melt pit and possibly the tennis bubbles. This is seen as one of our best opportunities to continue lowering GHG emissions in the future. Due to the cost this project will likely be phased in over several years.
- **LED Tennis Bubble Lights** – With the improvements in LED lighting, there is now an opportunity to lower consumption while at the same time improving the light quality. At this point the price is still very high but we hope to see that reduced to the point that this will be a viable project.
- **Tennis Bubble Heat** –The CRD's plan to convert the heat from the sewer into heat for the tennis bubbles and new high school now looks to be derailed due to funding issues. This reopens the plan to use waste heat from our refrigeration plant to supplement the bubble heating system. This was looked at in our 2009 energy study but has been on hold due to the CRD planned project. The estimate was to save $5,600 and 25.6 GHG.
- **Pool Heat** – Although we already use waste heat for our main pool, we are still using our natural gas boilers to heat our learners and swirl pools. Recently there has been a shift to much more energy efficient heat pumps for this purpose. A similar retrofit at another local pool is now seeing savings of 50% on their natural gas bills. This would be another great step to lowering our GHG emissions.

- **Solar voltaic panels –** With the price of this technology coming down substantially over the last few years, we are currently exploring this as a future option. Currently a system that would deliver 110,000 kWh per year is about $300,000. If funding became available for renewable energy sources or if we have captured most of our easy to obtain savings, this may well be a viable option for the future.
- **Arena Dehumidification** – As our old dehumidifier reaches the end of its useful life we are seeing a shift to a more energy efficient system. The new system uses a heat pump instead of natural gas; this will get rid of almost all the GHG associated with this function. The upfront cost is twice the price but the return on investment is much better with much lower operating costs and longer life expectancy.
- **New technology** - This is the big hope for the future, as technology improves more and more opportunities become available. Two years ago LED underwater pool lights were not yet ready for the market and now they are installed in all three of our pools and saving us 90,000 kWh per year. LED street lights were a dream, then an expensive reality and now the cost is at a point where there is a good business case to change over. The truth is we don't know what the future will bring, but we should make sure that we are in a good position to take advantage when future opportunities arise. We can do this by taking the time to look for these opportunities and by coming up with a funding plan to ensure we can move forward in a timely manner.

6. Senior Management Approvals

By signing below, Oak Bay's senior management acknowledges receipt and Council support in principle of the Strategic Energy Management Plan, as per Council's resolution dated December 16, 2013.

_____

Nils Jensen, Mayor

_____

Helen Koning, Municipal Administrator

7 Appendices

7.1 Appendix A

Stakeholders – The main stakeholder are;

- 18000 residents and taxpayers in Oak Bay.
- Oak Bay Council and Commission.
- BC Hydro.
- Fortis BC
- All departments within the Municipality of Oak Bay

List of Energy Team

Stakeholders – Energy Team			
Name	Title	Area	Contact Info
Mary Kucera	Marketing	Parks & Recreation	mkucera@oakbay.ca
Ray Herman	Director of Parks and Recreation	Parks & Recreation	rherman@oakbay.ca
Janette Sproston	Course Programmer	Monterey Centre	jsproston@oakbay.ca
Grant Brown	Manager of Administrative Services	Parks & Recreation	gbrown@oakbay.ca
Caroline Lawrence	Sports (Arena) Programmer	Recreation Centre	clawrence@oakbay.ca
Barry Russell	Maintenance Leadhand	Henderson Centre	brussell@oakbay.ca
Ken Olson	Operations & Energy Coordinator	Parks & Recreation	kolson@oakbay.ca

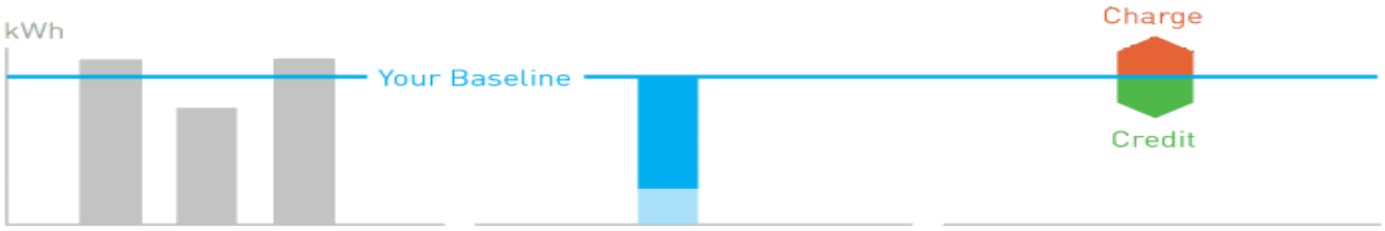
List of Energy Volunteers

Stakeholders - Volunteers			
Name	Title	Area	Contact Info
Patricia Walker	Municipal Treasurer	Municipal Hall	pwalker@oakbay.ca
Jim Pearson	Maintenance Supervisor	Recreation Centre	jpearson@oakbay.ca
Mandi Krieger	Human Resources	Parks & Recreation	mkrieger@oakbay.ca
Bill Cliff	Electrician	Public Works	bcliff@oakbay.ca
Bryon Ewart	Supervisor, Food Services/Catering	Recreation	bewart@oakbay.ca
Brian Gray	Electrician	Parks & Recreation	bgray@oakbay.ca

7.2 Appendix B

Conservation Rate

In 2011, BC Hydro introduced its new conservation rate for their large general service customers. This rate is designed to stimulate conservation by charging a higher rate if your consumption grows and giving credits for reducing consumption. The catch is that this is a rolling base line and is set by averaging our last three years. When we apply energy saving projects and lower our consumption we will receive credits on our bills for the next three years, at a diminishing rate until our base line includes the upgrades. If we wish to continue getting credits we will need to have a plan for continual improvement. Without a plan, plug load growth will likely drive our consumption up. This will add penalty charges to our bills.



Example - LED underwater pool lights. The chart below shows how the conservation rate greatly increases the return on investment for this project. This also shows that although the savings for reducing our kWh give us a return year after year, the rolling baseline makes the conservation rate credits disappear after three years. Savings from the conservation rate also reduced the payback for this project to one year.

Year	Cost kWh	kWh Saved	Savings	Year	Conservation Rate Credits	Totals
2013/14	0.071	89,176.8	$ 6,331.55	Year 1	$4,200	$ 10,531.55
2014/15	0.074	89,176.8	$ 6,599.08	Year 2	$2,800	$ 9,399.08
2015/16	0.0765	89,176.8	$ 6,822.03	Year 3	$1,400	$ 8,222.03
2016/17	0.0795	89,176.8	$ 7,089.56	Year 4 +	0	$ 7,089.56
			$ 26,842.22		$8,400	$ 35,242.22

Note – This chart only shows the simple payback and does not show the savings from taxes, maintenance savings, demand charges and the rate rider.

Conservation Rate Credits Rec Centre					
	2011	2012	2013	2014	Total
Jan	255.31	396.39	1,446.16	2,695.44	
Feb	-143.35	-628.65	1,953.71	1,453.88	
Mar	239.75	59.92	2,663.39	2,994.27	
Apr	893.38	967.05	1,173.68	2,132.22	
May	751.23	987.88	2,068.21	-47.48	
June	1,617.56	366.34	2,532.83	853.22	
July	2,867.66	2,206.64	2,912.17	563.37	
Aug	616.3	1,623.25	3,783.56		
Sep	763.59	3,031.17	3,189.12		
Oct	767.47	2,700.90	2,914.37		
Nov	796.52	2,615.46	2594.39		
Dec	133.47	2,349.82	2722.31		
	$9,558.89	$16,676.17	$29,953.90	$10,644.92	$66,881.36

Note: In 2011, a one month pool shut down had a significant effect for June and July. Also the increase in July 2012 is a result of the 2012 upgrades.
In June 2013' another round of upgrades were completed and this added to our monthly savings. If these projects had not been done the credits would have dropped by about 1/3 due to the rolling baseline.
This new rate is now in effect for Monterey Centre, Windsor Pavilion and Police/Fire Hall.
Additional savings from the conservation rate credit comes from tax savings, rated rider savings and reducing the peak demand charge.

Monterey Recreation Centre