



# City of Richmond

## Report to Committee

**To:** Public Works and Transportation Committee  
**From:** Cecilia Achiam, MCIP, BCSLA  
Interim Director, Sustainability and District Energy  
**Re:** 2012 Corporate Energy Management Update

**Date:** October 29, 2012

**File:**

### Staff Recommendation

That the staff report entitled "2012 Corporate Energy Management Program Update Report" from the Interim Director, Sustainability and District Energy, dated October 29, 2012 be received for information.

Cecilia Achiam, MCIP, BCSLA  
Interim Director, Sustainability and District Energy  
(604-276-4122)

Att. 7

REPORT CONCURRENCE			
<b>ROUTED TO:</b>	<b>CONCURRENCE</b>	<b>CONCURRENCE OF GENERAL MANAGER</b>	
Engineering Project Development	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>		
<b>REVIEWED BY SMT SUBCOMMITTEE</b>	<b>INITIALS:</b> 	<b>REVIEWED BY CAO</b>	<b>INITIALS:</b> OK

## Staff Report

### Origin

The Corporate Energy Management Program (EMP) supports the following Council Term Goal;

Council Term Goal #8.1: “Continued implementation and significant progress towards achieving the City’s Sustainability Framework, and associated targets.”

The EMP is a key contributing program towards achieving the Sustainability Framework Goals of a Sustainable Resource Use-Energy Smart City and Climate Prepared City. In addition, the program supports the significant progress made in the realizing of the Energy Sustainability Strategic Program Implementation Plan endorsed by Council on July 26, 2010 (**Attachment 1 and 2**).

This report summarizes the recent achievements of the Corporate Energy Management Program and highlights upcoming initiatives. The report information is also summarized in an attached brochure, to further illustrate key information and highlights of recent City energy projects and initiatives (**Attachment 3**).

### Background

Corporate wide, the City has been following three core strategies, as adopted by Council in the Energy Sustainability Strategic Program, to guide the transitioning towards more sustainable energy use (greater energy use efficiency) and lower greenhouse gas (GHG) emissions;

- **Empower** – building awareness and capacity
- **Reduce** – reduce overall energy consumption through conservation and efficiency
- **Renew and Localize** – accelerate transition to locally supplied renewable and clean energy

To put these strategies into actions, the corporate EMP has been focused on work in three main areas;

- **Energy conservation** - reduce the overall demand for an energy service (e.g., increased corporate energy use awareness and improved operational control to reduce waste)
- **Energy efficiency** - reduce the energy required to provide an equivalent energy service (e.g. lighting retrofits to more efficient technologies)
- **Renewable and clean energy** – increase the use of renewable energy sources and reduce the carbon intensity of emissions resulting from an energy service (e.g. installation of solar thermal energy systems at existing facilities)

In addition to the Sustainability Framework goals and targets, the City of Richmond, in collaboration with BC Hydro, agreed to an interim target of approximately 2.0% reduction (1,800,000 kWh) in electrical use by April 2013 from 2011 levels, which equates to the energy used on average year by approximately 50 homes in BC. The corporation is presently on-pace to achieve this target. This target was established to maximize the funding available from BC Hydro, one of our key EMP external funding partners, to support our EMP.

### *EMP Achievements – 2007-2010 EMP Highlights*

Between 2007 and 2010 approximately 4.0 GWh (4,000,000 kWh) of energy was saved through energy related projects, which amounts to almost in \$1,000,000 in total operational cost avoidance savings since 2007. During that time the City received approximately \$880,000 in external funding to help support its EMP.

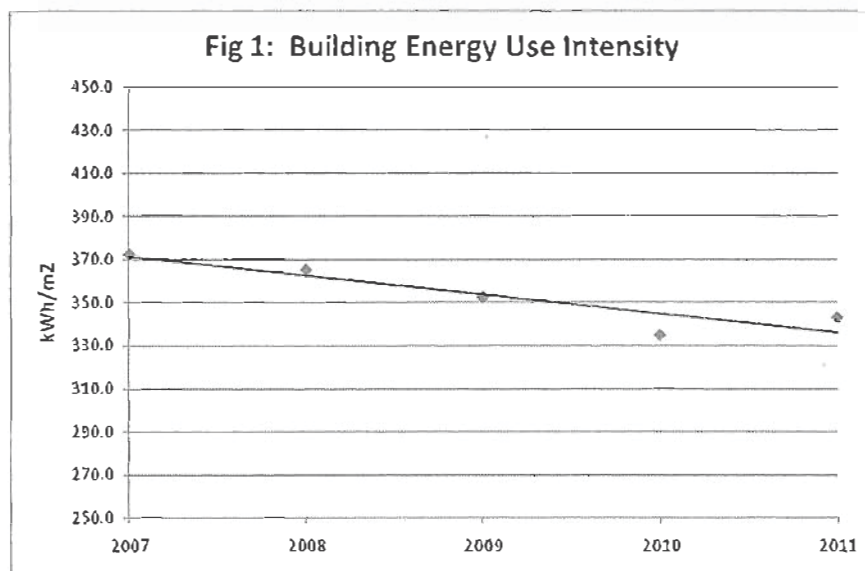
### **Findings of Fact**

#### *Energy Use Overview - 2011*

As specified in last year's Corporate Energy Update report, dated October 6, 2011, the Richmond Olympic Oval energy use information has been included in this 2012 report. The City's fleet energy related information and initiatives are managed separately under the Fleet Operations & Environmental Programs. The EMP now actively manages or coordinates, energy use reporting, inventory, and reduction programs, for all civic buildings, lighting, and water/wastewater services.

In 2011 City assets under the EMP utilized approximately \$5.4 million dollars of conventional energy<sup>1</sup> (electricity and natural gas), which equals approximately 79.3 GWh (this is equivalent to the amount of energy used on average each year by approximately 2,300 homes in BC).

Energy use at civic buildings accounts for a majority (approximately 83%) of total EMP corporate energy use value. Therefore, in order to continue to improve our overall corporate energy use efficiency, continuous efforts need to be made towards increasing the energy efficiency of civic buildings. Through Council's commitment to corporate energy management best practices our building energy use intensity (measured by kWh per square meter of building space) has decreased from approximately 373 kWh/m<sup>2</sup> in 2007 to 343 kWh/m<sup>2</sup> in 2011, as shown in the following Figure 1. Decreasing energy use intensity in our buildings (improving energy use efficiency) demonstrates that our corporate energy management program is effective.



<sup>1</sup> There are civic buildings that have renewable energy systems (e.g. solar thermal hot water heating at Minoru Aquatic Centre), which obtain "free" solar energy that is not accounted for in our total corporate energy use/cost amount.

Out of the approximately 120 civic facilities under City stewardship, energy use in 2011 at only 12 facilities accounted for over 80% of the overall civic building energy use, please see **Attachment 3** for a facility energy use breakdown.

This concentration of energy use by a small number of buildings has led the City to focus its assessment and auditing resources on the higher consuming buildings, where it is expected that the most significant energy savings and cost avoidance can be achieved. Energy efficiency improvements and renewable energy integration at these high consuming buildings will be key moving forward to reaching our short-term and long-term goals, which are currently under development.

#### *EMP Achievements - 2011/2012 EMP Highlights*

Due to the commitment of Council and staff to increased corporate energy use efficiency and awareness, the City of Richmond was recognized by BC Hydro as being a Power Smart Leader with the awarding of 2012 Leadership Excellence Award to the City in October 2012. The City of Richmond remains the only municipality in BC to achieve this high level of recognition for its energy efficiency and conservation work.

It is anticipated that the City will achieve a reduction of approximately 1.9 GWh of electrical and natural gas energy use (approximately 2% of current corporate use) from a variety of completed projects or from projects that are underway and are planned to be completed by early 2013. This reduction represents approximately \$110,000 in operational cost avoidance savings and a reduction of approximately 200 tonnes of CO<sub>2</sub>e (equal to removing approximately 50 Richmond cars from our roads each year).

Capital costs for energy management projects are typically funded through the revolving Corporate Enterprise Fund. For EMP projects, electricity and natural gas cost avoidance and external grants received are used to reimburse the fund. Enterprise fund repayments for energy management projects have totalled over \$1 million dollars since the start of this project financing arrangement. Recently three energy management projects were fully paid off ahead of schedule and closed, and two other projects had their repayment schedule timelines reduced by three and five years respectively. These repayments to the Enterprise Fund help allow funding to be available to other initiatives and requests.

One of the keys to the successful implementation of corporate energy management projects is interdepartmental collaboration. The EMP over the past year and a half has managed and supported various energy projects throughout the organization, as well as provided a central location for the reporting of energy related initiatives managed by other departments (e.g., Project Development, Facility Services, Engineering, etc.). This increased focus on collaboration between the EMP and other corporate departments was one of the main focus areas of the EMP in 2011 and 2012. Several key projects and initiatives that illustrate the success and the potential further development possibilities are as follows;

- Incremental cost support to Project Development for infrastructure replacement of natural gas roof-top units (that were near their end of life) to the highest efficiency roof-top units available.

- Best practices approach to improving energy efficiency and incorporating renewable energy at Gateway Theatre.
- Pilot testing of LED sports lighting at the Burkeville tennis courts, which if the test is successful could lead to other installations and energy reductions at other sports facilities
- Inclusion of energy assessments into yearly condition assessment by Project Development to determine potential energy conservation measures, and to help direct where further energy assessments are needed
- Corporate support for smaller stakeholder lead initiatives such as; funding the Library's installation of software to reduce power consumption of their computers and a new Steveston pool cover to reduce heating cost at night.

Other select highlights of the City's energy management program and other energy related corporate activities from 2011 and 2012 include:

- The securing of over \$200,000 of external funding to support the Corporate Energy Management Program and Sustainability Unit.
- The installation of a sewer heat recovery system at Gateway Theatre to displace heating energy use, and reduce GHG emissions – the project is currently being installed and will be completed by the end of the year.
- The completion of year 2 of a 3-year corporate energy awareness program, branded "Because Energy Awareness Matters (BEAM)" with support of BC Hydro, to promote energy conservation measures with staff.
- The construction and installation of a solar thermal air wall to displace electrical use at South Arm Community Centre, which is expected to be completed by December 2012.
- The testing of 11 different light-emitting diode (LED) street lighting fixtures to determine the most efficient and effective fixture to use for a new installation at Westminster Hwy. The LED lighting will be used instead of the conventional higher energy using high pressure sodium fixtures.
- The renovation of the Community Safety Building for RCMP headquarters to LEED Gold standard was completed. Some energy saving measures included as part of the renovation were new high efficient heat pumps, new insulation and windows, solar thermal panels for domestic hot water heating, and new lighting controls
- The upgrading of our corporate energy database to increase corporate energy use information accessibility, and the developing of corporate building energy demand profile to guide corporate energy and GHG targets. Both initiatives are expected to be completed by the end of the year.

Further detailed accounts of EMP projects in 2011 and 2012 are provided in **Attachments 4, 5, and 6.**

In addition to corporate initiatives listed above, the City, the Engineering Department, and the District Energy Management Program celebrated the opening of the Alexandra District Energy Utility in September, with its first phase connections all in place and providing geothermal heating and cooling to the new West Cambie neighbourhood. This facility is a corporate initiative with energy use implications for the whole community. Other potential district energy centre locations, namely River Green and City Centre, are currently undergoing feasibility review.

### *Planned Upcoming Projects*

There are numerous energy initiatives planned for 2013, as part of capital submissions as well as longer term projects which includes the implement recommended optimization measures at the five facilities participating in the BC Hydro COp program. Detailed information concerning these respective initiatives and projects is provided in **Attachment 7**.

### *Future EMP Vision and Goals*

Continuing efforts have been made by the EMP to support the goals of the Sustainability Framework, with focus on the goals pertaining to Sustainable Resource Use and Climate Prepared City.

A key role of the EMP is supporting the City in reducing its corporate energy use and GHG emissions. The EMP will be developing specific energy and GHG reduction targets for civic buildings and infrastructure. These sector-specific targets in addition to targets being developed by Fleet and Solid Waste will combine to generate a corporate-wide energy and GHG emission reduction target. This work will support the City in achieving greater reductions and moving towards carbon neutrality – one of the key targets in the City's Sustainability Framework.

Currently staff are in the process of developing a corporate projected energy demand profile for civic buildings, as part of the EMP, to aid the establishment of long term overall corporate energy reduction goals and targets. These corporate building energy targets will be developed to allow for alignment with our adopted community energy and GHG emissions reduction targets.

The current aim of the EMP is to complete the establishment of new and replacement facility specific energy and GHG emissions reduction targets by the end of 2013, including updating the High Performance Building Policy. This setting of specific targets will allow for energy related decisions at the design level to be further directed to reduce energy use, and therefore minimize operating costs moving forward.

In continuation from the Vision and Goals from last year's Energy Update Report, the following main focus areas remain in place for the EMP for 2013;

- Increase energy use awareness within the organization and community
- Pursue external funding and partnerships with outside agencies
- Maintain a leadership role in terms of municipal energy systems and policy
- Improve the “usability” of our energy use data at key facilities, to allow for more detailed analysis and the increased optimization of our energy use

- Incorporate a more systematic approach to building energy use performance analysis and benchmarking of our civic facilities, to allow for the continued improvement of our facilities, and the extension of their usefulness
- Continue to ensure that energy use and GHG emission accounting (in relation to reduction goals) is a high priority during the designing of new facilities and developments

The funding strategy for these programs will be brought forward as part of the operating budget process for consideration by Council.

### Financial Impact

There is no financial impact as a result of this report. Capital projects related to energy management are reviewed and approved by Council as part of the capital budget process.

### Conclusion

Through Council's steadfast commitment to increased corporate energy efficiency and the collaborative staff effort between departments, energy efficiency awareness is becoming more embedded into the corporate culture and decision making processes every year. Future initiatives to increase the effectiveness of the corporate EMP, increase corporate energy efficiency, and limit energy related operating cost increases include; setting specific energy targets for new and replacement infrastructure based on corporate energy and emissions targets, incorporating of renewable energy in new and existing corporate buildings, connecting corporate buildings to district energy system where practical, and continuing to retrofit existing buildings for improved energy performance.



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Attachment 1	City of Richmond's Corporate Sustainability Framework -- Energy Strategic Program	REDMS# 3425631
Attachment 2	Energy Strategic Program Implementation Plan	REDMS# 3692942
Attachment 3	Energy Report Summary – 2012	REDMS# 3695684
Attachment 4	City Energy Management Program 2011/2012 Key Initiatives	REDMS# 3666641
Attachment 5	Summary of 2011/2012 Energy Management Project	REDMS# 3696611
Attachment 6	2011-2012 EMP Achievements and Highlights – Further Details	REDMS# 3691423
Attachment 7	EMP Planned Project 2013-2015	REDMS# 3685577

# City of Richmond's Corporate Sustainability Framework

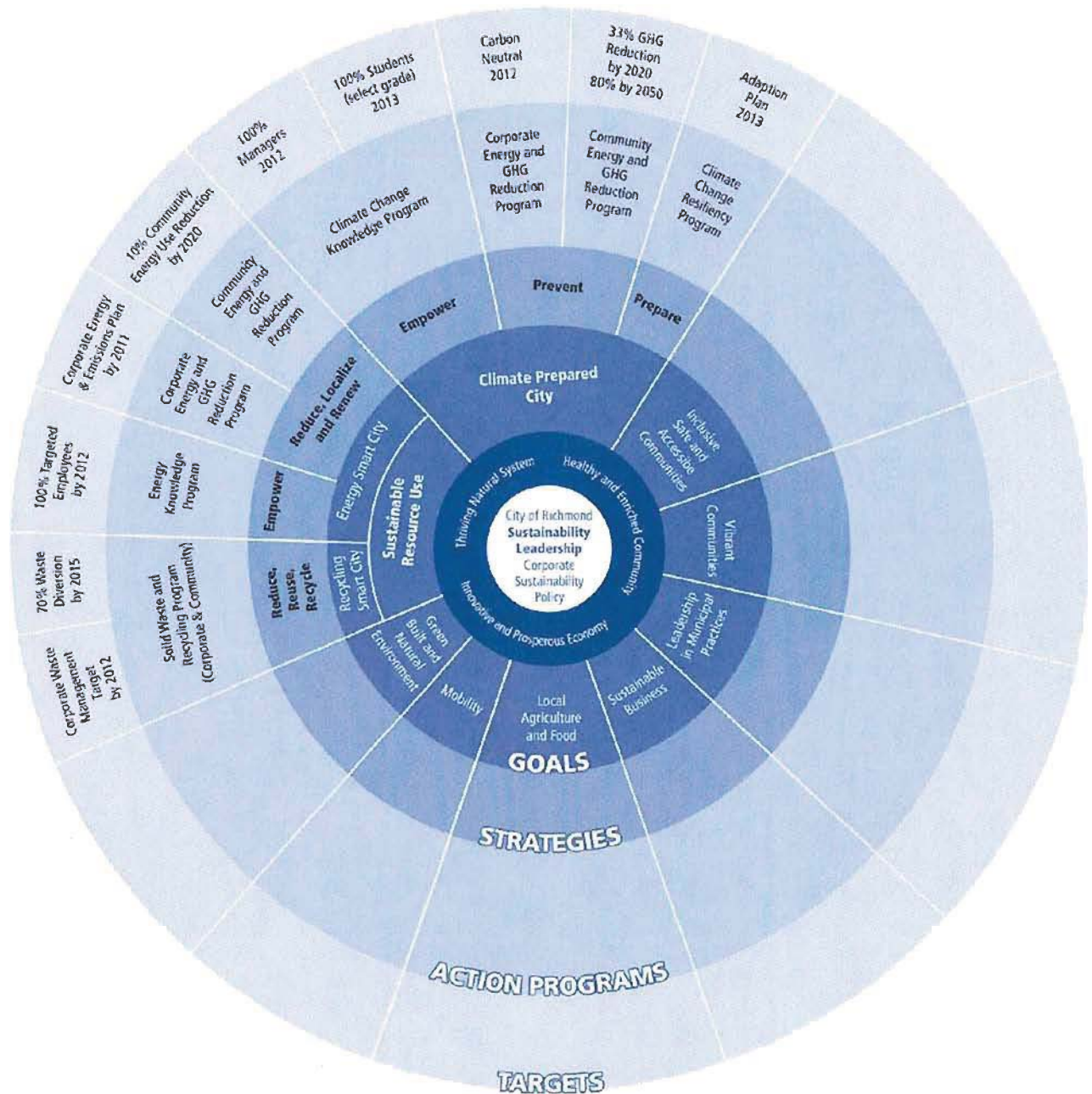


Table 3: 5-Year Implementation Plan

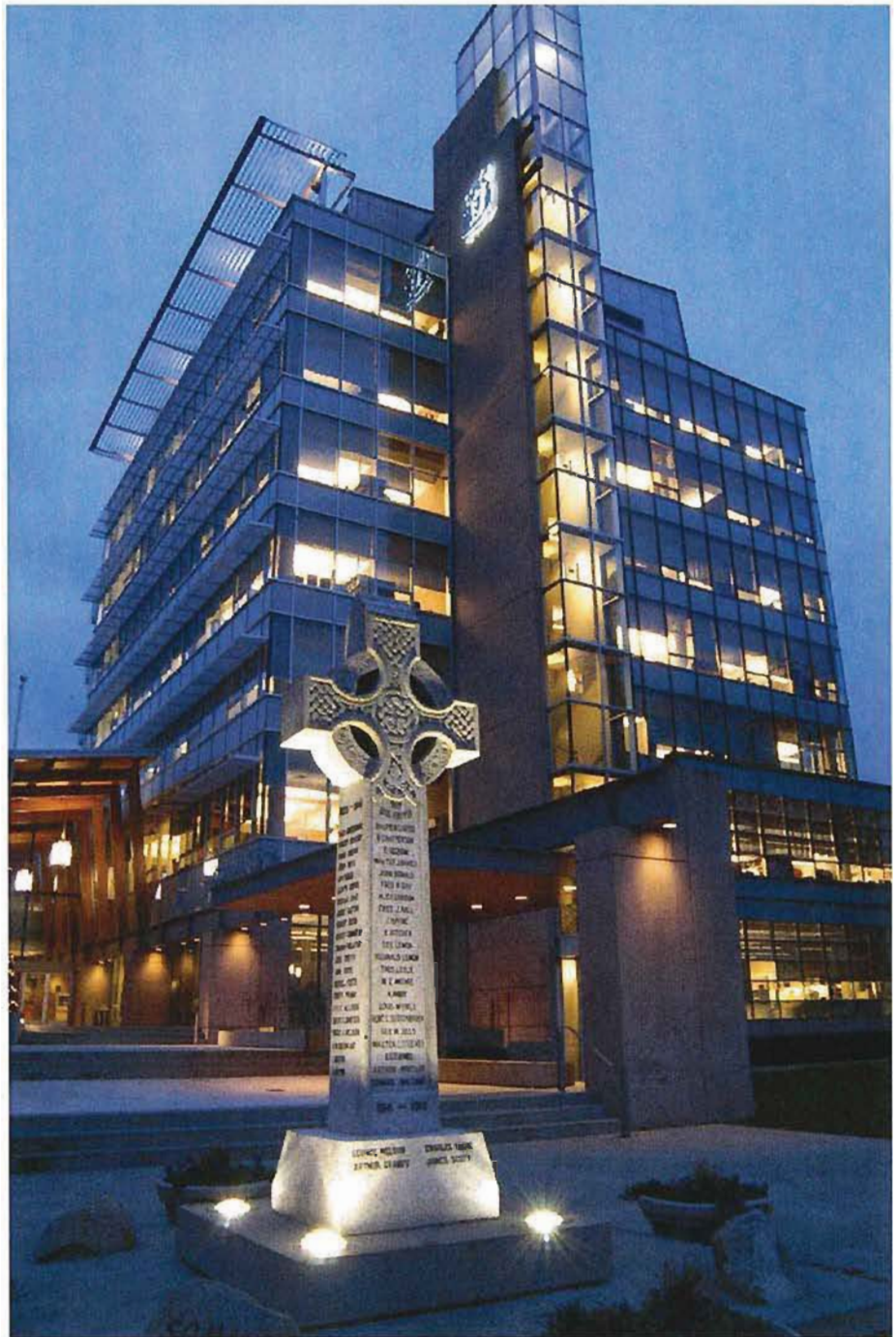
Action		2010	2011	2012	2013	2014	2015
Empower	Energy Knowledge Program			Review			
	Corporate Capacity-Building						
	Corporate Energy and Emissions Program						
	Management						
	Establish Carbon Neutral Staff Working Group to Develop Plan						
	Oversee Program through Climate Change & Energy Team						
	Inventory						
	Establish Corporate Inventory Reporting System						
	Manage Inventory System						
	Action Plan						
	Develop Carbon Neutrality Approach						
	Develop Corporate Energy & GHG Reduction Plan						
	Targets						
	Develop Corporate Energy & GHG Emission Reduction Targets						
Reduce, Localize & Renew	Reduction Action						
	Implement Corporate Energy & GHG Reduction Actions (ad-hoc)						
	Implement Corporate Plan (strategic action)						
	Report, Innovate & Improve						
	Research and Explore Innovations/Best Practices						
	Annual Report – Corporate Energy Use & GHG Emissions						Review
	Community Energy and Emissions Program						
	Management						
	Establish CEEP Working Group to Develop Plan						
	Oversee Program through Climate Change & Energy Team						
	Inventory						
	Collaborate with Province on Community Inventory						
	Action Plan						
	Develop Community Energy and Emissions Plan (CEEP)						
PWT - 35	Targets						
	Develop Community Energy and GHG Reduction Targets						
	Reduction Action						
	Implement Corporate Energy & GHG Reduction Actions (ad-hoc)						
	Implement Community Plan						
	Report, Innovate & Improve						
	Annual Report – Community Energy Use & GHG Emissions						Review
	Adaptation Action						
	Implement Actions (ad-hoc)						
	Implement Adaptation Strategic Plan						

Requires additional resources

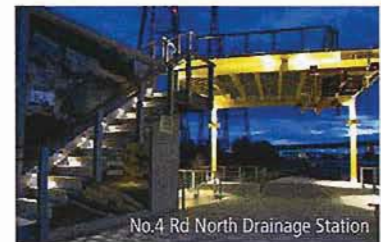
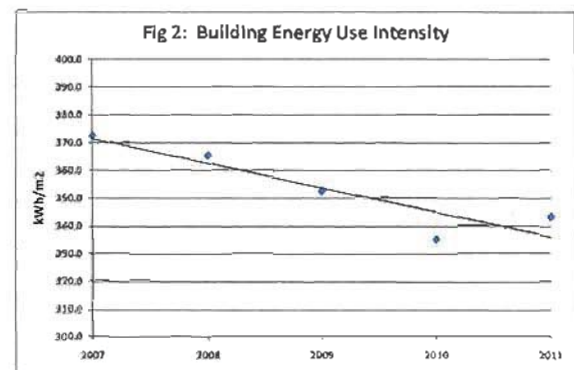
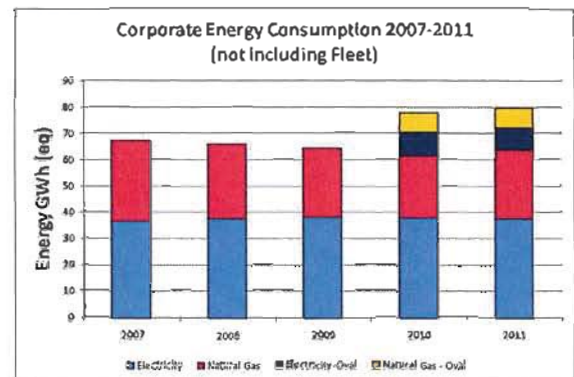
Funded within current resources

# Energy Update Report

## Summary 2011/2012



- Cost of energy in 2011 for the City of Richmond buildings, lighting, water and wastewater services was approximately **\$5.4 million dollars** or **79.3 GWh** (equal to average energy use of 2300 homes in BC annually).
- As compared with 2010, energy consumption for these civic assets increased by approximately 1.7 GWh. This was mainly due to a colder winter in 2011 that increased corporate natural gas usage.
- Although overall energy use for the organization has increased since 2007, due to new civic infrastructure (such as the Richmond Olympic Oval), our building energy use intensity (kWh/m<sup>2</sup>) has decreased since then, indicating **increasing corporate energy use efficiency**.



- In 2011, the majority of corporate energy use was by buildings-83%, followed by lighting-11% and water/wastewater services-5%.
- Of the ~120 civic facilities under City stewardship, energy use in 2011 at only 12 facilities accounted for ~85% of the overall civic building energy use, with our recreational facilities being the largest consumers.
- Recreational pools and ice arenas were our highest energy consuming facilities - with **Richmond Olympic Oval**, **Watermania**, **Richmond Ice Centre**, **Minoru Pools** and **Minoru Arenas** accounting for approximately 57% of the energy used by civic buildings in 2011.
- This focus of energy usage on a smaller number of buildings has lead the Energy Management Program to focus its assessment and auditing resources on the higher consuming buildings.
- Five high energy consuming buildings are participating in a BC Hydro continuous optimization (COP) program, which involves a detailed site investigation and will implement measures to increase energy efficiency by between 5-20%.

Fig 3: Overall Energy Use by Asset Class

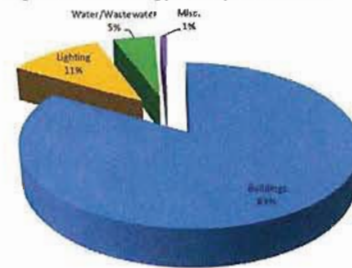
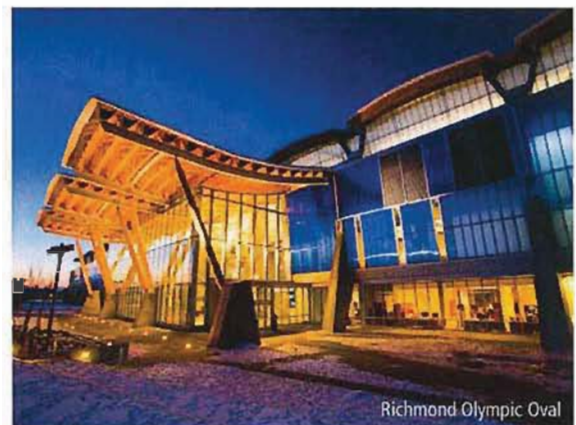
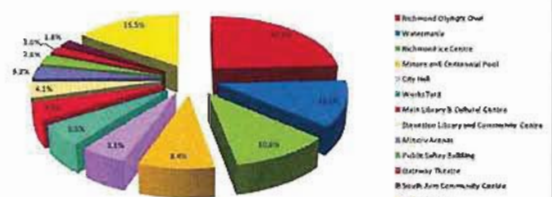


Fig 4: Building Energy Consumption Breakdown 2011



- Secured over **\$200,000** of external funding to support the Energy Management Program.
- The City of Richmond was again recognized by BC Hydro as being a **Power Smart Leader** - remaining the only municipality in BC to achieve this high level of recognition for the City's energy efficiency and conservation work.
- City is on course to achieving an estimated **1.9 GWh** reduction in electrical and natural gas use and approximately **200 tonnes** of greenhouse gas emissions from a variety of projects to be completed by early 2013. This equals approximately **\$110,000** operational cost avoidance savings.
- This energy reduction represents approximately 2% of our current corporate annual energy use and the GHG emissions reduction is equal to removing approximately **50 vehicles** from Richmond roads each year.
- Continued delivering corporate energy awareness program (Year 2), with support of BC Hydro, to promote energy conservation measures. Some from the past year's initiatives included a conservation commitment campaign, Aquatics and Fire Hall energy reduction challenges, and A/C awareness "Beat the Heat" Hawaiian shirt day.

2012 POWER SMART  
**LEADER** | BC Hydro | power smart



Ex. Solar Air Wall – to be installed at South Arm Community Centre

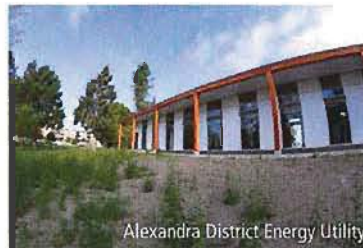


Hamilton Community Centre

- One LEED certifiable Gold building renovation was completed for RCMP headquarters use – Community Safety Building.
- Energy saving measures that were part of the renovation included, new high efficient heat pumps and windows, new insulation and windows, solar thermal panels for domestic hot water heating, and new lighting controls.
- The Alexandra District Energy Utility was officially opened in September 2012, with Phase 1 and 2 connections all in place and operating. The system provides geothermal renewable energy to heat and cool the residential units in the new West Cambie neighbourhood.
- Installation of sanitary sewer heat recovery system is underway to provide supplemental heating at Gateway Theatre, which will displace natural gas usage at the facility by ~900GJ and reduce carbon emissions by ~47 tonnes = to 12 vehicles off the road in Richmond each year.
- Pilot testing of light emitting diode (LED) lighting at the Burkeville tennis courts, with the goal looking at installing LED lights at other sports locations.
- Engineering tested 11 different types of LED street light fixtures. One of the 11 fixtures will be used for a new installation at Westminster Hwy. The LED lighting will be used instead of the conventional higher energy using high pressure sodium fixtures.



Community Safety Building



Alexandra District Energy Utility



Gateway Theatre



Alexandra District Energy Utility



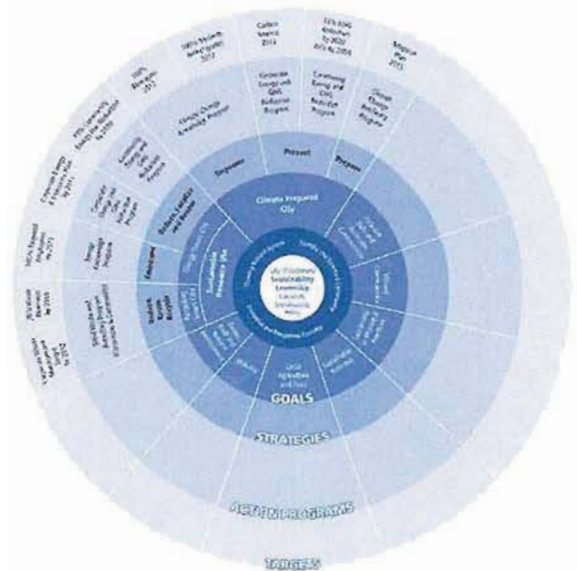
LED Street Lighting

- Continue to implement and work towards the Sustainability Framework goals, specifically the Sustainable Resource Use and Climate Prepared City Strategic Programs.
- Complete the establishment of both corporate and new facility specific energy and GHG emissions reduction targets, including the updating of the High Performance Building Policy.
- Continue to increase energy use awareness within the organization and community.

**Action Items include:**

- Continue to deliver information, through presentations and reports, to appropriate city staff and stakeholders concerning civic energy use, to inform and empower.
- Continue to facilitate energy reduction projects through the BC Hydro Power Smart Program and complete the BC Hydro Continuous Optimization program underway at five civic facilities.
- Complete the upgrading of our corporate energy use database, to improve energy reporting capabilities and corporate energy use information sharing.
- Set corporate building energy use targets, to help drive energy efficiency goals within the corporation.
- Complete Year 3 of the workplace conservation awareness program, which focuses on increasing staff energy use awareness and positively influencing energy related work behaviours.
- Continue development of an energy auditing and study schedule for our civic facilities.

## Corporate Sustainability Framework



## City Energy Management Program –2011/2012 Key Initiatives

Management Areas	2011/2012 Key Initiatives
<b>Plan</b>	<p><i>Energy Strategic Planning:</i></p> <ul style="list-style-type: none"> <li>Secured approximately \$200,000 in external funding in the past year to support energy initiatives efficiency initiatives such as               <ul style="list-style-type: none"> <li>Numerous lighting retrofits and re-lamping projects</li> <li>Funding in Energy Manager and Sustainability Project Manager positions</li> <li>Solar wall installation at South Arm Community Centre</li> </ul> </li> <li>In the process of completing a corporate building energy demand profile correlated with expected population growth. Report to Council will be forthcoming.</li> <li>Inclusion of energy auditing within our facility condition assessment, to streamline project one area of energy management project development.</li> </ul>
<b>Do</b>	<p><i>Building Capacity</i></p> <ul style="list-style-type: none"> <li>Workplace conservation Awareness program Year 2 completed, Year 3 in planning stages.</li> <li>Greater communication and collaboration between the Energy Manager and different departments (eg. Project Development, Facilities, and Electrical) has been undertaken in the past year, to ensure that energy management projects are conducted as efficiently and seamlessly as possible.</li> <li>Corporate energy information presentations conducted for different divisions and departments. Information presentation on the status and progress of the EMP to be given to Engineering and Public Work managers on a quarterly basis.</li> </ul> <p><i>Reducing Energy Use or Displacing conventional energy sources</i></p> <ul style="list-style-type: none"> <li>Application of leading-edge technology energy efficiency and alternative energy initiatives               <ul style="list-style-type: none"> <li>South Arm Community Centre – Solar Wall installation to pre-heat ventilation air</li> <li>Lighting retrofits and re-lamps at various corporate facilities (e.g. Richmond Ice Centre, Minoru Arena, Library Cultural Centre, Watermania, and City Hall)</li> <li>Gateway Theatre – Installation of a heat recovery unit within a sanitary pump station located nearby to displace natural gas heating at the facility – reducing gas use by approximately 900 GJ and GHG emissions by 47 tonnes of CO<sub>2</sub>e.</li> </ul> </li> </ul> <p><i>Increasing Financial Security &amp; Stability</i></p> <ul style="list-style-type: none"> <li>over \$100,000 in energy and maintenance cost avoidance</li> </ul>
<b>Monitor &amp; Report</b>	<p><i>Improving Energy Monitoring System</i></p> <ul style="list-style-type: none"> <li>Currently undergoing an update of the corporate energy database, to be completed by the end of the year. Among other features, the new database will allow for greater reporting capabilities and will facilitate more energy information sharing capacity within the corporation.</li> <li>Real-time monitoring of energy use has been installed at City Hall, Richmond Ice Centre, and Watermania. Richmond Olympic Oval and Library/Cultural energy monitoring will be upgraded by the end of the year.</li> </ul> <p><i>Reporting Performance</i></p> <ul style="list-style-type: none"> <li>Annual Corporate-wide Energy update report to Council</li> <li>Corporate projected energy demand profile report, to aid in the development of corporate energy reduction targets and policy, is planned to be brought to Council before the end of the year</li> </ul>
<b>Innovate &amp; Improve</b>	<p><i>Exploring New Approaches and Technologies</i></p> <ul style="list-style-type: none"> <li>The following projects and feasibility of further evaluation will be assessed in the coming months               <ul style="list-style-type: none"> <li>LED sports lighting performance</li> <li>Solar air wall at West Richmond Community Centre</li> <li>Corporate LED parking lot lighting retrofit</li> <li>Upgrade of building control systems, to fully web-based.</li> </ul> </li> </ul> <p><i>Energy Management System Evaluation</i></p> <ul style="list-style-type: none"> <li>BC Hydro energy management system assessment to be conducted in the spring.</li> </ul>

## Summary of 2011/2012 Facilities, Project Development, Energy Management, and other Energy Savings Projects

	Project location	Description	Project capital Cost	Estimated Annual Energy and Maintenance Cost Avoidance	Estimated Annual Energy Savings (kWh)	Estimated Annual GHG Emissions Reduction (tonnes CO <sub>2</sub> e)	Incentive Funding (Secured, Estimated)	Status
1	Main Library and Cultural Centre Lighting	Lighting re-lamp	\$25,000	\$4,000	62,000	1.5	\$6,500	Completed
2	Thompson Community Centre	Lighting re-lamp	\$31,000	\$4,000	52,000	1.3	\$40,227	Completed
3	Richmond Ice Centre and Minoru Arena	Lighting re-Lamp	\$89,000	\$19,000	289,000	7.2	\$38,835	Completed
4	City Hall Neon Sign Replacement	Lighting retrofit	\$52,000	\$3,200	12,000	0.3	\$3,422	Completed
5	Corporate facilities	Upgrade/replacement of Multi-Function Devices	Leased equipment	\$2,500	35,000	0.9	none	Completed
6	West Richmond and Steveston Community Centres	Roof top Unit Replacement	\$123,940	\$14,000	400,000 <sup>a</sup>	87	none	Completed
7	Minoru Arenas	Heat recovery installation	\$24,000	\$3,200	85,000 <sup>a</sup>	18	none	Completed
8	Minoru Arenas	Boiler Replacement	\$115,000	\$2,800	73,000 <sup>a</sup>	15	none	Completed
8	Steveston Pool	Pool cover replacement	\$8,500	\$5,000	135,000 <sup>a</sup>	25	none	Completed
9	Minoru Senior's Centre	Lighting re-lamp and retrofit	\$7,250	\$3,000	21,000	0.5	\$2,970	In Progress
10	City Hall Lighting Retrofit Completion	Lighting retrofit	\$31,500	\$1,400	51,000	1.3	\$14,280	In Progress
12	Main Library and Cultural Centre	Lighting retrofit	\$106,000	\$17,500	151,000	3.8	\$25,000	In Progress
13	CH Parking Lot Lighting Retrofit	Lighting retrofit	\$58,000	\$1,500	23,000	0.6	\$8,000	In Progress
14	Tennis Court Lighting Retrofit Pilot	Lighting retrofit	\$24,000	\$3,100	21,500	0.5	\$5,000	In Progress
15	City Hall Annex Retrofit	Lighting re-design and retrofit	\$168,000	\$11,500	140,000	3.5	\$28,000	In Progress

Project location	Description	Project capital Cost	Estimated Annual Energy and Maintenance Cost Avoidance	Estimated Annual Energy Savings (kWh)	Estimated Annual GHG Emissions Reduction (tonnes CO <sub>2</sub> e)	Incentive Funding (Secured, Estimated)	Status
16 South Arm Community Centre	Solar wall Installation	\$70,000	\$4,000	61,500	1.5	none <sup>b</sup>	In Progress
17 Gateway Theatre	Wastewater heat recovery installation	\$71,000	\$7,500	250,000 <sup>a</sup>	47.4	none <sup>b</sup>	In Progress
18 Main Library	Computer energy management software	\$1,000	\$4,500	70,000	1.7	none	In Progress
<b>Totals</b>		<b>\$1,005,190</b>	<b>\$111,700</b>	<b>1,932,000</b>	<b>217</b>	<b>\$172,234</b>	
<sup>a</sup> Total energy savings is for natural gas only <sup>b</sup> Incentive/grant application decision pending							

## 2011-2012 EMP Highlights – Further Details

In 2011 and 2012 one of the major focus areas of the EMP was to increase the collaboration with corporate departments, as interdepartmental collaboration is crucial to successful implementation of energy management projects. Several key projects and initiatives that illustrate the success and the potential further development possibilities are as follows;

- Incremental cost support to Project Development for infrastructure replacement of natural gas roof-top units that were near their end of life.
  - Support funding from the EMP helped off-set the increased incremental costs of installing the highest efficiency roof-top units available. The total project cost was \$123,940, of which the EMP provided approximately \$50,000 of incremental cost support. It is estimated that these units will reduce the energy costs at the two facilities involved by approximately \$14,000 annually.
- Inclusion of a high efficient heating, ventilation, and air conditioning (HVAC) system at the City Hall Annex renovation.
  - Research and development for the potential options available to the City for increased energy efficiency at the newly renovated City Hall Annex was facilitated by the energy management program, prior to the renovation. Once it was determined that a proven HVAC system was potentially compatible with the City Hall Annex configuration, Project Development got involved and reviewed the technology to determine if it could be installed. The system was chosen to replace the existing HVAC system, and is expected to reduce energy use associated with heating and cooling of the building by as much as 50%.
- Best practises approach to improving energy efficiency and incorporate renewable energy at Gateway Theatre.
  - In conjunction with personnel from Project Development, Engineering, Energy Management and District Energy Management, agreement was reached as to how best to incorporate three separate energy related projects at the Gateway to ensure that the work was done as effectively and efficiently as possible.
- Pilot testing of LED lighting at the Burkeville tennis courts
  - In discussion with Parks Planning, it was determined that the lighting at the Burkeville tennis courts, which was in need of upgrades, would be an ideal location to test some LED sports lighting technology. The replacement of the existing lighting at Burkeville is expected to reduce the energy use of the facility by approximately 20,000 kWh annually, and if successful could lead to other installations and energy reductions at other sports facilities.
- Inclusion of energy assessments in conjunction with yearly condition assessment
  - In collaboration with Project Development, walkthrough energy audits have been included with the yearly building condition assessments starting in 2012. These walkthrough energy audits will help determine energy conservation measures at lower

energy consuming buildings, and will help direct where further energy studies are needed.

- Corporate support for smaller stakeholder lead initiatives
  - The EMP helped support smaller energy efficiency saving initiatives that were brought forward by Library and Steveston Pool personnel. The EMP funded the Library installation of software to reduce power consumption of their public computers, and funded a new Steveston pool cover, which is used at night to reduce heating cost and replaced the old non-functioning pool cover. The projects are estimated to avoid the City approximately \$9,000 annually in energy costs.

Other select highlights of the City's energy management program and other energy related activities from 2011 and 2012 include;

- The City of Richmond was again recognized by BC Hydro as being a Power Smart Leader - remaining the only municipality in BC to achieve this high level of recognition for the City's energy efficiency and conservation work.
- Estimated 1.9 GWh of electrical and natural savings (approximately 2% of current corporate use) from a variety of projects to be completed by early 2013. This represents approximately \$110,000 in operational cost avoidance savings and a reduction of approximately 200 tonnes of CO<sub>2</sub>e (equal to removing approximately 50 Richmond cars from our roads each year).
- The continued development of a corporate energy awareness program, with support of BC Hydro, to promote energy conservation measures with staff, which the City has entitled Because Energy Awareness Matters (BEAM). Under this program Year 2 of the BC Hydro Workplace Conservation Awareness (WCA) program was recently completed with lots of support from our designated energy champions and staff. Initiatives and strategies for Year 3 will be developed this fall to further build on the WCA program's initial successes.
- The installation of a sewer heat recovery system at Gateway theatre to displace heating energy use, and reduce GHG emissions – the project is currently being installed and will be completed by the end of the year. It is estimated that the installation will reduce the use of natural gas by approximately 900 GJ and reduced GHG emissions by 47 tonnes of CO<sub>2</sub>e.
- Construction and installation of a solar thermal air wall at South Arm Community Centre to displace natural gas and electrical use, which is expected to be completed by December 2012. The project involves the installation of two separate solar thermal walls on the two south facing facades of the building. It is estimated that the project will avoid annually approximately \$5,000 in energy costs, and reduce GHG emissions from the facility by approximately 30 tonnes of CO<sub>2</sub>e.
- Upgrading of our corporate energy database to allow for, among other features, greater reporting capabilities and facilitate energy information sharing with our facility

stakeholders (e.g. community centre associations). It is expected that this new web-based program will be installed and operational by the end of 2012.

- Facilitation of an external report to assess the projected corporate energy demand profile of the City given our estimated population growth and a maintaining of our current level of services. This work will support the development of corporate energy reduction targets.

## Energy Management Planned Projects – 2013 Capital Submission Request

Project Name	General Scope	Estimated Project Cost	Anticipated Cost Avoidance through Energy Savings
Gateway Theatre coupling replacement	Replace couplings in high temperature loop system to reduce system's temperature and the operation run time	\$45,000	\$5,600
Building Envelope Sealing	Conduct air sealing, weather stripping, and interior compartmentalization at four corporate buildings (City Hall, Cultural Centre, Gateway, and Richmond Ice Centre), to reduce energy loss through conditioned air leakage.	\$90,000	\$14,000
Richmond Ice Centre brine pump insulation	Insulate brine headers at Richmond Ice Centre to reduce brine pump energy use through reduced run-time.	\$92,500	\$22,000
Works Yards automatic controls upgrade	Implement recommended heating ventilation and air-conditioning control measures, as per consultant's assessment report.	\$26,000	\$12,000
Lighting Retrofits	Conduct 3-5 lighting retrofit and upgrade projects at existing infrastructure and facilities that provide strong energy efficiency gains and demonstrate strong economic returns.	\$150,000	\$25,000
Pre-Design Assessments	Conduct five-eight pre-design assessments for energy management projects, in order to ensure that potential projects are well developed and designed	\$80,000	n/a
<b>Sub-Total</b>		<b>\$483,500</b>	<b>\$78,600</b>
Infrastructure Energy Efficiency Upgrade Funding	Establish a energy efficiency upgrade fund to maximize the opportunity to enhance the energy performance of our buildings and reduce utility costs, in conjunction with Project Development projects (e.g. West Richmond Community Centre, Richmond Ice Centre, and Watermania)	\$150,000	TBD
<b>Total</b>		<b>\$633,500</b>	<b>\$78,600</b>

## Energy Management Planned Projects 2014-2015

Project Name	General Scope	Estimated Project Cost	Anticipated Energy Savings
Corporate Parking Lot Retrofits	Parking lot lighting inventory will be completed before the end of 2012. Once completed a request for proposal will be developed to determine the cost and scope of the project.	TBD	TBD
Upgrading of Building Management Control Systems	City Hall Annex renovations include major upgrades to the building control systems, and the installation of web-based management system. This building will be used to research and test the management system, and to potentially facilitate the installation and upgrades at other locations.	TBD	TBD
BC Hydro COP - City Hall	Investigation Phase of this program is expected to be completed by December 2012, with implementation starting soon after.	TBD	150,000 kWh
BC Hydro COP - Richmond Ice Centre	Investigation Phase of this program is expected to be completed by May 2013, with implementation starting soon after.	TBD	170,000 kWh
BC Hydro COP - Watermania	Investigation Phase of this program is expected to be completed by November 2013, with implementation starting soon after.	TBD	200,000 kWh
BC Hydro COP – Library and Cultural Centre	Investigation Phase of this program is expected to be completed by December 2013, with implementation starting soon after.	TBD	100,000 kWh
BC Hydro COP - Oval	Investigation Phase of this program is expected to be completed by December 2013, with implementation starting soon after.	TBD	400,000 kWh