



City of Richmond

Report to Committee

To: Public Works & Transportation Committee

Date: November 2, 2010

From: Cathryn Volkering Carlile
General Manager – Community Services

File: 01-0370-01/2010-Vol
01

Re: Energy Update Report

Staff Recommendation

That the Energy Update report dated November 2, 2010 from the General Manager of Community Services be received for information.

Cathryn Volkering Carlile
General Manager – Community Services
(4068)
Att. 2

FOR ORIGINATING DEPARTMENT USE ONLY			
ROUTED TO:	CONCURRENCE		CONCURRENCE OF GENERAL MANAGER
Facility Management	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Engineering & Public Works	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Parks & Recreation	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Transportation	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Sustainability	Y <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
REVIEWED BY TAG	YES <input checked="" type="checkbox"/> <i>MPK</i>	NO <input type="checkbox"/>	REVIEWED BY CAO
			YES <input checked="" type="checkbox"/> <i>CAO</i> NO <input type="checkbox"/>

Staff Report

Origin

This Energy Update report summarizes City's achievements in implementing the City of Richmond's Energy Management Program (EMP) specific to actions such as studies and projects related to reducing energy use, energy costs and Green House Gas (GHG) emissions in City owned buildings, amenities, and other infrastructure since 2009. The EMP supports Council Term Goals #2 and #7, which state:

Financial Responsibility and Levels of Service – Ensure the City has the capacity to meet the financial challenges of today and in the future, while maintaining appropriate levels of service.

Sustainability and the Environment – Demonstrate leadership in and significant advancement of the City's agenda for sustainability through the development and implementation of a comprehensive strategy that among other objectives includes incorporating sustainability into our City policies and bylaws.

Background

The City of Richmond's EMP was first created in 1990, and has continued its evolution by placing greater emphasis on corporate programs as well as supporting community strategic energy planning and policy development.

With approximately 80% of the corporate energy¹ (natural gas and electricity) consumed by City buildings, the EMP as part of Facility Management has historically been involved in planning and implementation of the energy efficiency projects on buildings and achieved great energy reduction over the years.

In 2009, the EMP was adjusted to create a collaborative decentralized, corporate-wide program to provide strategic support by incorporating the consideration of energy management into corporate policies, and support community-wide initiatives such as the Community Energy and Emissions Plan (CEEP). This adjustment, did not adversely impact the EMP's focus in reducing costs and energy for buildings and civic amenities, the highest energy consumer group.

This report provides highlights of the key achievements of energy reduction initiatives taken across the organization.

The City EMP has been supported by external funding from our utility providers BC Hydro and Terasen Gas as well various Federal programs.

Recognition 2009/2010

City of Richmond has been externally recognized with the following awards and recognitions:

- At the BC Hydro Power Smart Awards in May 2009, Richmond was recognized as the only municipal Power Smart Leader. On October 25, 2010, it was announced that Richmond maintained this leadership award for 2010.
- BC Hydro Plaque recognizing the completion of our Strategic Energy Management Plan (SEMP) and our 1st year, BC Hydro co-funded, City Energy Manager program.

¹ Energy consumption for fleet and waste will be part of the Corporate Energy and Emission Plan by 2011.

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- BC Hydro Plaque and News Release for Innovative Lighting project at our Arenas and Pools due to efforts by Facility Management and Parks and Recreation.
- BC Hydro Plaque recognizing energy reduction from Information Technology's server virtualization initiative.
- For developing and teaching a training module on Operation and Maintenance best practices for the BCIT Sustainable Energy Manager certificate program.
- Presenting a session on Best Energy Management Practices at the 2009 BC Hydro Annual Power Smart Forum provided by Facility Management.
- Mentoring other municipalities on Richmond's monitoring and reporting program.

Analysis

Achievements 2009/2010

- In 2009 and 2010 Richmond's EMP was successful in securing over \$820,000 in external incentive funding. These funds, mainly from BC Hydro and the Federal Government, helped subsidize projects that reduced consumption, energy costs and GHG emissions (**Attachment 1**). BC Hydro provided resources and training to support all aspects of corporate and community energy management programs.
- Facility Management and the EMP negotiated electricity and gas rate structures and contracts for the City. These initiatives resulted in \$130,000 annual savings and cost avoidance². Other benefits realized from these initiatives include fewer maintenance calls and improved the overall quality of facilities for our staff and users.
- In 2009, the EMP and Facility Management were successful in reducing (GHG) emissions by 6.6% for existing corporate buildings², of approximately 375 tonnes. Council recently adopted a community wide GHG reduction target of 33% from 2007 levels by 2020. This reduction in GHG's is the equivalent of taking 75 cars off the road annually.
- Metro Vancouver conducted a study for heat reclamation from Lulu Island Sewage Treatment facility located in south Richmond. The outcome of the study indicated that there is a great opportunity to use the waste heat for meeting demand in the Steveston neighbourhood. Staff will continue collaborating with Metro Vancouver and will report back to Council when additional information is available.
- The Alexandra District Energy Utility (DEU) project has been advanced and staff are completing reviews of the RFEOI for utility partners for the River Green project.
- The Oval Corporation started an energy assessment to identify further opportunities for energy retrofit after the transition to legacy mode. The detailed study will follow the assessment and expected to be 100% funded by BC Hydro.
- Facility Management and Parks and Recreation implemented an innovative park pathway lighting project in Minoru Park (North of the sport fields) in late 2009. This project uses LED technology with a smart control system that minimizes energy consumption. The lighting system has improved the security in the park and provided a new trail for runners. The energy usage of this system is 88% less than conventional systems.

² Only existing buildings without consideration of new civic buildings.

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- The Parks Department installed Musco™ lighting at Minoru and other turf fields. The retrofit has improved the lighting efficiency by 30%. The fields are provided with higher efficiency and better distributed lighting at no increase to energy consumption or energy cost.
- To avoid truck idling, the City Parks fleet has been equipped with auxiliary batteries to provide hazard lighting while staff are working on the roads. The City has also recently added a diesel-electric hybrid truck to the fleet. The energy and cost savings of this vehicle are being monitored.
- The change of City Parks staff shift from working five 8 hour days to four 10 hour days has reduced weekly commute time and fuel consumption by 20%.
- Use of remote high-tech control system for sport lighting and irrigation systems has improved the preventative maintenance program and also reduced the City's carbon footprint through less frequent preventative maintenance inspections.
- The City started an extensive program to convert existing incandescent traffic lights to LED. Over the past 9 years, the City has converted 80% of all its traffic lights to LED. The conversion has resulted in the avoided consumption of over 7.9 GWh, and \$495,000 in avoided energy costs.
- Facility Management has completed several lighting retrofit and control upgrade projects at community centres and other City owned facilities (**Attachment 2**). In total 18 facilities including 5 parking/parkade, 4 community centres, 3 sport facilities and 3 office spaces were retrofitted. This project was mainly funded by BC Hydro and the City's Enterprise Fund.
- The City Carpool program has been in place since January 1996 and has benefited both City staff by reducing their collective commute costs and GHG emissions and the City by increasing utilization of the fleet while at the same time reducing the net employee carbon footprint. Currently, the program includes 78 employees participating, and 18 vehicles (6 of which are vans, 1 pick-up truck, and 11 sedans).
- A new policy was introduced to provide transit passes to staff attending business meetings at YVR, the Cambie corridor or downtown as a means to encourage staff to take public transportation instead of City or personal vehicles.
- Introducing new City bylaws and policies for parking requirements for new developments in the vicinity of the Canada Line corridor has been very successful at reducing the Community's energy and GHG emissions and is in line with the recent Council adopted GHG and Energy reduction targets. This measure has also provided a great incentive for developers and buyers to achieve their financial and green objectives.
- Engineering & Public Works has an ongoing Drainage Pump Station program where fixed speed electric motors are replaced with energy efficient variable speed electric motors.
- As part of the Cambie Drainage Pump Station project, the City installed a green roof. Green roofs are beneficial in many ways. They reduce the amount of water runoff, and provide food and habitat for birds. At the Library and Cultural Centre, plans are in the works for a rooftop green garden. This will utilize the rooftop space for the growth of food crops. Like green roofs, this green garden will provide some insulation to the building, reducing heat loss.
- Fire Hall #2 (Steveston) has been designed to LEED™ Gold standards and is currently under construction. In 2009, Fire Hall #6 (Shellmont) was seismic upgraded, and received double glazed windows throughout, and a heat recovery and heat pump system.
- Hamilton Community Centre's expansion has been built to LEED™ Gold standards as well. It utilizes solar hot water and a green roof to reduce energy consumption and heat loss respectively.

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South Arm Community Centre has gone through a major renovation including energy retrofits for lighting, HVAC, domestic hot water and associated control systems.

- High efficient LED lighting has been used for many new street and parking lighting demonstration projects such as Middle Arm Park, parking areas at Minoru complex, Steveston Community Centre, Gary Point, South Arm Community Centre and throughout City Hall. LED lighting is extremely energy efficient and has a longer lifetime than conventional lighting. The City still looking into extensive use of the LED technology as LED becomes more affordable.
- In 2010, the goals, principles, targets and proposed actions in support of more sustainable community energy management in Richmond were highlighted in 20 presentations delivered to community groups by the Community Energy Manager.

Goals and Initiatives

Richmond's EMP has completed an overarching opportunity assessment for our 64 highest energy use facilities. This assessment identified opportunities that offer the best return on investment. In addition, staff are exploring locations and options for the addition of clean energy sources to some City owned building sites.

The majority of projects scheduled for completion in our 2010 work plan are retrofits of existing building mechanical systems. The first project is a small scale District Energy Utility (DEU) consisting of centralized plant with new high efficiency boilers, new heat exchangers and the addition of a thermal solar panel system at the Steveston Community Centre. This project will supply heat and hot water to the outdoor pool, the community centre/library and the Martial Arts building. After completion, this energy savings project will further add to the reduction of GHG's in City owned buildings. This project has created approximately \$100,000 in infrastructure replace cost alone (**Attachment 2**).

At the Gateway Theatre site, a sewage heat recovery system is being studied. Once completed, the heat recovery system has the potential to supply heat and hot water to Gateway theatre and possibly nearby buildings (e.g.: Brighthouse school).

Metro Vancouver is currently planning and designing a replacement for the Gilbert Trunk Sewer. City staff is requesting that heat recovery from the Gilbert Trunk be incorporated into the project. This is in alignment with the pending Metro Vancouver Integrated Liquid Waste and Resource Management Plan's Strategy 2.1 that commits to utilizing liquid waste as a resource.

Following a successful pilot operation during the 2010 Winter Olympic Games, the City has recently started a permanent incentive program to guarantee up to 12 reserved parking spaces for staff at City Hall who agree to start carpooling. This program is expected to entice more staff to share their own cars for carpooling.

Water turbines at pressure reducing valves, and a wind turbine are both options being studied for consideration in 2011 or later, subject to availability of funding. Either project would generate clean energy and excess power would be sold to the grid. The City is seeking funding to create a viable business case for these projects.

The energy consumed at Richmond tennis courts has been looked into. Staff have reviewed the data and have investigated various options and technologies to address smarter use of tennis court lighting. Balancing the community's enjoyment and access to these facilities versus energy consumption has been a challenge. Currently staff are pursuing 2 pilot projects with consideration for user input:

- Use of a free demo system that uses induction lighting (long lasting and efficient) with smart lighting control system to provide lighting only when users are present.

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- Installation of a smart lighting control system using existing lighting technology (Metal Halide).


Planning for Workplace Energy Conservation Awareness (WECA) program started in August 2010. This program will target the majority of operational staff to change their behavior towards energy (electricity and natural gas) reduction at the workplace. BC Hydro has committed funding to pay for consulting and marketing costs associated with this program for one year, with potential of program extension to 3 years.

Financial Impact

There is no financial impact as a result of this report.

Conclusion

The City of Richmond Energy Management Program (EMP) has been very successful in delivering effective energy reduction initiatives in City owned buildings, amenities, and other infrastructure. Moving forward, the EMP will continue to collaborate with all City departments to evaluate further energy reduction opportunities through detailed assessments, research, application of new technologies, green energy systems and applying for all available incentive funding to help prioritize and facilitate future energy projects and programs.



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Energy Manager
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City Energy Management Program – 2009/2010 Key Initiatives

Management Areas	2009/2010 Key Initiatives
Plan	<p>Energy Retrofit Planning</p> <ul style="list-style-type: none"> • 64 buildings: energy opportunity assessment completed in 2009 • 2010 energy retrofit plan developed (detailed study of opportunities from the assessment report) • Secured approximately \$400,000 in external grant applications to support 2010 energy initiatives efficiency initiatives such as <ul style="list-style-type: none"> ○ Boiler Replacement and solar panels at Steveston Pool ○ Boiler Replacement and solar panels at South Arm Pool ○ Workplace conservation Awareness program ○ Energy Managers and Energy Specialist positions ○ DEU studies
Do	<p>Building Capacity</p> <ul style="list-style-type: none"> • Implemented energy awareness initiatives (e.g., PW Open House, Earth Hour) • Secured \$420,000 in external grants to support 2009 energy initiatives <p>Reducing Energy Use</p> <ul style="list-style-type: none"> • Leading-edge technology energy efficiency initiatives <ul style="list-style-type: none"> ○ Steveston Centralized Heating system (DEU) Phase 1 ○ LED lighting technology for existing outdoor parking lots ○ Induction lighting for CH indoor and LCC outdoor parkades. ○ T5 HO for indoor tennis courts, swimming pools, arenas <p>Increasing Financial Security & Stability</p> <ul style="list-style-type: none"> • \$130,000 in avoided cost escalation in 2009 including: <ul style="list-style-type: none"> ○ Stabilized gas utility cost ○ \$120,000 cost saving in 2009 after operating costs and loan payment.
Monitor & Report	<p><i>Improving Energy Monitoring System</i></p> <ul style="list-style-type: none"> • Studied Continuous Optimization of major buildings using real time monitoring (will be implemented for City Hall in 2010) <p><i>Reporting Performance</i></p> <ul style="list-style-type: none"> • Energy retrofit project reporting • Annual report to Council
Innovate & Improve	<p><i>Exploring New Approaches and Technologies</i></p> <ul style="list-style-type: none"> • Scoping and Feasibility Studies <ul style="list-style-type: none"> ○ District energy utility initiatives ○ Steveston DEU (superconductor solar panels) ○ Future South Arm Pool/Whiteside School DEU (Renewable Energy) • Pilot Projects <ul style="list-style-type: none"> ○ Adaptive (dimnable) LED lighting for Minoru Green Pathway ○ Sewage heat recovery system at Gateway Theatre. ○ Demo Wind and water Turbines <p><i>Energy Management System Evaluation</i></p> <ul style="list-style-type: none"> • 2009 and 2010 energy management system assessment report (third-party)

Summary of 2009 Facilities Management Project Development
Energy Management Projects

Project location	Description	Project capital Cost	Estimated Annual Energy Cost Avoidance	Secured Incentive (paid or signed agreement in place)	Simple Payback (Year)	Source of External Funding	Notes
Projects							
1	Steveston Tennis Courts	\$49,526	\$3,409	\$44,738	<1	BC Hydro	Completed
2	City Hall Parkade	\$37,200	\$10,379	\$20,832	1.6	BC Hydro	Completed
3	City Hall	\$99,641	\$22,283	\$34,874	2.9	BC Hydro	In Progress
4	Minoru Aquatic Centre	\$23,973	\$6,233	\$13,356	1.7	BC Hydro	Completed
5	Minoru Parking Area	\$64,787	\$6,080	\$23,252	6.8	BC Hydro	Completed
6	Gateway Theatre	\$18,281	\$2,578	\$6,398	4.6	BC Hydro	Completed
7	South Arm Community Hall	\$8,000	\$825	\$2,800	6.3	BC Hydro	Completed
8	Thompson Community Centre - Gym	\$11,896	\$1,813	\$0	6.6	NA	Completed
9	Works Yard Store Warehouse	\$11,000	\$1,299	\$3,850	5.5	BC Hydro	Completed
10	Minoru - Pavilion	\$12,128	\$1,636	\$4,245	4.8	BC Hydro	Completed
11	Fire Hall # 7	\$9,300	\$1,037	\$3,255	5.8	BC Hydro	Completed
12	East Richmond Community Hall	\$8,193	\$556	\$2,940	9.4	BC Hydro	Completed
13	Library Parkade Lighting	\$16,960	\$2,791	\$9,498	2.7	BC Hydro	Completed
14	City Centre Community Centre	\$4,042	\$760	\$1,451	3.4	BC Hydro	Completed
15	Lacrosse Box Parking Lighting	\$13,323	\$1,524	\$4,782	5.6	BC Hydro	Completed
16	Steveston Parking	\$8,882	\$1,016	\$3,188	5.6	BC Hydro	Completed

Project location	Description	Project capital Cost	Estimated Annual Energy Cost Avoidance	Secured Incentive (paid or signed agreement in place)	Simple Payback (Year)	Source of External Funding	Notes
17	South Arm Parking	\$13,421	\$1,288	\$4,817	6.7	BC Hydro	Completed
18	Gary Point Parking	\$22,205	\$2,540	\$7,969	5.6	BC Hydro	Completed
19	Steveston Community Centre Centralized Heating system. (Phase I)	\$140,000	\$6,000	\$56,667	13.9	RInC (WD)& Terasen Gas	Phase II in progress as part of 2010 EM Projects
Total Projects		\$572,757	\$74,047	\$248,912	4.4		
Studies							
1	City Major Buildings	\$32,000	NA	\$0	NA	City is in negotiation with BC Hydro for detailed study funding (phase II)	
2	Community and corporate DEU Studies	\$220,000	NA	\$80,000	NA	BC hydro funded \$70,000 and Terasen committed to \$10,000	
Total Studies		\$252,000	\$0.00	\$80.00	NA		
Total 2009 Projects and Studies		\$824,757	\$74,048	\$328,912	6.7		