



City of Richmond

Report to Committee

To: Public Works and Transportation Committee **Date:** May 25, 2015
From: John Irving, P.Eng, MPA **File:** 10-6125-05-01/2015-
Director, Engineering Vol 01
Re: **2015 Corporate Energy Management Program Update**

Staff Recommendation

That the staff report titled “2015 Corporate Energy Management Program Update” from the Director, Engineering, dated May 25, 2015, be received for information.

John Irving, P.Eng, MPA
Director, Engineering
(604-276-4140)

Att. 2

REPORT CONCURRENCE	
CONCURRENCE OF GENERAL MANAGER	
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REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS:
APPROVED BY CAO	
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Staff Report

Origin

The City's Energy Management Program (EMP) and energy initiatives described in this report support the following Council 2014-2018 Term Goals:

#4 Leadership in Sustainability:

Continue advancement of the City's sustainability framework and initiatives to improve the short and long term livability of our City, and that maintain Richmond's position as a leader in sustainable programs, practices and innovations.

4.1. Continued implementation of the sustainability framework.

4.2. Innovative projects and initiatives to advance sustainability.

#5 Partnerships and Collaboration:

Continue development and utilization of collaborative approaches and partnerships with intergovernmental and other agencies to help meet the needs of the Richmond community.

5.1. Advancement of City priorities through strong intergovernmental relationships.

#6 Quality Infrastructure Networks:

Continue diligence towards the development of infrastructure networks that are safe, sustainable, and address the challenges associated with aging systems, population growth, and environmental impact.

6.1. Safe and sustainable infrastructure.

Attachment 1, "Energy Summary Report 2015," includes a summary of key highlights of the Energy Management Update Report and recent City energy initiatives.

Background

The City's EMP contributes to the increased energy efficiency of the corporation, and is a significant component of the City's Corporate Carbon Neutrality achievement. Long term, the continuing support of the EMP is integral to the maintaining of the City's Climate Change Action Charter commitments and overall corporate sustainability related initiatives.

The City's EMP has continued to be successful in increasing the resource use efficiency of the corporation by focusing on three main action areas:

1. Energy conservation – reduce the overall demand for energy (e.g., increased energy use awareness and improved operational control to reduce waste)
2. Energy efficiency – reduce the energy required for operations (e.g., lighting retrofits to more efficient technologies)

3. Renewable and clean energy – increase the use of renewable energy and reduce the carbon intensity of emissions (e.g., installation of solar thermal energy systems)

Due to strong and consistent Council support of the City's EMP, the City continues to develop and implement corporate and community energy efficiency projects, and embed energy efficiency within the City's corporate culture.

Based on the City's continuing efforts and success with its energy efficiency and conservation work, the City was again recognized by BC Hydro in October 2014 with the Leadership Excellence Award (the highest level of recognition BC Hydro presents). The City of Richmond remains the only municipality in BC to achieve this high level of recognition from BC Hydro.

In collaboration with BC Hydro and as part of a current EMP funding agreement, the City has committed to reduce corporate electricity use by 1.3% or 550,000 kWh by April 2016 (from 2014 levels), which is equal to the energy used by approximately 14 single-family homes in Richmond per year. This target and the continued collaboration with BC Hydro helps to maximize the overall incentive funding the City receives and allows for the continued delivery of energy management projects.

Findings of Fact

EMP Achievements – 2008-2013 EMP Highlights

Energy conservation work at the City and energy related projects have cumulatively saved over 38.0 GWh of energy since 2008 (equal to the energy consumption in 950 Richmond single-family homes per year). In this same period, the City has avoided approximately \$1,800,000 in total operational costs and over 6,000 tonnes of greenhouse gas emissions (CO₂e) (equal to emissions from 1,850 Richmond cars). Since 2008, the City has received over \$1,200,000 in external funding that has supported expanded EMP projects and accelerated the repayment of capital funding to the corporate Enterprise Fund. The Enterprise Fund is an internal corporate fund that many EMP projects are funded through, with energy utility savings used to repay the Fund.

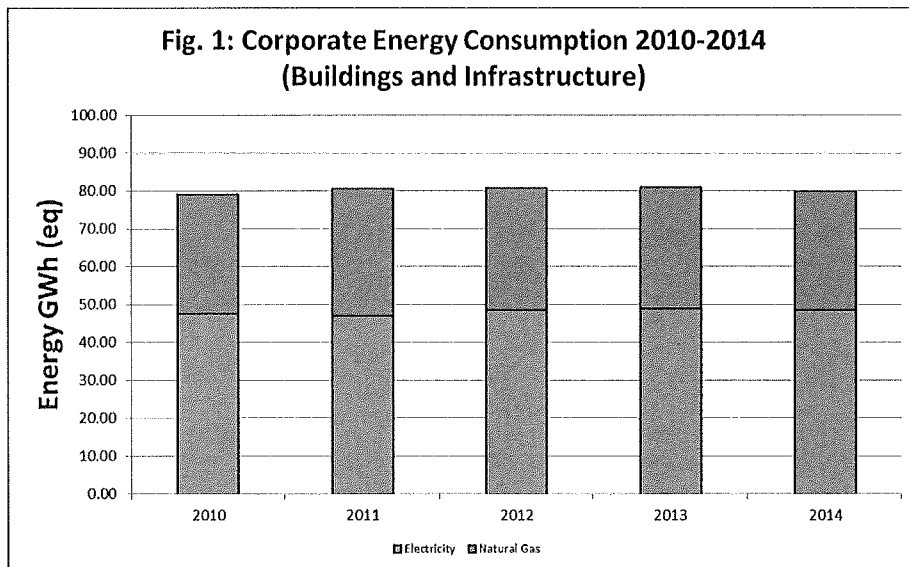
Corporate Energy Use Overview - 2014

In 2014, City assets, including the Richmond Oval, consumed approximately \$6.1 million dollars of conventional energy¹ (electricity and natural gas), which equals 80.4 GWh (equivalent to the amount of energy used on average each year by approximately 2,050 homes in Richmond). This energy use resulted in corporate emissions of approximately 5,889 tonnes of CO₂e.

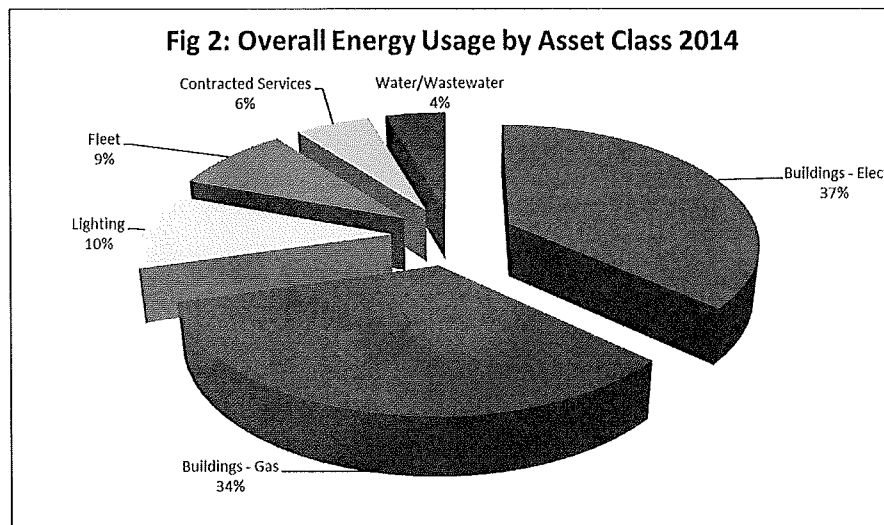
As shown in Figure 1 below, the total energy use for City infrastructure has remained fairly stable since 2010, even though the City has continued to add infrastructure to its asset list to meet increasing community needs (e.g. Community Safety Building, new street lighting in City development areas, and increased capacity at City drainage pumps). This increase in infrastructure will continue with the completion of the new City Centre Community Centre, the replacement of Fire Hall No.1 and No.3, and the replacement of the Minoru Aquatic and Older Adult's Centres. The continued support and success of the EMP has been a crucial component of the City's recent energy stability.

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

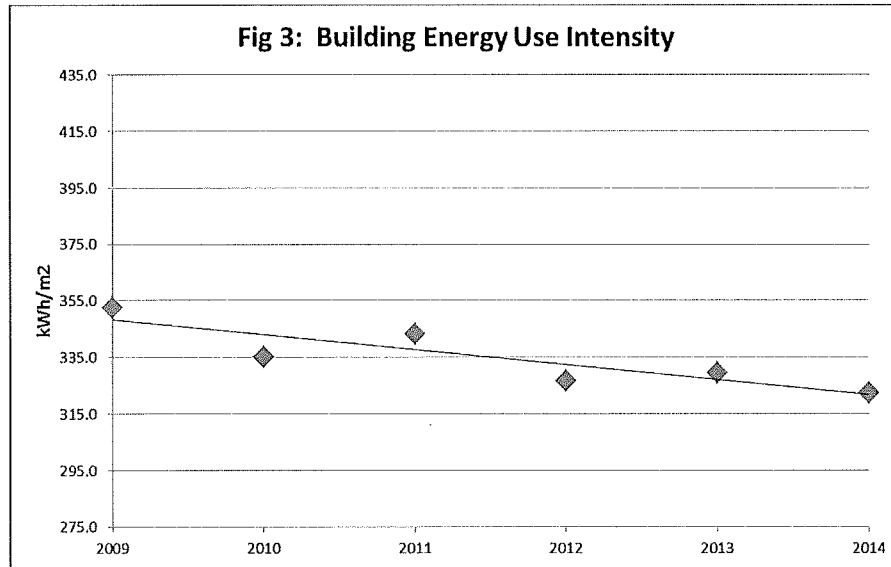
Without the continued investment and improvement in resource use efficiency in existing buildings and equipment (i.e. given business as usual replacements and development), it is estimated that the City’s energy use would have increased by 10% since 2010.



Since energy use at civic buildings accounts for a majority (approximately 71%) of total reported corporate energy use in 2014, a continued focus of the City’s EMP has remained on increasing the energy efficiency at City facilities (see Figure 2 – Overall Energy Usage by Asset Class).



As shown in the following Figure 3, civic building energy use intensity has decreased from approximately 353 kWh/m² in 2009 to 322 kWh/m² in 2014. This reduction in energy use intensity is a good indication that the City’s EMP remains an effective tool to reduce energy use and operational costs. Further reduction in building energy use intensity will occur once the replacement of Fire Hall No.1 and No.3, and the replacement of the Minoru Aquatic Centre and Older Adults Centre have been completed.



Although increased energy efficiency is the main component when energy projects are developed and implemented at City facilities, other corporate and community benefits are also pursued (e.g. improved lighting/safety, increased client comfort, and improved operator control). Energy projects are typically conducted in conjunction with other building improvements or infrastructure replacements to maximize project benefits.

The success of the City’s EMP relies on stakeholder involvement. During all phases of energy efficiency projects at City facilities, stakeholders are consulted and engaged to ensure that the project will work with the operational realities of the facility and staff. Through the City’s workplace conservation awareness program, staff are further encouraged to participate in increasing corporate energy efficiency through behavioural-based ways (e.g. turn energy using infrastructure off or down when not needed). Energy management best practices are the responsibility of all staff, and staff are encouraged to play an active role in identifying energy efficiency and reduction opportunities whenever possible.

EMP Achievements - 2014 EMP Highlights

In conjunction with the City's Capital Buildings Project Development, Facilities Services, and Engineering Planning sections, energy efficiency projects that have been recently completed are anticipated to save the City approximately 1,700,000 kWh in electricity and natural gas use (equal the power used in 44 homes in Richmond in a year) and avoid over \$100,000 in operational costs. This total energy savings represents a reduction of approximately 2.1% in overall City energy use, and will result in reduced emissions of over 170 tonnes of CO₂e (equal to removing approximately 53 Richmond cars from our roads each year). Based on the net capital cost to the City of approximate \$650,000 to complete these 2014 EMP projects, it is anticipated that these projects overall will have a 6.2 year payback.

As part of the most recent BC Hydro EMP funding agreement, the City surpassed its 2013/2014 target for electricity reduction (660,000 kWh), with approximately 730,000 kWh in electricity savings from completed projects over that time period.

A detailed overview of EMP projects highlights in 2014 is provided in Attachment 2; general highlights include:

- External Funding: \$280,000 of external funding was leveraged to support the City and the Corporate Energy Management Program in 2014.
- Showcase projects: The most recent upgrades at the Richmond Ice Centre accounted for the majority of the anticipated energy savings from 2014 projects, and included the upgrade of the refrigeration plant to more efficient plate and frame chillers, and the installation of a heat recovery system and new high efficiency boilers. This aging mechanical equipment was scheduled for replacement as it was at or very near end of life. Additionally, related mechanical equipment failures resulted in partial facility closures over the past year.

Currently Richmond Ice Centre projects are on track to achieve approximately 400,000 kWh of electricity savings and approximately 800,000 kWh of natural gas savings over a full year. These savings represent an overall reduction of 20% in energy use and approximately \$60,000 annually in cost avoidance savings at the facility.

- Policy Implementation: With the adoption by Council of the updated City's High Performance Building Policy in 2014 (with more ambitious energy efficiency targets for new buildings) and staff implementation of the Policy, it is projected that the new Minoru Complex facility will achieve LEED Gold designation with a strong focus on energy efficiency.

The positive benefits that can be attributed to this high level of designation include; doubling the size of the facility without increasing energy use, decreasing the facility's GHG emissions by approximately 70%, and integrating renewable power generation at the facility.

- Building Control Upgrades: To ensure that the City's higher consuming buildings are managed and operated as effectively as possible, the City has begun implementing Phase 1 of the Direct Digital Control Upgrade and Management Plan. As part of Phase 1, three facilities (City Hall, Works Yard, and Thompson Community Centre) are currently undergoing modernization of their building automation systems, which will enable a greater capacity to improve building operation and energy use monitoring.

In addition to corporate energy management activities, the City is active in the development of community energy and emissions reduction actions through the advancement of district energy. The City has two renewable district energy systems in operation, the Alexandra District Energy Utility, and the Oval Village District Energy Utility. These investments will help the City transition from conventional energy sources to more sustainable and stable energy systems, reducing long term costs to customers and greenhouse gas (GHG) emissions.

EMP Goals for 2015 and Upcoming Projects

The following main focus areas remain in place for the EMP for 2015:

- Increase energy use awareness within the organization and show leadership in the community
- Pursue external funding and partnerships with outside agencies
- Maintain a leadership role in municipal energy systems and policy
- Improve the usability of energy use data at key facilities, to allow for more detailed analysis and the increased optimization of energy use
- Incorporate a more systematic approach to building energy use performance analysis in civic facilities, to allow for the continued improvement of 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 following key energy initiatives are in various stages of implementation, and are scheduled to be completed in 2015:

- Heating plant and mechanical improvements at Watermania Aquatic Centre
- Completion of building automation system upgrades and improved energy monitoring capabilities at City Hall, Works Yard, and Thompson Community Centre
- Lighting retrofits and improvements at various facilities, including City Hall and Britannia Shipyards
- Heating system and lighting optimization at various civic recreational facilities

Financial Impact

None.

Conclusion

The City's Energy Management Program continues to work towards and help facilitate maximizing the energy use efficiency of City facilities and infrastructure. Through Council support, the Program has been very successful in developing and implementing projects at City facilities that increase energy efficiency, and provide other corporate and community benefits. Cumulatively since 2008, energy conservation projects at the City have saved over 38.0 GWh of energy (equal to the energy consumption in 950 Richmond single-family homes per year), which amounts to approximately \$1,800,000 in cost avoidance savings and over 6,000 tonnes of

greenhouse gas emissions reduced (equal to emissions from 1,850 Richmond cars). Without the continued investment and improvement in resource use efficiency in existing buildings and equipment, it is estimated that the City's energy use would have increased by 10% since 2010.

With the revision of the City's High Performance Building Policy, and its higher energy efficiency targets for new buildings, and continuing to focus on reducing the City's existing corporate footprint through energy conservation, energy reduction, and increased integration or renewable energy sources, the corporation is well positioned to limit its future operating cost and conventional energy use increases.



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Att. 1 Corporate Energy Report Summary – 2014
Att. 2 City Energy Management Program 2014 Key Initiatives

REDMS# 4592072
REDMS# 4584628