



CITY OF VANCOUVER

ADMINISTRATIVE REPORT

Date: February 1, 2007  
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TO: Standing Committee on City Services and Budgets

FROM: Director of Facilities Design and Management (Corporate Services) and the Director of Planning and Operations (Board of Parks and Recreation) in consultation with the Director of Finance and the Manager of the Sustainability Group.

SUBJECT: Green House Gas Reduction Strategy (Corporate Climate Change Action Plan):  
- Report Back on Phase 1 (Upgrade Work to City Hall), and  
- Award of contract for Phase 2 - Park Board Energy Performance Contract

RECOMMENDATION

- A. THAT, subject to the conditions set out in Recommendations B and C, the General Manager of Parks and Recreation be authorized to enter into a contract with Ameresco Canada Inc. for energy savings measures work on Parks and Recreation facilities, as set out in Table 1 of Appendix "A", at a maximum total capital cost of \$8.64 million plus GST; source of funding to be as follows:
- \$310,000 from the Park Board 2006-2008 capital plan (Community Centres, Rinks and Pools) for upgrading work;
  - \$175,000 from external energy efficiency incentives (BC Hydro); and
  - \$8.15 million from a loan from the Capital Financing Fund to be repaid back with interest from energy cost savings generated from the energy saving measures, on terms to be established by the Director of Finance.
- B. THAT the Director of Legal Services be authorized to execute and deliver on behalf of the City, all legal documents required to implement Recommendation A.
- C. THAT all such legal documents be on terms and conditions satisfactory to the General Manager of the Board of Parks and Recreation and to the Director of Legal Services, and further that no legal rights or obligations will be created or arise by Council's adoption of Recommendations A, B, and C unless and until such legal documents are executed and delivered by the Director of Legal Services.

- D. THAT the General Manager (Board of Parks and Recreation) report back within one year of the completion of the upgrade work set out in the report and that said report include information about the Greenhouse Gas ("GHG") reductions, the financial savings and the payback periods.

#### **GENERAL MANAGER'S COMMENTS**

The General Manager of the Board of Parks and Recreation RECOMMENDS approval of A through D above, noting that these projects are consistent with the City's climate change strategy, are supported by a positive business case and that the Commissioners of the Vancouver Park Board approved a motion endorsing A through D above, on February 26, 2007.

#### **CITY MANAGER'S COMMENTS**

The CITY Manager RECOMMENDS approval of A through D above, noting that these projects are consistent with the City's climate change strategy and are supported by a positive business case.

#### **COUNCIL POLICY**

Funding for all capital expenditures must be approved by Council and Council approves award of contracts that exceed \$300,000.

On April 23, 2002, Council adopted the Definition and Principles of Sustainability to guide, prioritize and improve the sustainability of City actions and operations.

On May 2, 2002, Council approved the motion proposed by the Federation of Canadian Municipalities to support the Canadian Government's ratification of the Kyoto Protocol.

On March 25, 2003, Council approved an emission reduction target of 20 percent from 1990 levels for the City of Vancouver, subject to evaluation of the implications of the target to ensure it is realistic. On this same date, Council created the Cool Vancouver Task Force and requested that it report back with a report on the components of a GHG Reduction Action Plan for both the corporation and the community.

On June 24, 2003, Council received the Cool Vancouver Task Force's Discussion Paper on GHG Reduction Planning and approved a process to develop GHG Reduction Plans for both the City (Corporate) and the City (Community).

On December 2, 2003, Council received and accepted the Corporate Climate Change Action Plan ("CCAP") from the Cool Vancouver Task Force and affirmed and approved the 2010 target of a 20 percent reduction, below 1990 levels, in Corporate GHG emissions.

On February 24, 2004, Council directed staff to issue a Request for Proposals for energy performance contracting in order to achieve Council's mandated target of 20 percent reduction in GHG by 2010, and to report back on the selection of the contractor. Subsequently, Ameresco Canada Inc. was selected to be the Energy Performance Contractor for City owned and managed facilities. Staff directed Ameresco Canada Inc. ("Ameresco") to undertake Phase 1 of this work by conducting an energy audit of City Hall Campus and to recommend energy-savings and GHG reduction measures.

On September 22, 2005 the City entered into the Phase 1 (City Hall Campus) contract with Ameresco for energy savings and GHG reduction measures work on City Hall Campus facilities. The total value of the contract is \$1.82 million with a resulting GHG reduction of 320 tonnes CO<sub>2</sub> or about 89% of the 360 tonne CO<sub>2</sub> average target outlined in the policy adopted by Council on March 25, 2003.

## PURPOSE

The purpose of this report is to seek Council's approval for the City to enter into the Phase 2 (Park Board Facilities) energy performance contract with Ameresco Canada Inc., and to establish a source of interim financing for this project, which will ultimately be paid for with the energy savings and external grants. The report recommends that the energy performance contract be comprised of energy-savings measures, which are to be implemented in thirty (30) facilities administered by the Board of Parks and Recreation.

## BACKGROUND

Historically, the City has undertaken capital upgrades and retrofitting of City and Park Board facilities on an as-needed basis, funded through annual capital budgets. Over the past fifteen years, many successful energy efficiency projects have been completed within City facilities, using a combination of internal funding and BC Hydro Power Smart rebates. While energy efficiency is one of the criteria used in justifying such work, this one-off approach does not necessarily maximize potential energy savings, nor does it allow the City to meet its GHG reduction goal.

Reducing greenhouse gas emissions from the City and Park Board facilities is an important part of the City and Park Board's commitment for reducing its own corporate greenhouse gas emissions by twenty percent of its 1990 levels by 2010 (a 9,000 tonne reduction). This will be achieved by undertaking capital upgrade projects that retrofit Civic and Park Board facilities with more energy-efficient technologies, resulting in a more energy-efficient operation.

## DISCUSSION

### Energy Performance Contracts

An energy performance contract is a agreement that establishes a relationship between the owner of building facilities (in this case, the Board of Parks and Recreation) and an energy performance contractor (in this case, Ameresco Canada Inc.) whereby the energy performance contractor is required to provide the following services for a fixed fee:

- Energy-savings assessment. Provide a list of proposed energy-saving measures, with an estimate of capital cost, GHG reduction, and a supporting business case, including financial savings and financial payback.
- Project management. Act as a general contractor for the agreed to capital upgrades and retrofit work.
- Materials sourcing. Assist the City in procuring the most appropriate materials and technologies at the best possible price for the energy-savings measures that are implemented.
- Grant applications. Assist the City in applying for applicable grants for this work.
- Capital cost guarantee. Provide a guaranteed ceiling on the up-front capital cost for the work.

- Energy savings guarantee. Provide the City a guarantee of the ongoing annual energy savings associated with the retrofit work. This provides the City certainty regarding the payback periods and the business case for the capital work undertaken.

## Energy Performance Projects

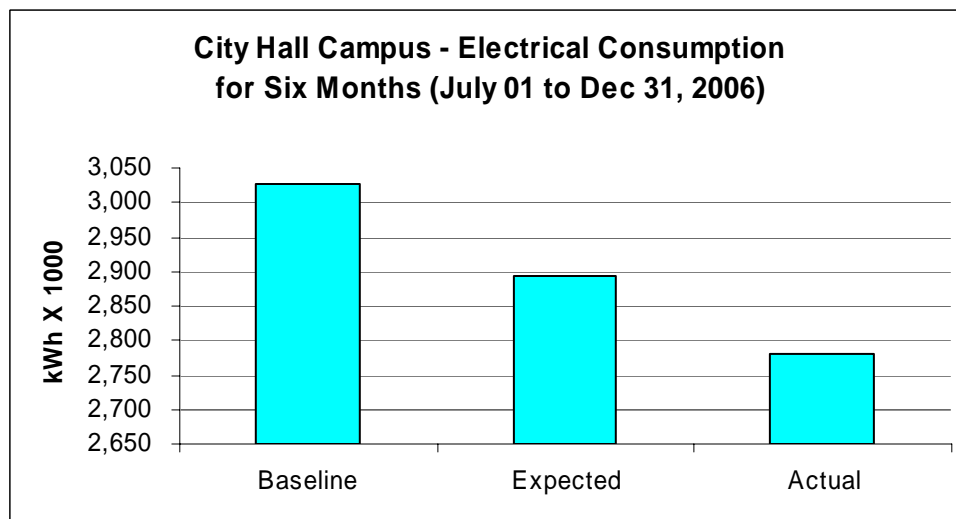
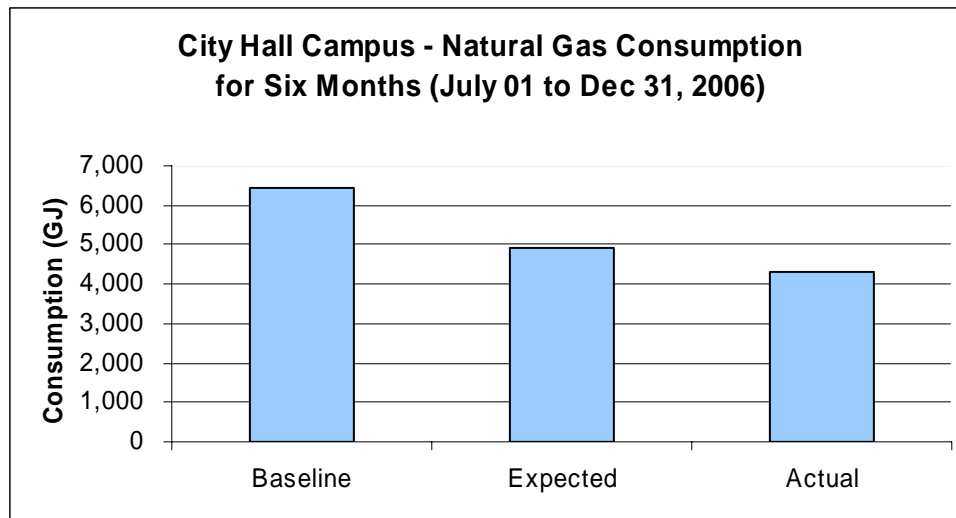
### Phase 1: City Hall Campus - Progress Report

As directed by Council in February 2004, staff, through a request for proposals from energy performance contractors, selected Ameresco to provide a detailed proposal to carry out work in the City and Park Board facilities. The initial phase (Phase 1) of the work related to the City Hall Campus which consists of the following facilities:

- City Hall Main Building - 453 West 12th Avenue,
- City Hall East Wing - 2675 Yukon Street, and
- City Hall West 10th Avenue Annex - 515 West 10th Avenue.

The Phase 1 work is now complete and staff have deemed this project a success based on the following parameters:

- **Financial** - energy savings are on track and initial loan payment made to funding source (PEF - Property Endowment Fund). Based on the projected savings, staff are confident the loan will be paid back as scheduled.
- **Ergonomic** - staff, with a few exceptions, are appreciative of the new lighting system that is both energy efficient and intended to reduce glare on computer screens.
- **Infrastructure Renewal** - building systems have been replaced, upgraded or retrofit and this has assisted to extend the life of aging building infrastructure.
- **Legal** - an acceptable contract has been negotiated and this can serve as a model for future phases of this work.
- **Environmental (GHG Reductions)** - based on the projected energy savings, the City Hall Campus will be able to achieve 89% of the GHG reduction target of the 20% reduction below 1990 levels (as set by Council Policy). Note that the water savings are currently being deemed as at present as staff are in the process of installing a water meter to serve City Hall.
- **Energy Savings** - The "Actual" Electrical and Natural Gas savings have exceeded "Expected" Savings when compared to the "Baseline". These savings calculations are based on the "Construction Period Savings", the actual measured savings for the guarantee will commence on July 1, 2007. The following two charts demonstrate this:



## Phase 2: Board of Parks and Recreation Facilities

Ameresco submitted a feasibility report for the Phase 2 Energy Performance project in January 2007, a summary of which is attached as Appendix A. When implemented, the energy saving measures will achieve 102% of the GHG reduction target as set by Council Policy for these specific buildings. It is unlikely that that every City or Park Board facility can meet the 20% GHG reduction target, but staff are confident that this can be achieved on an average basis throughout the entire building portfolio.

Table 1 of Appendix A summarizes Ameresco's analysis of potential energy-savings measures for the thirty (30) facilities managed by the Board of Parks and Recreation to be included in the Phase 2 project. The list included Community Centres, arenas, indoor and outdoor swimming pools and golf course club houses. The projected GHG reductions are achieved through savings in natural gas and electricity implementing the following energy saving measures:

- lighting upgrades
- improvements to control systems

- replacement of old and inefficient boilers
- HVAC equipment upgrades and replacement
- one solar heating project (swimming pool)
- one heat recovery project (ice rink)

In addition some water conservation measures have been included, building on the ongoing work that both City and Park Board are engaged in.

Some of the energy saving measures that Ameresco considered did not meet the business case criteria and were not included in the initial list. Park Board staff have identified three of these as projects that are in the a future capital budget plan for the Park Board; Vancouver Aquatic Centre boilers, Kensington Community Centre boilers and West End Community Centre (WECC) arena refrigeration system/building air conditioning separation. The two boiler projects result in significant GHG reductions and the WECC project will provide operational flexibility for the upcoming refurbishment of the refrigeration plant room. Injecting this capital improves the the financial cases and leverages this capital by over 100% as the energy savings will pay for approximately 50% of the cost of the projects.

The list in Table 5 of Appendix A is a subset of the measures listed in Table 1, made up of a building by building breakdown of the energy saving measures that Ameresco is recommending that the Park Board undertake at this time (plus one which has already been completed, and is included to keep track of GHG reduction).

The business case developed by Ameresco shows the benefits of:

- (a) using a holistic approach and implementing each measure now as part of the contract (the one-time cost and ongoing annual savings associated with implementing each retrofit measure now); and
- (b) avoiding the cost of implementing each measure in an ad hoc fashion sometime in the future (as separate one-off projects and one-time cost with ongoing annual savings associated with implementing each retrofit measure independently).

Ameresco concluded that the recommended measures cumulatively:

- result in an annual reduction of 2,240 tonnes of GHG emissions, which represents a reduction of 20% from 1990 levels (or 102% of the 20% target for these specific facilities);
- represent a total investment by the City of \$8.64 million (with a portion to be offset with grants from external agencies and/or existing capital plan funding);
- will generate annual savings of approximately \$543,166 (based on current utility rates);
- result in a simple payback of 15.3 years; and
- have a strong business case justification, with a positive net present value of \$2,015,749.

## FINANCIAL IMPLICATIONS

There are three recommended sources of funding, totalling \$8.64 million, for the recommended measures (Appendix A):

- funding from the Park Board 2006-2008 capital plan (\$310,000) for capital upgrades for three (3) of the measures recommended;
- grants from external agencies (BC Hydro and NRCan) based on energy savings estimated by Ameresco to be \$175,347 (if necessary, interim financing from internal sources will be arranged for this item); and
- energy cost savings that result from implementing the energy savings measures can be utilized to support interim financing during the payback period. This includes savings from existing budgets and additional savings that result from avoided increases in energy costs in the future.

The measures that are being proposed have a range of payback periods, depending on the capital cost and savings generated by each. It is estimated that interim financing will have a term of twenty years. The financial model anticipates that the budgets for these energy costs will continue to increase over assumed levels, as the price of natural gas and electricity continues to increase in the future, increasing the savings and shortening the payback period with the possibility of the loan being fully repaid in less than 20 years.

In considering the terms for internal loans for capital projects, the Director of Finance normally considers the total value of the loan and the lifespan of the project. In most cases, internal loans are less than 10 years, however, in cases where there is the appropriate business need, longer terms are recommended. In the case of the energy loans, normal practice would restrict the term to 10 years, however, as these projects meet other corporate objectives - namely the achievement of greenhouse gas reductions - the proposed term of 20 years is acceptable. The justification of this longer term is that it allows the City to achieve a higher GHG reduction target than would otherwise be possible. Should Council approve the recommendations in this report, the source of the internal financing will be the Capital Financing Fund with repayment from energy savings over the term of the loan.

## ENVIRONMENTAL IMPLICATIONS

The following are the annual improvements to the environment as a result of this project;

- GHG reduction of 2,240 tonnes;
- electrical energy savings of 1,510,987 kWh;
- natural Gas savings of 37,356 GJ;
- water savings of 18,391 m<sup>3</sup>.

## CONCLUSION

This report recommends that the Board of Parks and Recreation enter into an energy performance contract with Ameresco Canada Inc., which will involve energy-saving measures in thirty (30) Park Board facilities. An \$8.64 million investment by the City will have a positive financial return (investment paid off within twenty years), and a positive overall net present value of \$2,015,749, as well as annual GHG reduction 2,240 tonnes.

## Appendix A

### Park Board GHG Emissions Reduction Project Summary

#### *Overview*

The Emissions Reduction project proposed for selected Park Board facilities is aimed at achieving the objectives of the City's Corporate Climate Change Action Plan (CCAP) which requires that green house gas (GHG) emissions from corporate operations be reduced to 20% below 1990 levels by 2010. The target emissions reductions for this specific project are based on reducing GHG emissions from the selected facilities to 25% below current levels to compensate for the increased GHG intensity of BC's electricity supply expected between 1990 and 2010.

The proposed project includes a wide range of individual efficiency projects or "energy saving measures" at each of the facilities. The 30 largest facilities (excluding those that have or are about to undergo major renovations) were chosen for this project. Measures were included in the final scope based on a number of criteria including emissions reductions, simple payback and financial business case as well as the overall project financial payback limitations. The following table summarizes the major components of the project.

**Table 1**

Measure	Measure Cost	Other Funding *	Net Cost	Savings	Simple Payback	Emissions Reduction
				\$		
Lighting	\$ 991,215	\$ 175,347	\$ 815,869	\$ 82,350	9.9	75
DDC	\$ 1,054,745	\$ -	\$ 1,054,745	\$ 83,874	12.6	353
Boilers	\$ 3,881,929	\$ 250,000	\$ 3,631,929	\$ 193,975	18.7	996
HVAC & Mech	\$ 2,099,674	\$ 60,000	\$ 2,039,674	\$ 143,268	14.2	738
Water	\$ 218,540	\$ -	\$ 218,540	\$ 27,167	8.0	63
Other	\$ 140,644	\$ -	\$ 140,644	\$ 12,531	11.2	16
Professional Fees	\$ 248,400					
<b>Total Selected Measures</b>	<b>\$ 8,635,148</b>	<b>\$ 485,347</b>	<b>\$ 8,149,801</b>	<b>\$ 543,166</b>	<b>15.0</b>	<b>2,240</b>

(\*) Other Funding includes \$310,000 in Park Board Capital contribution and \$175,347 in external incentives

Highlights of the project include:

- The project can be financed from utility savings with a 20-year term loan at 6% interest.
- Funding includes \$310,000 of Park Board capital contribution from the 2006-2008 capital plan as well as an estimated \$175,347 of incentives primarily from B.C. Hydro Power Smart.
- Achieves 102% of the GHG emissions reduction target for these facilities which is equivalent to removing 430 cars from the road.
- Has a positive Net Present Value (NPV) of over \$2 Million
- Includes the replacement of a significant amount of aging building systems (including 14 boiler plants) which represents avoided future capital expenditures
- Includes solar heating and waste energy recovery measures.
- Will result in improved occupant comfort and enhanced equipment standardization as well as facility operations efficiency improvements.
- Will result in a 19% reduction in utility costs for these facilities



**Financial Business Case**

Many of the proposed measures involve replacing aging, inefficient equipment and systems and the ability to fund their replacement cost out of utility savings represents avoided future capital expenditures. For each Measure, and for the project as a whole, a cash flow analysis was performed which included the impact of any future avoided capital cost. The resultant Net Present Value (NPV) of these cash flows for the total project exceeds **\$2 million**.

**Financial Summary (Table 2)**

Table 2 to the right summarizes the financial parameters of the project. After the Park Board capital injection of \$310,000 and the estimated incentives, the balance of the project costs can be financed over a 20 year term at an interest rate of 6%. The financing term, as well as the NPV calculations, assumes a 2.5% annual utility price escalation.

Total Project Cost	\$ 8,635,148
Net Project Cost	\$ 8,149,801
Annual Savings	\$ 543,166
Simple Payback	15.0
Financing Term (Years)	19.6
Emissions Reduction (Tonnes)	2,240
% of Reduction Target	102%
Net Present Value (NPV)	\$ 2,015,749

(Note: NPV based on total project cost)

**Annual Savings (Table 3 and Table 4)**

The annual savings are broken down as per the Table 3 on the right. The natural gas reductions generate the majority of the annual dollar savings. The electrical savings are net of the impact of several ice-rink heat recovery systems which actually increase electrical consumption in order to reduce gas consumption.

Savings Breakdown		
Electricity	\$ 87,637	16%
Gas	\$ 414,214	76%
Water	\$ 16,368	3%
Operating	\$ 21,807	4%

Table 4 on the right summarizes the utility reduction percentages with natural gas having the largest percent reduction.

Savings % Reduction			
Elec	Gas	Water	\$
9%	29%	6%	19%

**Emissions Reductions**

The proposed measures achieve 102% of the target emissions reduction for these specific facilities. The reductions are the equivalent of permanently removing 430 cars from the road. The vast majority of the emissions reductions (95%) are the result of reduced natural gas consumption as opposed to electricity consumption. This is because of the relatively low carbon intensity of BC's electricity supply (which is calculated based on the average intensity as opposed to incremental, thermally generated supply). The low carbon intensity of BC's electricity makes achieving a 25% reduction in emissions much more difficult than in other provincial jurisdictions.

### ***Energy Saving Measures by Building***

The table below summarizes the cost, savings, business case and emissions reductions for each of the facilities included in this project.

**Table 5**

#	Building Name	Measures	Savings	NPV	Emissions Reduction
		Cost	\$		
	<b>Total</b>	<b>\$ 8,386,748</b>	<b>\$ 543,166</b>	<b>\$ 2,015,749</b>	<b>2,240.1</b>
1	Champlain Heights CC	\$ 24,891	\$ 3,821	\$ 21,887	7.8
2	Douglas Park CC	\$ 90,199	\$ 5,281	\$ 14,998	13.3
3	Dunbar CC	\$ 66,980	\$ 6,404	\$ 27,326	8.6
4	False Creek CC	\$ 150,005	\$ 8,629	\$ 26,207	34.0
5	Hastings CC	\$ 298,480	\$ 15,042	\$ 40,705	59.7
6	Kensington CC	\$ 603,012	\$ 35,603	\$ 133,335	153.3
7	Kerrisdale Community Centre	\$ 184,004	\$ 7,988	\$ 15,646	17.1
8	Marpole-Oakridge CC	\$ 85,916	\$ 7,476	\$ 30,571	17.4
9	Ray-Cam	\$ 80,113	\$ 4,997	\$ 12,741	12.9
10	Renfrew CC	\$ 560,657	\$ 59,730	\$ 386,381	269.7
11	Round House CC	\$ 140,504	\$ 15,911	\$ 76,211	38.5
12	Kitsilano Community Center	\$ 131,137	\$ 4,931	\$ 6,527	12.7
13	Sunset Arena	\$ 322,243	\$ 25,320	\$ 122,591	92.4
14	West End CC	\$ 631,470	\$ 26,581	\$ 42,504	78.7
15	Kerrisdale Arena	\$ 513,852	\$ 16,272	\$ 14,124	69.8
16	Kitsilano Arena	\$ 362,344	\$ 35,443	\$ 185,320	105.4
17	Lord Byng Pool	\$ 370,970	\$ 10,148	\$ 13,099	43.8
18	Templeton Pool	\$ 500,204	\$ 36,230	\$ 196,715	173.8
19	Vancouver Aquatic Centre	\$ 700,674	\$ 56,286	\$ 232,516	202.5
20	Kitsilano Pool	\$ 8,099	\$ 27,996	\$ 1,544	141.9
21	New Brighton Pool	\$ 387,935	\$ 14,910	\$ 29,812	74.7
22	Second Beach Pool	\$ 328,577	\$ 31,726	\$ 109,181	159.0
23	Bloedel Conservatory	\$ 392,236	\$ 19,273	\$ 50,582	81.4
24	Evans Yard	\$ 136,660	\$ 3,663	-\$ 2,658	3.6
25	Fraser View Golf Course	\$ 45,670	\$ 2,193	\$ 4,937	4.6
26	Langara Golf Course	\$ 247,227	\$ 7,617	\$ 17,300	34.0
27	McCleery Golf Course	\$ 37,164	\$ 3,708	\$ 13,067	14.1
28	Parks Admin Bldg	\$ 228,695	\$ 7,011	\$ 25,609	24.7
29	Sunset Nursery	\$ 742,747	\$ 40,426	\$ 151,736	287.9
30	Vandeusen Gardens	\$ 14,083	\$ 2,550	\$ 15,234	2.7

### ***General Description of Energy Saving Measures***

The following section provides general descriptions of the types of measures being implemented in the facilities. A complete list and full description of each of the 201 individual measures is included in the Feasibility Study Report with will form part of the contract documents.

#### Lighting Measures

Existing lighting fixtures will be retrofit with new high efficiency equipment where viable. This will improve lighting quality and result in a standardization of lighting components for maintenance purposes. The predominant measure is the replacement of older T12 fluorescent fixtures with magnetic ballasts to T8 lamps and electronic ballasts.

#### Direct Digital Control (DDC) Measures

This measure involves the installation of computerized control systems or the upgrade and expansion of existing systems. Where there are existing systems, the DDC panels will be upgraded to the latest software versions and recommissioned to optimize efficiency. In addition to the resultant utility savings, this measure will improve occupant comfort and improve overall building operator efficiencies and response times.

#### Boiler Measures

This measure primarily involves the replacement of existing boiler plants with new high-efficiency plants. By reducing both combustion and standby losses, gas consumption (and GHG emissions) can be reduced significantly. Boiler plants are being replaced at 14 facilities and the average age of the existing boilers in these facilities is 27 years. As a result, this measure will result in a significant amount of avoided future capital costs when these boilers would have had to be replaced regardless while bringing forward the utility savings.

#### HVAC and Mechanical Measures

These measures include various efficiency improvements including heat recovery systems at pools and ice arenas as well as fan system replacements and pumping modifications. A solar radiation system is also included for Templeton Pool.

#### Water Conservation Measures

These measures include push-button controls and low-flow heads for showers where they have not already been installed as well as automatic controls for urinal flush tanks.

#### Other Measures

These measures include energy saving measures such as Vending Mizers to reduce the energy consumption of vending machines. They also include installing low emissivity (LowE) ceilings at two ice arenas (West End Community center and Kitsilano Arena).