

October **2010**



CITY OF SURREY

Corporate Emissions Action Plan



SUMMARY

Overview

The City of Surrey has undertaken this project to define opportunities to reduce energy consumption and greenhouse gas (GHG) emissions from the City's corporate operations. This plan aligns with the objectives of the Climate Action Charter, which the City signed on September 26, 2007.¹

The City has pursued energy efficient operations for many years and has implemented numerous actions to date. This Corporate Emissions Action Plan (CEAP) formalizes those past actions, adds new actions, and defines targets for reducing GHG emissions. The Plan identifies short-to-medium term actions to reduce GHG emissions and energy use over the next one to five years and outlines implementation requirements, roles and responsibilities, monitoring and reporting requirements, and financing opportunities to assist with plan implementation.

Corporate Energy and GHG Emissions Inventory

In 2009, the City of Surrey consumed a total of 417,079 GJ of energy and emitted 15,225 tonnes of GHG emissions (expressed as tonnes of carbon dioxide equivalents, CO₂e) in the delivery of its services. Of these total GHG emissions, electricity consumption accounts for approximately 9%; natural gas consumption accounts for approximately 47%, and; fuel consumed to run the City's fleet accounts for approximately 44%.

The City has also compiled inventories for previous years (2005 to 2009). Over this five year period, average annual energy consumption was approximately 445,000 GJ and average annual GHG emissions were approximately 14,500 tonnes CO₂e.

Key Opportunities and Actions

A total of 13 energy saving and GHG emissions reduction actions have been developed in the following four areas: buildings, fleets, infrastructure, leadership, and engagement. These actions are outlined on the following page.

GHG Emission Reduction Target

The five year average (2005-2009) is the baseline from which the City will measure progress. A target for reducing GHG emissions has been defined as:

- Reduce GHG emissions to 20% below baseline levels by the year 2020.

¹ The Climate Action Charter is a voluntary agreement between local governments and the Province to commit to action to reduce carbon emissions. Signatories pledge to be carbon neutral in their corporate operations beginning in 2012 and to foster sustainable community development.

Implementation

In order to meet the 10-year target of reducing corporate emissions by 20%, the City of Surrey will need to dedicate staff time and identify funding to support plan implementation. The plan can be implemented with existing staff resources. Annual budgeting will define costs required for audits and upgrades, and many opportunities exist to receive partial funding from a range of incentive programs. Additionally, processes for ongoing monitoring of energy use will be formalized, with staff assigned responsibility for collecting and reporting data annually. The CEAP should be considered a 'living document' that is able to incorporate new ideas and new technologies. A review or update every three to five years is recommended to ensure relevance to City priorities and initiatives.

Summary of Actions

Buildings

- Action-1 Ensure high energy performance of new facilities
- Action-2 Conduct audit and retrofit activities in City facilities
- Action-3 Include alternative energy evaluation in replacement, renovation, and maintenance activities
- Action-4 Develop ongoing energy management activities

Fleet

- Action-5 Continue implementation of green fleet management activities
- Action-6 Establish an alternative vehicle pilot program

Infrastructure

- Action-7 Investigate potential for alternative energy demonstration
- Action-8 Evaluate and implement street-lighting alternatives
- Action-9 Implement user control lighting and artificial turf for major sports fields

Leadership & Engagement

- Action-10 Establish a procurement policy that considers energy and GHG emissions
- Action-11 Encourage energy conservation behaviours in the workplace
- Action-12 Consider expanding energy and emissions monitoring and reporting
- Action-13 Continue to dedicate CARIP rebate to sustainability related activities.

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INTRODUCTION

Background

The City of Surrey has made a voluntary commitment to achieve “carbon neutral” municipal operations beginning in 2012. This is a commitment of signatories to the **BC Climate Action Charter**. Achieving carbon neutrality will require the City to implement actions to reduce energy consumption and associated greenhouse gas (GHG) emissions, and beginning in 2012, acquire carbon offsets to negate the impact of any remaining emissions.

The City signed the Climate Action Charter at the September 2007 UBCM conference. This Plan supports the City’s commitment to the Climate Action Charter. It proposes corporate GHG emissions reduction targets and outlines measures that the City will undertake to reduce energy use and carbon emissions from its operations.

Surrey is the second largest city in British Columbia. The population is projected to increase from 431,949 inhabitants (2006) to 682,000 by 2031². The City of Surrey is an organization of approximately 3,500 employees across 9 departments.³ It operates over 100 facilities in the community; manages over 2,000 pieces of equipment in its fleet; provides over 55 outdoor sport and athletic facilities (and hundreds of parks); manages the infrastructure required to deliver water, sewer and drainage services; operates traffic and street-lighting; provides fire services, and; contracts with a number of entities to provide additional services to the community.

The City of Surrey is committed to advancing the principles of sustainability. In 2008, City Council unanimously adopted the Sustainability Charter, a comprehensive framework for implementing a progressive, 50-year vision for a sustainable city. Building on the Charter, and relevant to this Plan, are the actions that City staff have implemented to improve energy efficiency and reduce GHG emissions from City operations (see text box at right).

Actions already underway to reduce energy use and GHGs from City operations

- Audits and retrofits to improve the energy efficiency of civic facilities
- Investigating opportunities for alternative and district energy
- Pursuing certification (gold level) under E3 Fleets Green Fleet Rating System
- Corporate anti-idling policy
- LED lighting on signal trucks
- 3 hybrid vehicles, 12 natural gas vehicles, and use of B10 biodiesel
- DOCs (Diesel Oxidation Catalysts) on older vehicles
- Purchase of battery and propane powered hot patch machines
- Fleet Smart driver training
- Down-sizing and right-sizing the fleet and Fire department vehicles
- Reduction in diesel fuel as a result of single stream recycling
- Changed all traffic signals to LED
- Adaptive street-lighting project
- Energy audits on pump stations
- Tracking fuel and emissions from employee business travel
- Working towards more sustainable corporate meetings and events

² Population figures from Surrey Planning and Development Department.

³ Approximate number of full time equivalents; does not include part time or auxiliary staff.

Context for Climate Action in BC

BC Climate Action Charter

The **BC Climate Action Charter** is a provincial initiative introduced in September 2007 to encourage local governments to reduce energy and emissions from their operations. Participating local governments, including the City of Surrey, have voluntarily committed to achieving carbon neutral operations by 2012. Signatories to the Charter are currently eligible for a rebate of the carbon tax paid to the Province (called the Climate Action Revenue Incentive Program, CARIP).

Carbon Neutrality and Carbon Offsets

Achieving carbon neutral operations means that the City of Surrey will:

- Establish a **baseline** of annual GHG emissions,
- Reduce those emissions as much as possible through **reduction measures**, and
- Purchase **carbon offsets** to net the remaining emissions to zero.

Actions that local governments take to reduce emissions in their operations reduce their carbon footprint (see Figure 1). At any time there will still be some residual carbon emissions and these are generally counter balanced by the acquisition of carbon offsets in order to achieve **carbon neutrality**. A **carbon offset** is a verified (i.e. audited) reduction in GHG emissions that occurs somewhere in the economy as a result of a specific offset project. The effect of the acquisition of offsets is to “net to zero” the emissions of the local government.⁴

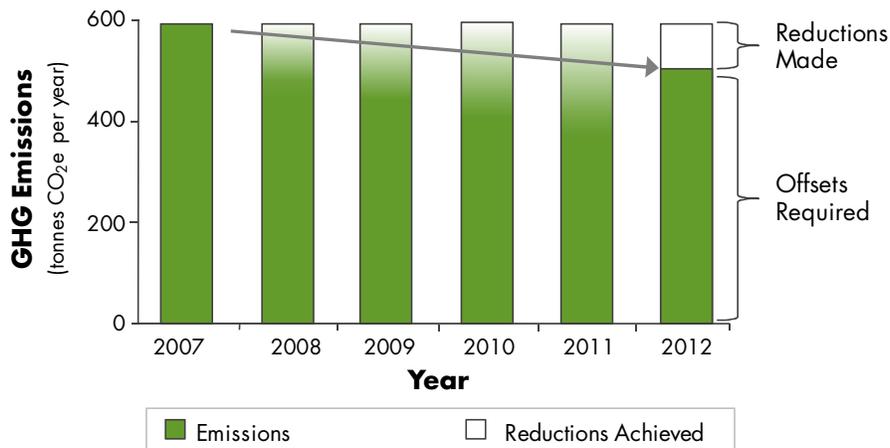


Figure 1: Reductions and offsets on the path to carbon neutrality (hypothetical example)

⁴ Actions to reduce the carbon footprint of local government operations are ‘reductions’ and cannot be counted as offsets. Carbon neutrality is achieved through a combination of (i) emissions reductions and (ii) offsets (see Figure 1). Conservation activities reduce the amount of carbon emissions thus reducing the ‘carbon footprint’ of the City. However, those remaining emissions must be offset by finding carbon reductions elsewhere in society. Those reductions are offsets – a contractual way of purchasing the environmental benefit of another party’s reductions. The provincial Climate Action Secretariat is currently working to provide better guidance to local governments and more information is expected at the 2010 UBCM conference in September.

WHERE ARE WE NOW?

Corporate Energy and Emissions Inventory (2009)

Energy Sources

An energy and greenhouse gas inventory is a tabulation of the energy used, and the associated GHG emissions, as a result of the City's operations. The City has compiled an inventory for each year from 2005 to 2009.

Table 1 summarizes the GHG emissions, energy consumption, and approximate energy costs by source from City operations in 2009.

The City of Surrey contracts out a number of municipal services – most notably solid waste collection. Under the Charter protocol⁵ these services are to be included in the municipal corporate inventory if they are considered "traditional municipal services". At present, solid waste collection and streetlight maintenance are included in the inventory; other contracted services will be evaluated and may be added in the future.⁶

What is a GJ?

A gigajoule (GJ - or one billion joules) is a measure of energy. We buy natural gas in GJ but other energy as kilowatt-hours (electricity) or litres of fuel. One GJ is about the same energy as:

- natural gas for 3-4 days of household heating
- 26 - 27 litres of diesel or gasoline
- two 20 lb propane tanks
- the amount of electricity used by a typical house in ten days.

Table 1: Energy and Emissions Inventory Summary for 2009

	Energy Use (GJ)	GHG Emissions (tonnes CO ₂ e)	Annual Energy Expenditure (Approx \$)
Electricity	173,083	1,346	\$ 5,763,033
Natural Gas)	144,525	7,187	\$ 2,110,677
Vehicle Fleet	99,472	6,687	\$ 2,642,274
TOTAL	417,080	15,220	\$ 10,515,984

⁵ There is a draft protocol defining the activities to be captured within the carbon footprint of the local governments. It defines included activities as "traditional municipal services" and these must be included regardless of whether they are provided in house or through a contract. A copy of the current draft protocol is available at: <http://www.toolkit.bc.ca/carbon-neutral-government>

⁶ The City has compiled a preliminary list of contracted services; staff are evaluating which of these services will need to be included in the inventory, with guidance from the Province. Note that contractor fuel data from two of the larger City contracts (solid waste collection and street light maintenance) has been included in the figures presented here. Additional contractor data will be integrated into future year inventories, as it becomes available. To aid in the collection of this data, the City will look to integrate a requirement for fuel data provision into its contracts.

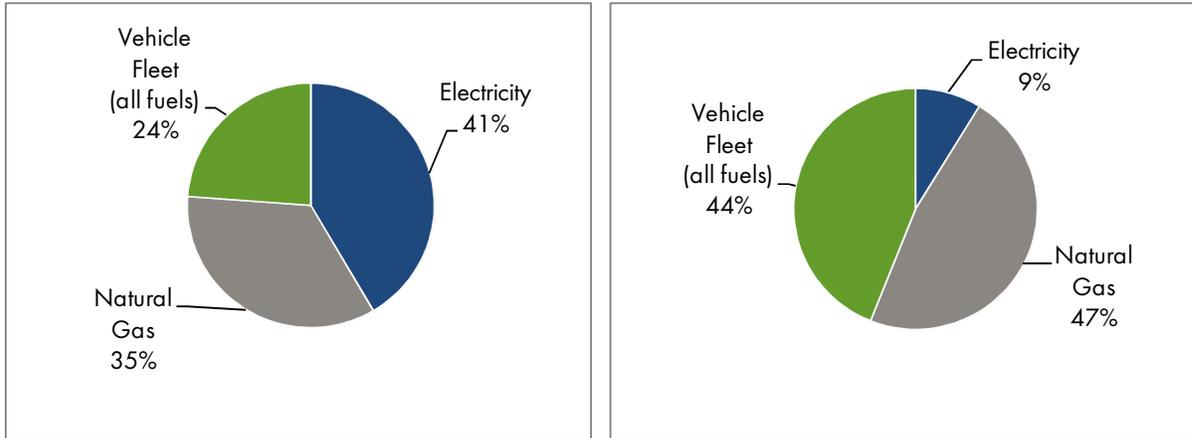


Figure 2: Energy consumption (left) and GHG emissions (right) by source⁷, 2009

(Note that this figure presents the 2009 data, the long term baseline for measuring progress is a five year average from 2005- 2009)

Municipal Service Areas

The energy and GHG inventory can be broken down according to the City’s service areas (Figure 3), including: administration and governance (Admin); drinking, storm and wastewater (Water); solid waste collection, transportation and diversion (Waste); roads and traffic operations (Roads); arts, recreation, parks and cultural services (Recreation), and; fire protection (Fire). Recreation facilities account for a large component of the corporate inventory – this is typical for many municipalities.

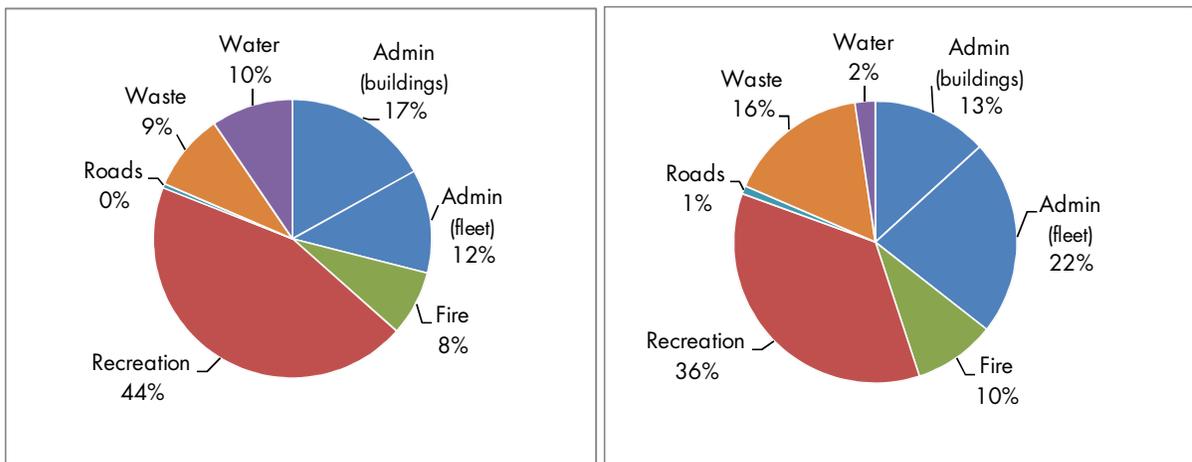


Figure 3: Energy consumption (left) and GHG emissions (right) by service area, 2009

⁷ Electricity provides about half of the energy for corporate operations yet it contributes only a small share of the carbon emissions. This is because the electricity in BC is primarily hydropower and has a low ‘carbon content’. Note that emissions from decomposing waste collected at corporate facilities are not included in this inventory as they are excluded from the Climate Action Charter scope)

WHERE ARE WE GOING?

Corporate Energy and Emissions Forecast

Surrey is the fastest growing municipality in a rapidly growing region. Population projections developed by the City's Planning and Development Department estimate a 38% increase in population between 2006 and 2021, from 431,949 to 596,800 residents. This translates into an increase of approximately 10,000 people per year.⁸

The energy consumed to run City of Surrey operations is affected by growth in the community. More residents results in increased demand for infrastructure and services, which is generally accommodated through expanded or new facilities and infrastructure. An estimate of the potential increase in energy and GHG emissions (a forecast) was based on capital plans for major civic projects and population projections (Table 2).⁹

Table 2: Emissions Forecasting Assumptions

Area	Description	Assumptions
Facilities	There are significant capital projects valued at over \$250 million planned through 2020. New growth results in increased energy consumption and GHG emissions.	Energy use in new facilities based on BC hydro statistics for commercial buildings.
Vehicle fleet	Vehicle fleets grow slowly as new activities are created, or new areas need servicing.	Assumed no substantive increase in vehicle energy consumption.

Based on these assumptions, energy consumption for City operations could increase from around 445,000 GJ per year (average annual energy consumption from the period 2005 to 2009) to over 740,000 GJ by 2020. This represents an approximate increase of 65% (Figure 4).

⁸ City of Surrey Population Estimates and Projections (<http://www.surrey.ca/Doing+Business/Population+and+Demographics/Population+Estimates+and+Projections.htm>)

⁹ Plans reviewed included: (i) Build Surrey Program; (ii) Five-year Financial Plan, 2010 - 2014; (iii) Engineering Dept 10-year Servicing Plan, 2010 - 2019; (iv) Parks, Recreation and Culture Strategic Plan; (v) Library Facilities Master Plan, 2006 – 2025.

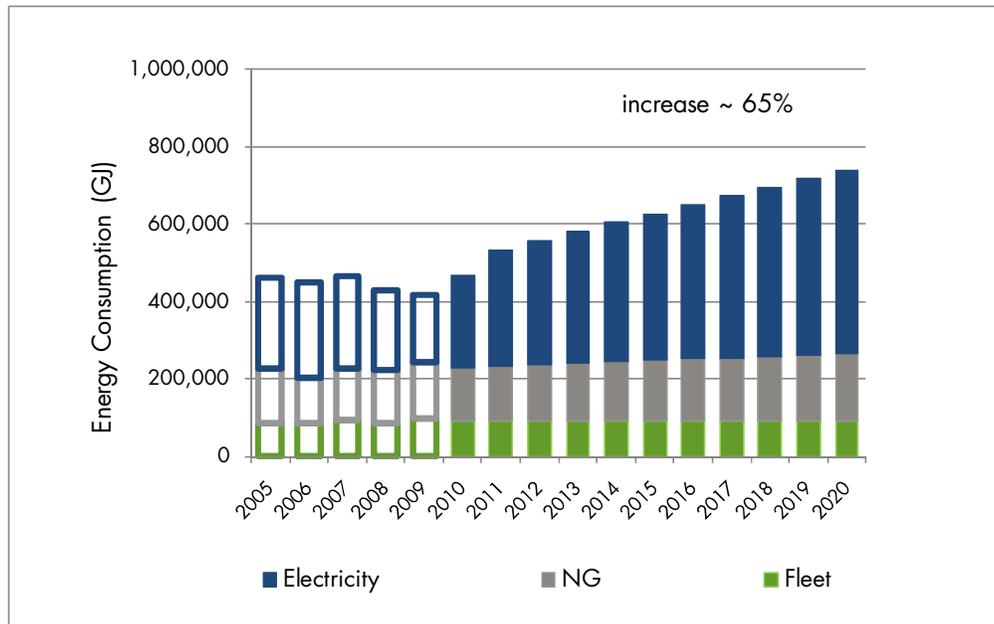


Figure 4: Forecasted Energy Consumption (GJ) for City Operations

GHG emissions from City operations are expected to increase from approximately 14,500 tonnes CO₂e (average annual GHG emissions from the period 2005 to 2009), to approximately 18,200 tonnes CO₂e by 2020. This represents an approximate increase of 25% (Figure 5). Note that this assumes no increase in vehicle fleet fuel consumption – only increases due to new facilities or facility expansions.

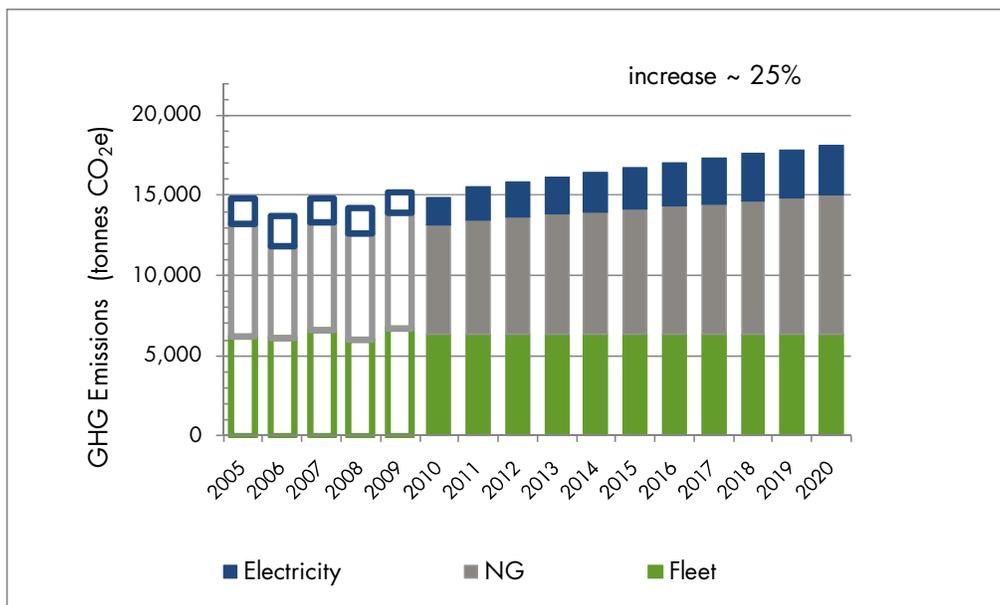


Figure 5: Forecasted GHG Emissions (tonnes CO₂e) for City Operations

(Note that this forecast is based on present level of energy consumption for buildings. There are possible improvements in energy efficiency that may be achieved through further improvements to the building code and other energy standards which could reduce this growth.)

Carbon Costs

Local governments in BC now have carbon liabilities:¹⁰

- First for the “carbon tax” associated with the purchase of fossil fuels (e.g. gasoline, diesel, natural gas, propane). By signing the **BC Climate Action Charter** and committing to become carbon neutral, local governments are eligible for a rebate on the carbon taxes paid (called the Climate Action Rebate Incentive Program or CARIP rebate). The carbon tax was initiated at \$10 per tonne on July 1, 2008, and will reach \$30 per tonne by July 1, 2012. Based on 2009 levels of energy consumption, the CARIP rebate could be approximately **\$416,200** in 2012.
- Second, for the voluntary purchase of carbon offsets to become carbon neutral starting in 2012. The cost of offsets in 2012 is unknown; however, a value of \$25 per tonne is widely cited. At this price, the cost of offsets (based on 2009 emissions) would be approximately **\$380,500** in 2012.

In order to achieve carbon neutrality in 2012, the City will likely need to acquire carbon offsets for any GHG emissions remaining after undertaking reduction activities. The Climate Action Charter does not specify the source of offsets for local governments.¹¹

The Carbon Neutral Working Group of the Green Communities Committee (a joint initiative of the Union of BC Municipalities and the Climate Action Secretariat) is working to develop guidance around suitable carbon offsets for local governments.

¹⁰ The BC carbon tax was initiated at \$10 per tonne of emissions on July 1, 2008, and increases \$5 per tonne each July 1. The carbon tax is levied on fossil carbon fuels directly consumed (propane, natural gas, gasoline, diesel, etc). The CARIP rebate estimates provided are based on the carbon tax that will be in effect at its maximum level beginning July 1, 2012 at \$30 per tonne of carbon. The actual 2012 CARIP rebate will be somewhat lower than this as the first half of 2012 will be at \$25 per tonne. From 2013 onward, the value is expected to be \$30 per tonne.

The cost of offsets is based on the total carbon inventory which includes the fossil fuels consumed (as cited for the carbon tax) plus the carbon associated with electricity consumption. The CARIP rebate does not include electricity since there is no carbon tax levied on electricity. However, there is carbon emitted in the electrical grid to produce the electricity and this is included in the municipal inventory. Offsets are estimated at the rate of \$25 per tonne which is a commonly cited expected cost for offsets.

In summary, the CARIP rebate will be based on a portion of the carbon footprint at \$30 per tonne, while the offset cost is based on the entire inventory at \$25 per tonne. By coincidence, electricity in BC has a low carbon content, which results in the two values being of the same range. Note that these are estimates and the true cost of offsets in 2012 is currently unknown. Additionally, the recovery of the CARIP rebate will depend upon the tracking systems in place to prove the purchases.

¹¹ As mentioned on Page 2, the Province is currently working to provide better guidance on offsets for local governments. More information is expected to be announced at the 2010 UBCM Conference.

WHERE DO WE WANT TO GO?

Commitments to Sustainability

The City has implemented a number of initiatives aimed at reducing energy consumption and GHG emissions, and improving the sustainability performance of corporate operations (see text box on page 1). In addition to these initiatives, there are ongoing activities at the community-scale that further demonstrate the City's commitment to sustainability, including:

- A **Sustainability Charter** that provides a framework for integrating social, environmental and economic considerations into decision-making;
- A draft **Official Community Plan** (in development) with policies to support sustainable development, energy efficiency and alternative energy;
- A **District Energy Study** that explores the viability of developing district energy systems and renewable fuel sources in the City Centre area of Surrey;
- A **Sustainable Development Checklist** that will assess the sustainability implications of development;
- A **Community Energy Manager** hired to spearhead further work on District Energy and Power Smart energy saving programs for residents and businesses in the City.

It is because of these types of initiatives that the City of Surrey was recognized with the 2009 Fraser Basin Council's **Overall Sustainability Award**.

In the Mayor's 2009 State of the City address, the City's commitment to sustainability was further underscored with the announcement of a new **economic investment action plan** focused on developing job opportunities within Surrey (in an effort to provide options for residents to work closer to home, thereby reducing GHG emissions from transportation) and providing incentives to encourage high density development in certain zones. Phase 2 of this plan was announced in the Mayor's 2010 State of the City address, and Council is now moving forward with that plan and a Clean Energy Strategy for the City.

50-Year Vision

The Sustainability Charter articulates a 50-year vision for the City that strongly supports efforts to reduce energy and emissions from corporate operations:

Surrey values and protects its natural environment through stewardship of its rich tree canopy, and enhancement of its natural areas and biodiversity. It is a safe City, with a vibrant City Centre and livable communities that provide a range of affordable and appropriate housing options. Surrey leads the way in sustainable design, “green” buildings and “green” infrastructure. It provides transportation choice, with a focus on the efficient movement of people and goods, not just vehicles. **Surrey incorporates “Triple Bottom Line Accounting” into its operations, incorporates and encourages alternative energy sources, and strives for carbon neutrality and no net impact from waste.** It is a city that fosters local employment opportunities and “green” businesses including a sustainable agricultural base and local food security. Surrey has a network of widely accessible community health and social services, parks, recreation, library and cultural opportunities that promote wellness and active living. The City embraces its cultural diversity, and promotes tolerance, social connections and a sense of belonging.

Values

Surrey has defined **five core values** to guide its work. These values are well aligned to encourage efforts to reduce energy use and GHG emissions.

Value	Description	Relationship to energy and emissions reduction efforts
Community	We care about and contribute to the broader well-being of the community; we strive to make Surrey a great place to live, work, invest, recreate and raise a family	Pursuing energy and emissions reductions within the broader sustainability context.
Innovation	We welcome change; we actively look for leading edge initiatives and welcome new approaches and original thinking; we are committed to continuous improvement; we recognize all experiences as important learning opportunities.	Encouraging leading edge thinking and action to reduce our carbon footprint.
Integrity	We are honest; we are accountable for our decisions; we meet our commitments; we are forthright in our communications; we understand and comply with all laws, regulations and policies.	Monitoring and reporting progress on energy and emissions reductions.
Service	Customers are important to us; we want to help our customers; we seek to better understand our customers’ needs and actively work to achieve responsive, balanced solutions.	Delivering services more efficiently from an economic and energy perspective.
Teamwork	We support each other; we trust each other; we respect each other; we take a City-wide view of the challenges we face; we value everyone’s ideas.	Supporting staff and contracted services to take action to reduce energy and emissions.

Energy and Emissions Policy Statement

In keeping with the Sustainability Charter and the City’s defined core values, the following *Corporate Energy and Emissions Policy Statement* is proposed:

Corporate Energy and Emissions Policy Statement:

The City of Surrey will conduct its operations to ensure:

- i. the highest practicable energy efficiency in municipal operations;
- ii. fiscally responsible operations; and
- iii. continuous reduction of GHG emissions.

A series of objectives, which align with the *Sustainability Charter* as outlined below, will ensure the City’s commitment to the *Corporate Energy and Emissions Policy Statement*.

Corporate Energy and Emissions Objectives	Related <i>Sustainability Charter</i> Commitments (from <i>Corporate Operations Sphere</i>)
<i>Define energy consumption, efficiency opportunities, and GHG emissions reductions as desired outcomes of capital spending and operational planning</i>	<ul style="list-style-type: none"> • Develop policies and programs to undertake full life cycle cost analysis evaluation of new and retrofitted buildings and infrastructure; • Design new infrastructure as green infrastructure to have as long a service life and as low a long-term maintenance cost as practicable; • Consider the life cycle investment in all facility decisions, including replacement costs, operating costs and maintenance costs; • Develop policies and practices to institutionalize “Triple Bottom Line” accounting principles in the decision-making process to ensure social and environmental costs and benefits are evaluated; • Adopt policies for “triple bottom line” analysis in purchasing decisions related to the procurement of equipment and vehicles.
<i>Build business cases to demonstrate that energy savings, operational improvements, and GHG reductions can all be pursued in a cost effective manner</i>	<ul style="list-style-type: none"> • Develop and adopt policies for the use of “triple bottom line” analysis in decisions related to building energy use; • Analyze the costs and benefits of alternative fuels in relation to their social, environmental and economic impacts

Corporate Energy and Emissions Objectives	Related <i>Sustainability Charter</i> Commitments (from <i>Corporate Operations Sphere</i>)
<i>Explore and pilot test new opportunities and technologies for energy conservation and renewable energy. We will take responsible measures to balance the cost and performance risks of new technologies with the benefits of innovation</i>	<ul style="list-style-type: none"> • Conducting demonstration projects such as green infrastructure pilot projects and make the public aware of the City's energy initiatives, successes and pilot projects; • Implement and publicize green infrastructure projects; • Incorporating alternative energy systems such as geo-exchange and solar heating systems for City facilities where feasible, including new and retrofitted buildings and structures.
<i>Promote within City staff their ownership of energy conservation and operational innovation</i>	<ul style="list-style-type: none"> • Undertaking staff training aimed at improving energy efficiency; • Developing and implementing policies focused on encouraging employees to use alternative transportation modes for commuting.
<i>Report on our activities, progress, and carbon footprint</i>	<ul style="list-style-type: none"> • Conducting sustainability audits for new and existing municipal facilities; • Include sustainability criteria/considerations in Corporate Reports

HOW WILL WE GET THERE?

Reduction Opportunities

Actions to reduce energy consumption and GHG emissions from City operations span four areas:

1. **Buildings:** The City has identified a number of new and expanded civic facilities to accommodate the growing demand for services in the community. One of the key strategies will be to ensure that new facilities are built to high energy performance standards. For existing facilities, measuring and monitoring building energy performance will be an important strategy for realizing energy and emissions reductions in City operations. Specific measures under this strategy include defining an auditing and retrofit planning and prioritization schedule, and partnering with utilities to maximize resources available for improving the energy performance of civic facilities.
2. **Fleet:** Activities to reduce fuel consumption and emissions from the City's vehicle fleet are well underway. The City has joined the E3 Fleet program and is seeking to be certified Gold under the E3 Green Fleet Rating System. Continued green fleet management activities, including aggressive action to right-size vehicles and improve utilization, will greatly assist the City in reducing fuel use and emissions associated with City vehicles. Further leadership in fleet management will be demonstrated through a pilot program to test alternative vehicles with a view to expediting their widespread use for City operations.
3. **Infrastructure:** Strategies to reduce energy consumption and GHG emissions from City infrastructure focus on opportunities to improve the energy performance of streetlighting and infrastructure in use at City parks and sports fields, including user control lighting and artificial turf. Infrastructure systems are often driven by electricity – which in BC has a small carbon footprint. As a result, conservation of electricity does not save a lot of carbon. However, there is often a solid business case for saving electricity based on energy and cost savings.
4. **Corporate Leadership:** Activities involving education and outreach with City staff are foundational and support the reductions in the other three areas. Promoting energy conservation behaviours in the workplace by engaging City staff will be a critical strategy for ensuring that these other measures (i.e. for buildings and fleet vehicles) are successful in achieving energy and emissions reductions. Additionally, a number of services are provided through external contractors and efforts to encourage contractors to monitor and improve energy performance and reduce GHG emissions will be an important strategy for the City.

BUILDINGS

Number of Buildings (includes infrastructure)	310
Electricity Consumption (2009)	48,078,539 kWh
Natural Gas Consumption (2009)	144,525 GJ
GHG Emissions (2009)	8,533 tCO₂e

Action-1 Ensure high energy performance of new facilities

In keeping with the Sustainability Charter goal to design new infrastructure to be “green” and “to have as long a service life and as low a long-term maintenance cost as practicable,” the City will require the evaluation of minimum energy performance standards for all new municipal facilities, as well as major renovation and expansion projects. This will ensure that new construction goes “beyond the building code” and demonstrates leadership to the community by providing practical examples of durable, high performance buildings. Third party standards are useful to provide benchmarks for performance.¹² Key standards include:

- **Leadership in Energy and Environmental Design (LEED)** – a “green building” rating system that provides points for a number of sustainability related activities (beyond energy and emissions).
- **ASHRAE 90.1** – an energy design standard for buildings. This addresses building envelope and system requirements for commercial buildings, residential buildings higher than three stories, and semi-conditioned buildings (warehouses, etc.). The current BC Building Code requires compliance with ASHRAE 90.1 (2004). A 2007 ASHRAE 90.1 standard has been published and updates are expected every few years.

The City will:

- Continue its practice, for all new facilities and major expansions, of evaluating the capital cost requirements and operating energy and carbon savings from constructing to the most current energy standard in ASHRAE 90.1 (where applicable).
- Consider the development of a corporate policy that would require all new buildings to go beyond the building code and achieve a certain level in the LEED rating system or meet the performance standards of the *most recent version* of ASHRAE 90.1 (currently 2007).

¹² Local governments that have established high performance standards for civic facilities include: (1) City of Richmond – LEED Gold Certification was set as the desired standard for new City buildings greater than 2,000 m² (approximately 20,000 sq. ft.). The City of Richmond will seek to meet the performance standards of LEED Silver Certification for major renovations to existing facilities and new City buildings smaller than 2,000 m² and; (2) City of Vancouver – all new civic facilities over 500 m² are required to be LEED Gold and 30% more energy efficient than standard construction.

Action-2 Conduct audit and retrofit activities in City facilities

The City has conducted energy audits and retrofits on selected civic facilities, including three community pools, and has started to benefit from the energy savings. This action, which commits the City to formalize these activities as an ongoing building energy management program for existing facilities, is expanded on in Appendix B (Building Energy Management Framework). Key activities within this action include:

- **Establish a priority list of facilities to be audited:** A building energy audit considers the entire building as a working system. The energy auditor will identify what is working well in a building and where there are inefficiencies, and will recommend energy conservation measures (ECMs), with associated estimates around energy and cost savings. Appendix B lists facilities to be audited and provides a cost estimate.
- **Build partnerships and secure funding:** There are funding opportunities through BC Hydro to support energy studies and audits, and provided a threshold level of energy savings is identified through the audit, BC Hydro offers incentives to cover up to 60% of the implementation costs of energy-saving projects. Further opportunities exist with BC Hydro and Terasen to pilot metering programs, and hire energy managers for corporate operations (see below). The City should look to build relationships with these utilities in order to capitalize on resources available for energy management.

The City will:

- Conduct audits on all identified facilities within 5 years (see Appendix B). Specifically, it is recommended that the City:
 - Conduct Level II audits on those buildings consuming more than 2,000 GJ per year (18 facilities) over 3 years.
 - Conduct Level I audits on all facilities consuming between 500 and 2,000 GJ annually (25 buildings) over 3 years.
 - Apply to BC Hydro's Continuous Optimization Program to access funds for recommissioning of the 14 larger buildings.
- Implement all activities identified that have a simple payback of 7 years or less.
- Work to secure partner funding for all major retrofit activities.

Level I – “Walk through” Audit

- Review energy bills, brief on-site survey (“walk-through”), discussions with building operator, general assessment of age and condition of building and equipment
- High-level audit usually sufficient for identifying low-cost or no-cost measures
- Provides scoping level estimate of total costs and savings that may be suitable future capital planning
- Approximate cost: \$0.08/ft² or minimum \$3,000 per building

Level II – Detailed Audit

- Thorough survey of energy use within the building, including equipment conditions
- Detailed analysis of practical measures, including any changes to operation and maintenance procedures
- Estimated costs and savings of specific measures, with economic evaluation of recommendations
- May identify potential capital intensive improvements that require further data collection and analysis
- Approximate cost: \$0.15/ft² or minimum \$10,000 per building

Action-3 Include alternative energy evaluation in replacement, renovation, and maintenance activities

Many high efficiency and renewable energy projects have poor economics when executed as a standalone activity. However, there are many opportunities to include such items, when equipment is replaced at the end of its service life. For example, the economics to change a 10-year old boiler for a heat pump or solar panel system are usually poor – the equipment is functioning and the energy savings that could be achieved often do not offset the capital costs. However, for a 30-year old boiler at the end of its service life, the incremental cost for an alternate system may be manageable.

The City will:

- Continue its practice of purchasing the most energy efficient equipment available with a simple payback of seven years or less within available budgets
- Evaluate opportunities for alternative energy or innovative technologies at the time of major equipment replacements.

Action-4 Develop ongoing energy management activities

For a large organization like Surrey, there are certainly the available skill sets in equipment, electrical systems, and building operations already on staff to evaluate opportunities. While audits and retrofits are frequently conducted by external contractors, the City can contribute to the success of these efforts by encouraging staff to become more engaged in the energy management of the buildings. Activities such as regular reviews of facility system settings (temperatures, automated switches, etc.) can help to reinforce conservation behaviors and ensure that the desired results of retrofits are achieved.

The City will:

- Increase the awareness of energy considerations in facility operations activities.
- Partner with the Sustainability Office to identify opportunities related to energy management and conservation.
- Consider establishing a formal Energy Management Committee to provide input and resources to these issues.
- Partner with BC Hydro, Terasen and others to pursue funding opportunities, including those sources outlined in Table 4.

FLEET

Number of Vehicles and Equipment	2,000
Gasoline Consumption (2009)	752,793 L
Diesel Consumption (2009)	37,508 L
Biodiesel (B5) (2009)	1,863,211 L
Compressed Natural Gas (2009)	26,584 L
Propane (2009)	2,400 L
GHG Emissions (2009)	6,687 tCO₂e

Action-5 Continue implementation of green fleet management activities

The City is currently pursuing certification through the E3 Fleet program for its fleet.¹³ The certification is part of the E3 Green Fleet Rating program, which uses a point-based system to evaluate performance at a Bronze, Silver, Gold or Platinum level. Points are obtained by implementing actions in the following areas: Green Fleet Action Plan; Idling Reduction; Fuel Data Management; Trip and Route Planning; Fuel Efficiency; Training and Awareness; Vehicle Purchasing; Operations and Maintenance; Utilization Management, and; GHG Reductions.

The City will continue to implement progressive fleet management activities – including activities to improve fleet efficiency (e.g., regular maintenance and driver training) and to reduce the size of the fleet (e.g., right-sizing and utilization management) – in order to realize savings in fuel consumption, GHG emissions, and costs.

The efforts of fleet management will be supported by other levels of government as the Federal government has recently committed to improving the fuel economy of light duty vehicles to meet California standards by 2016, and has recently (May 21, 2010) launched a process to improve the fuel economy of diesel vehicles. Combined, these efforts are likely to result in significant reductions in GHG emissions attributed to the fleet.

The City will:

- Obtain E3 fleet certification by the end of 2010.
- Continue efforts to reduce fuel use and emissions from fleet vehicles.

¹³ E3 is a program developed by the Fraser Basin Council as a rating system for vehicle fleets. The program evaluates the systems and activities of fleet operations and awards points. The resulting certification is a Bronze, Silver, Gold or Platinum rating.

Action-6 Establish an alternative vehicle pilot program

The City has included a range of new vehicle technologies into its fleet including hybrid vehicles, natural gas vehicles, and biodiesel, as well as a number of air pollution control aftermarket additions to reduce air pollutants. Recently a proposal was announced that could see biofuels generated from organic waste used to power waste collection trucks.

Implementing new technologies can pose a financial risk for the municipality. New technologies typically have higher costs, and may require effort to debug any performance issues. The City must balance its desire to be a leader in sustainability against its financial responsibilities to the taxpayers. This action meets both those objectives.

This action proposes that the City identify, evaluate, and acquire (as available) alternative fuel and/or new technology (e.g. electric, hydrogen fuel cell, and compressed natural gas) vehicles (collectively called alternative vehicles). These will be pilot tested with the City's operations. An expected period to fully evaluate a vehicle may be on the order of 2 -3 years. The benefits of this type of approach include:

- Fleet vehicles are highly visible in the community and this visibility builds support for further action.
- Creating a better understanding of the requirements for an alternative vehicle fleet (i.e. maintenance and operational needs, training needs for staff, infrastructure needs, and costs associated with all of these requirements).
- Taking a flexible approach by not committing the City to any one type of new technology, but instead exploring what opportunities exist for reducing fossil fuel consumption and GHG emissions from the fleet.

The City will:

- Commit to pilot testing a small number of commercially available alternative vehicles as they are available.
- Consider branding the initiative as the "*Surrey Alternative Vehicle Pilot Program*" in an effort to showcase the City's efforts, and innovative approaches and demonstrate leadership in the community. This could include a range of features – labeling of the vehicle, a GPS tracker connected to a website, etc.
- Document results – both favourable and unfavourable to ensure that lessons learned can be shared with others.

INFRASTRUCTURE

Note: Figures for energy consumption and GHG emissions from "Infrastructure" are covered under 'Buildings'

Action-7 Investigate potential for alternative energy demonstration

In an effort to demonstrate local opportunities for alternative energy, the City will investigate the potential to set up small scale alternative energy demonstration projects in the community. The demonstration projects should ideally be located in a highly visible public space and include interpretive signage that explains the technology, how it works, its benefits, and possible implementation opportunities locally. This action will be coordinated with the City's Clean Energy Strategy and the Mayor's Clean Energy Advisory Network.

The City will:

- Identify and implement alternative energy demonstration projects over the next 2 years.

Action-8 Evaluate and implement street-lighting alternatives

A study is underway to evaluate adaptive street-lighting (e.g., dimmable incandescent lighting) as a possible measure for reducing the energy consumed by municipal infrastructure. In addition to this study, the City is evaluating the feasibility of light emitting diode (LED) lighting with a trial planned for late fall 2010. The City is also interested in investigating the potential to use solar LED lights and may evaluate their feasibility in the future. Once the lighting options have been evaluated, the City can make informed decisions around which options to pursue.

The City will:

- Continue to study the feasibility of alternative street-lighting and, depending on the business case, look to implement solutions on a larger scale within the next 3 years.

Action-9 Implement user control lighting and artificial turf for major sports fields

The City has implemented user control lighting and artificial turf at a number of outdoor sports fields. These activities have resulted in reduced energy consumption, water use and GHG emissions. User control lighting gives citizens that are using sports fields the ability to turn lighting on when the field is in use and off when leaving the field. This provides direct benefits in terms of reduced energy consumption and GHG emissions. In addition, the installation of artificial turf on sports fields has led to reduced maintenance requirements for the City, including less watering, and fewer trucks and equipment needed to maintain fields.

The City will:

- Continue to implement user control lighting and artificial turf at major sports fields as appropriate.

LEADERSHIP & ENGAGEMENT

Action-10 Establish a procurement policy that considers energy and GHG emissions

This strategy builds on goals outlined in the Sustainability Charter and calls on the City to develop a procurement policy that clearly articulates its goals and expectations around energy efficiency and GHG emissions (among other sustainability considerations) to its contractors. The policy will identify criteria that will be used, in addition to financial and quality criteria, in the procurement process (i.e. requests for proposals, tenders, and purchases of office supplies and equipment). The policy may include:

- Guidance or requirements around third-party rating systems or labeling programs to consider when procuring office supplies and equipment (e.g., Energy Star, Environmental Choice, Forest Stewardship Council, etc);
- A minimum percentage of post-consumer recycled content for all paper purchases;
- Guidelines for the procurement of fleet vehicles (e.g., appropriately-sized, low emissions vehicles);
- Expectations and reporting requirements around energy consumption and GHG emissions from contracted services (in order to assist the City in meeting its Climate Action Charter commitment);
- A minimum energy performance (or green building) standard to be achieved by all new (or expanded) civic facilities (see Action-1);
- Energy conservation targets in facility management contracts;
- A requirement for the City to evaluate all major capital expenditures using a life cycle costing approach, so the full impact of projects is considered in decision-making;
- Guidelines for contractors to encourage diversion of construction and demolition waste from development projects;¹⁴
- Broader sustainability considerations, such as contractor and product compliance with applicable social and environmental legislation, implementation of social and environmental programs, etc.

The policy will require a legal opinion to ensure that the City is operating within its rights and jurisdiction. Additionally, the policy should be accompanied by: (1) evaluation criteria that clearly communicate expectations to contractors and vendors, and; (2) outreach to assist contractors and vendors in responding to and meeting City requirements.

The City will:

- Develop a sustainable procurement policy that considers energy and GHG emissions.

¹⁴ Metro Vancouver's *Demolition, Land Clearing & Construction Waste Management Toolkit* could be used as a resource to support this policy (<http://www.metrovancouver.org/buildsmart/BuildSmartDocuments/dlctoolkit08v19.pdf>)

Action-11 Encourage energy conservation behaviours in the workplace

The City will develop a staff outreach program (“in-reach”) aimed at changing behaviours and actions in the workplace to favour energy efficiency and conservation. The purpose of the program is to foster a culture of energy conservation at the City of Surrey. In order to do this, the City may wish to apply a social marketing approach; an approach that tries to understand the barriers that employees face (or perceive they face) in their efforts to reduce energy at work. Once these barriers are understood, the City can apply specific strategies targeted at removing barriers and encouraging behavioural change in employees. For example, where the barrier is lack of knowledge, the strategy might be to provide information and learning opportunities; where the barrier is forgetfulness, the strategy might be to provide sticker prompts or email reminders; where the barrier is apathy, the strategy might focus on providing incentives to encourage employees to care and take action or it might consider automating systems so that minimal effort is required by employees to realize change). The program need not be an onerous task for City staff, instead:

- One point of contact could ensure that activities are coordinated under a central banner with common messaging (e.g., through the Sustainability Manager or Energy Management Committee);
- The inter-departmental Sustainability Team could act as a resource for these efforts, providing ideas and feedback, and linkages to their individual departments and divisions;
- Senior management could provide support by communicating the importance and goals of the behaviour change program to staff;
- Key operations staff could help to implement specific activities such as training and education (e.g., for employees with responsibility for operating facilities, fleet vehicles or equipment);
- All staff could be encourage to participate, whether through contributing ideas for change or by coordinating outreach activities and events, such as lunch and learns, or participation in public initiatives such as Earth Hour, Bike to Work Week, etc.

The City will:

- Develop a strategy to engage staff in energy conservation behaviours in the workplace.

Action-12 Consider expanding energy and emissions monitoring and reporting

The City should consider expanding its energy and emissions monitoring to include a broader scope of emissions, such as those from paper consumption, business travel and employee commuting. While local governments are not currently accountable for emissions in these areas, including them in monitoring frameworks, inventories and reduction strategies demonstrates leadership and accountability. In future, should reporting requirements change to incorporate a larger scope of emissions, local governments that have systems in place to track

emissions in these areas will be in a position to provide accurate data and reporting.¹⁵ Additionally, reduction activities in these areas tend to be highly visible to and top-of-mind for employees. The reduction of paper use in the workplace serves as a tangible example of change, and efforts to support alternative commutes tend to be appreciated by staff.

As part of the City's Climate Action Charter commitment, it is expected that the carbon footprint (corporate inventory) will need to be estimated annually in order to quantify the amount of carbon offsets required. This activity should be expanded to include an annual report on energy management and GHG emissions reduction activities.

The City will:

- Explore its current capacity to track additional corporate GHG emissions (e.g., paper use, employee commuting, etc).
- Make a decision on which additional GHG emissions will be tracked (and possibly reported) in the future.
- Put systems in place (where necessary) to allow for ongoing monitoring and reporting of these GHG emissions. This may include continuing use of the Cool Tool for inventory purposes, or adopting a new tool such as the provincial SMARTTool.¹⁶
- Compile an annual report on the carbon footprint from the previous calendar year, including a brief discussion on energy management and GHG reduction activities.

Action-13 Continue to dedicate CARIP rebate to sustainability related activities.

The Climate Action Revenue Incentive Program (CARIP) provides Climate Action Charter signatories with a rebate on their carbon tax. Based on 2009 consumption, the CARIP rebate is estimated to reach \$416,200 by 2012. The City currently dedicates its CARIP rebate to the Sustainability Office, which focuses the funds on sustainability-related activities, including projects and programs that assist in reducing energy and GHG emissions. Continuing this practice will ensure that dedicated funds exist to support ongoing efforts to reduce energy and GHG emissions, which may in turn realize further cost savings through energy efficiency.

The City will:

- Continue to direct the CARIP rebate to an operating budget (or reserve fund) specifically dedicated to promoting sustainability activities within its corporate operations, and throughout the community.

¹⁵ Emissions reporting under the provincial Greenhouse Gas Reductions Target Act (GHGRTA) requires public sector organizations (excluding local governments) to track and report emissions associated with paper.

¹⁶ The City of Surrey is currently participating in a pilot project with the Province and local governments, to assess the utility of the provincial SMARTTool for purposes of local government corporate emissions inventories.

TARGETS AND IMPLEMENTATION

Target Requirements

The commitment to carbon neutrality does not specifically require a reduction target to be defined for corporate operations. By setting the objective as “carbon neutral” the Climate Action Charter defines that the net effect will be that corporate operations will have zero effective emissions. This will be obtained through a combination of reductions and offsets (where remaining carbon emissions will have their carbon impact “netted to zero”). While the purchase of offsets is seen as an expense, the activities that achieve energy savings will (in the long run) save the City money, and reduce its carbon footprint, as well as the associated carbon liabilities.

A corporate GHG reduction target has many functions, including:

- Defining a clear and measurable goal for the City to pursue;
- Focusing the attention of staff on conservation activities; and
- Providing a consistent message that is easily communicated and clearly understood.

Energy and GHG Emissions Baseline

A proposed baseline energy consumption and GHG emissions level is 445,000 GJ of energy and 14,500 tonnes CO₂e annually (Figure 6).

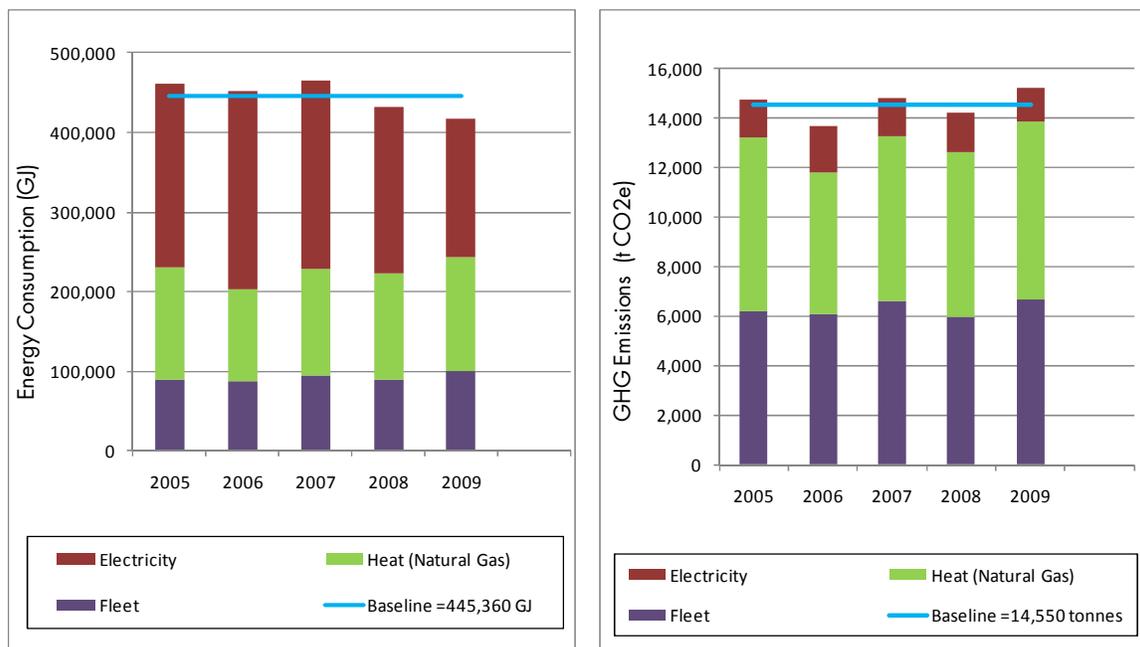


Figure 6: Historical energy consumption (left) and GHG emissions (right), 2005 - 2009

Reduction Opportunities and Target

Senior Government Initiatives

Senior levels of government have made commitments to take action on climate change.

Relevant to civic operations, these include:

- Through the BC Energy Efficient Buildings Strategy, the provincial government has committed to reduce the energy demand in commercial and institutional buildings by 9% per square meter by 2020. This will be achieved through a combination of building code improvements, and appliance and equipment standards.
- The federal government announced in April 2010 that it would move to adopt California's fuel economy standards. These effectively reduce the fuel consumption by 33% to 45% for different classes of light duty vehicles from 2009 to 2016. For a fleet with an average age of 7 – 10 years, these more efficient vehicles will be a substantial component of the fleet by 2020.
- The federal government has just announced plans to develop with the US, new efficiency standards for heavy duty diesel vehicles. While no reductions have been defined, an improvement of 20% is anticipated by 2020.

The combined effect of these measures will be to reduce the growth of emissions that was projected (see Figure 5 on page 6). This is referred to as the business-as-usual (BAU) forecast as it represents the emissions that will occur if the City takes no action.

Action Plan Components

In addition to the changes made to provincial building codes and federal fuel efficiency standards, this Plan outlines a number of actions to reduce energy and emissions. To define a plausible target to be reached by 2020, the following assumptions have been made:

- New facilities are built to green or high energy efficiency standards with a corresponding reduction of energy use and emissions of 30%.
- A program of audits and retrofits results in savings of 15% in overall electricity and building natural gas usage. Some facilities will reduce more and some less.
- Fleet management activities including alternative vehicles result in savings of an additional 20 % in fuel use by 2020.

The majority of these GHG emission reductions will be achieved through aggressive action to manage fuel consumption and emissions from the City's fleet, and manage and continuously improve the energy performance of new and existing civic buildings.

Table 3 presents a simplified analysis, but is indicative of the reductions that could be achieved. This analysis assumes that energy and GHG savings occur together. In practice, some technologies will result in different reductions in energy and GHG emissions.

Table 3: Potential Changes in Energy Consumption and GHG Emissions to 2020

Target Year	Energy Consumption (GJ)	GHG Emissions (tonnes CO ₂ e)
Baseline	445,000	14,500
Forecasted emissions to 2020 (no intervention)	740,000	18,200
Business-as-usual forecast to 2020	680,000	15,600
Anticipated GHG reductions from Action Plan:		3,500
<ul style="list-style-type: none"> Existing buildings New buildings Fleet vehicles 	—	1,250
	—	1,000
	—	1,250
Resulting emissions in 2020	—	12,100
2020 target (reduction from baseline)	—	17%

Figure 7 shows the difference between the business-as-usual scenario and the reductions expected from the City’s Energy and Emissions Action Plan.

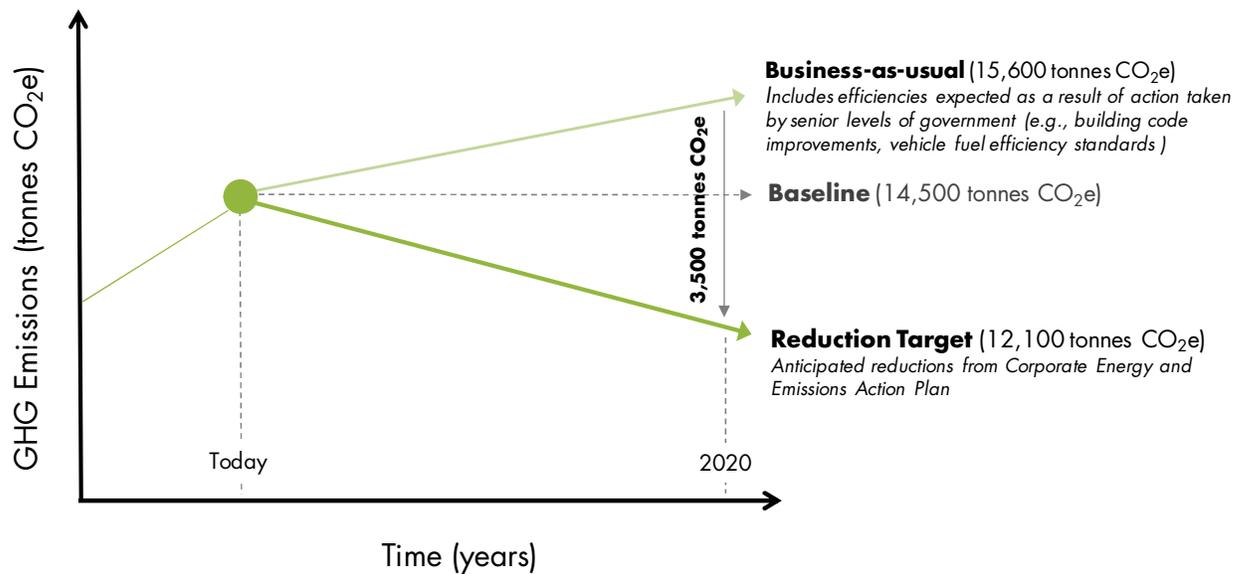


Figure 7: Reduction Scenario Graphic

Reduction Target [Proposed]

The following corporate GHG emissions reduction target is proposed:

“The City will target to reduce GHG emissions from corporate operations by 20% from baseline levels by the year 2020.”

A simplified analysis of the potential GHG reduction impact of the Action Plan shows that a 17% reduction from the baseline is possible. A 20% reduction by 2020 is recommended for the following reasons:

- a) The City has expressed a desire to demonstrate leadership in this area, and;
- b) 20% by 2020 is a clear and effective target for the City to communicate both internally and externally.

Implementation

Roles and Responsibilities

Oversight of CEAP implementation and responsibility for coordination falls to the Sustainability Office within the City Manager’s Office. City departments are responsible for implementing the strategies outlined in the CEAP. This requires that CEAP strategies are incorporated into departmental business plans and budgets, with staff responsibilities and financial resources allocated accordingly. Each and every staff person at the City of Surrey holds some degree of responsibility for implementation of the CEAP and of activities to reduce energy and emissions in general (Figure 8).

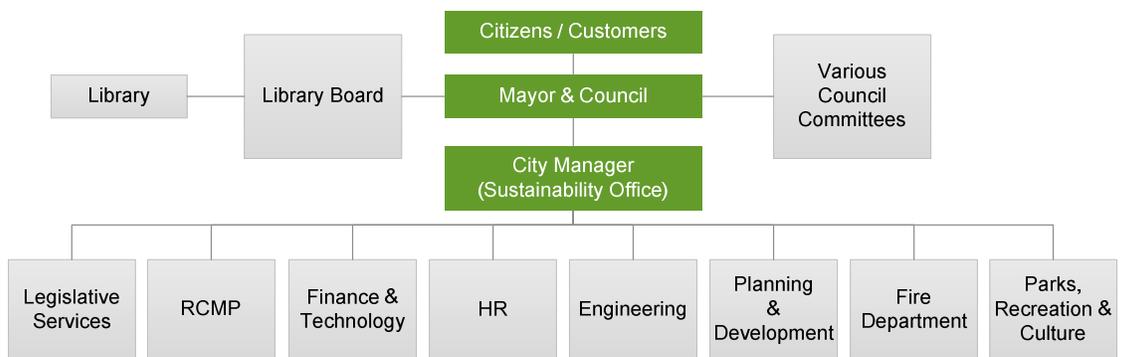


Figure 8: City of Surrey Organizational Chart

Successful implementation of the Plan will further require that energy and GHG management be established as a core responsibility for key staff, such as Facilities staff, Purchasing staff, Fleet Managers and Mechanics, etc. The types of tasks that will need to be carried out include:

- Promoting energy efficiency amongst staff;
- Communicating with contractors, vendors, partners, citizens, etc;
- Contracting services to retrofit and recommission buildings, or for facility management;
- Developing procurement policies that consider energy and GHG emissions;
- Conducting lifecycle costing for major capital expenditures;
- Evaluating appropriate fleet vehicles, and;
- Coordinating staff training for fuel efficient driving, facility management, etc.

Monitoring and Reporting

Responsibility for data collection should be tasked to appropriate staff persons to ensure ease of reporting on CEAP implementation. The corporate energy and emissions inventory should continue to be updated on an annual basis.

In addition to the corporate energy and emissions inventory, staff should provide a brief report on progress with CEAP implementation (qualitative information on how implementation is going, including challenges and opportunities and recommended next steps). CEAP progress reporting should be streamlined with existing reporting efforts (i.e., Sustainability Charter) at the City of Surrey in order to minimize burden on staff. For example, this reporting could be coordinated by the Sustainability Manager and rolled up into the annual reporting for the Sustainability Charter.

In three to five years, City staff should conduct a more comprehensive review of CEAP implementation, changing and adding reduction strategies as necessary. In this way, the CEAP becomes a living document that is useful for both ongoing energy and GHG management as well as longer-term planning. The three-to-five year update might include:

- An updated corporate energy and GHG emissions inventory;
- A detailed review of the actions and their success in reducing energy and emissions;
- Recommendations for improvements or additions to reduction strategies, and;
- Communications around plan progress with staff, Council and stakeholders.

Financing Energy and Emissions Reductions

Funding to support CEAP implementation may come from a variety of sources, some of which are outlined below in Table 4.

Table 4: Sample funding programs to support the Corporate Energy and Emissions Plan¹⁷

Program	Key Features
Climate Action Revenue Incentive Program (CARIP)	This provincial initiative will reimburse communities that have signed on to the Climate Action Charter. Some local governments are using the CARIP rebate to fund corporate energy and emissions reduction measures
BC Hydro Power Smart	BC Hydro provides funding to support a number of energy efficiency and conservation measures, including some that the City is already taking advantage of (e.g. Energy Manager, Energy Management Assessment, Adaptive Street Lighting). Additional Power Smart programs exist to support: <ul style="list-style-type: none"> • Energy studies (audits) • Implementation of energy saving measures identified in audits (given a threshold level of savings can be achieved) • Retrofits (e.g., lighting, arenas, etc) • New construction • Product incentives • Employee awareness / behaviour change workshops
FCM Green Municipal Fund	Grants and loans available to support plans, feasibility studies, field tests and capital projects that reduce energy and GHG emissions. Applications for capital projects undergo a competitive process with RFPs launched annually in various sectors (i.e. brownfields, energy, transportation, waste and water)
Community Works Fund	This funding represents a portion of the transfer of Federal Gas Tax revenue under the New Deal for Cities and Communities. Local governments in British Columbia will receive this benefit through 2010, and projects that are eligible include capacity building projects and environmentally sustainable municipal infrastructure projects.

Table 5, on the following page, outlines departmental responsibilities, potential partners, timelines, and estimated costs for implementing the actions in the CEAP.

¹⁷ In addition to funding to support corporate action, several entities (including BC Hydro and the FCM Green Municipal Fund) support actions to reduce energy and emissions at the community level. For example, BC Hydro and FCM both provide 50% funding for Community Energy Plans (also known as Community Energy and Emissions Plans, PCP Local Action Plans, Climate Action Plans, and Energy and GHG Management Plans)

Table 5: Corporate Energy and Emissions Action Plan Implementation Framework

#	Reduction Opportunity Areas and Actions	Suggested Lead	Potential Partners	Estimated Timeframe*	Estimated Costs
BUILDINGS					
1	Ensure high energy performance of new facilities	Planning and Development (Facilities)	BC Hydro	Medium term	Staff time + incremental costs of high performance buildings
2	Conduct audit and retrofit activities in City facilities	Planning and Development (Facilities)	BC Hydro	Medium term	Staff time + audit costs (~ \$100,000 - \$200,000)
3	Include alternative energy evaluation in replacement, renovation, and maintenance activities	Planning and Development (Facilities)	Finance Dept.	Short term	Staff time
4	Develop ongoing energy management activities	Planning and Development (Facilities); Sustainability Office	All depts; BC Hydro; Terasen	Short term	Staff time
FLEETS					
5	Continue implementation of green fleet management activities	Engineering	All depts	Short to Medium term	Staff time + capital costs (unknown)
6	Establish an alternative vehicle pilot program	Engineering	Sustainability Office	Short to Medium term	Staff time + capital costs (unknown)
INFRASTRUCTURE					
7	Investigate potential for alternative energy demonstration	Parks, Recreation and Culture; Engineering; Planning and Development	Sustainability Office; SolarBC; BC Hydro	Medium term	Staff time + capital costs (unknown)
8	Evaluate and implement street-lighting alternatives	Engineering	BC Hydro	Short term	Staff time + capital costs (unknown)
9	Implement user control lighting and artificial turf for major sports fields	Parks, Recreation and Culture		Short to Medium term	Staff time + capital costs (unknown)
LEADERSHIP & ENGAGEMENT					
10	Establish a procurement policy that considers energy and GHG emissions	Sustainability Office; Finance	All depts; vendors and suppliers	Short term	Staff time
11	Encourage energy conservation behaviours in the workplace	Sustainability Office	All depts	Short term	Staff time + costs for communications materials
12	Consider expanding energy and emissions monitoring and reporting	Sustainability Office; Finance	All depts	Short term	Staff time
13	Continue to dedicate CARIP grants to sustainability related activities	Finance; Sustainability Office		Short term	N/A

* Short = <3 yrs; Medium = 3 – 5 yrs; Long = > 5 yrs

CONTACTS

This document was prepared by Ron Macdonald and Amy Seabrooke of Stantec Consulting, for the City of Surrey Sustainability Office. The contents were developed through consultation and discussions with City staff.

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APPENDIX A: CORPORATE INVENTORY REVIEW

The City of Surrey's 2008 corporate GHG emissions inventory, compiled using The Pembina Institute's Cool Tool, was reviewed by comparing the Cool Tool data with reference calculations based on available 2008 data from BC Hydro. This high level review follows the guidelines set by the Province of BC for the Climate Action Charter, and does not provide a detailed accounting of energy consumption and GHG emissions that would be typical of a full inventory.

Corporate Inventory Components

GHG inventory protocols – methodologies for accounting for GHG emissions – define emissions according to “tier” or “scope.” These are explained below:

- Scope 1: Direct Emissions - Actual 'tail-pipe' or stack emissions that occur from the consumption of fossil fuels - this includes fuel oil, natural gas, and motor fuels primarily.
- Scope 2: Indirect Emissions - Which occur distant from the point of energy consumption. Primarily, this is electricity because at some point in the electrical grid, some fossil fuel is consumed to generate a portion of the electricity.
- Scope 3: Optional Reporting - These are additional activities that an organization might choose to report on as part of its sustainability initiatives. Formally, these emissions are not on the local governments 'books' but may be included in the inventory and reporting.

Additionally, the Climate Action Charter's guidelines for Carbon Neutral Local Governments further classification by defining “traditional municipal service” areas. This high-level review is conducted using tiers of emissions only.

Inventory Review Results

The corporate energy and emissions inventory compiled for 2008 appears reasonably complete based on comparisons with reference data generated using standard inventory protocols (see Table 6). Key observations include:

- BC Hydro was able to provide only a partial (90% - 95% complete) Account History Report (AHR) for the City of Surrey at the time of analysis. The number of BC Hydro accounts registered to the City of Surrey exceeds the 500 account threshold at which all data requests must go to a specialized team that handles large extractions. The unavailable accounts are either inactive or have small consumptions, as indicated by

the relatively close correlation in consumption between the two analyses despite the large difference in the number of accounts. The number of accounts may also be due to accounting of consolidated accounts in the Cool Tool, while the BC Hydro AHR segregates individual sub-accounts. Note: it was difficult to compare data by account as the Cool Tool loses the utility accounts numbers (though it keeps the facility name and location).

- The Cool Tool uses an emissions factor of 22 tonnes CO₂e/GWh. This is a BC Hydro value for 2007 electricity production of BC Hydro within BC. At present there is no defined value which can be stated to accurately reflect the carbon content of the electricity in BC. The Smart Tool which compiles inventories for public sector organizations currently uses a BC Hydro three-year rolling average for electricity production of 26 tonnes CO₂e/GWh for 2008.

Table 6: Cool Tool Review Summary¹⁸

Item	Cool Tool			Reference Data			
	# Accounts	Consumption	GHGs (tonnes CO ₂ e)	Data Source	# Accounts	Consumption	GHGs (tonnes CO ₂ e)
Tier 1: Direct Emissions							
Buildings (Natural Gas)	85	133,686 GJ	6,644	Financial Services billing records	90	134,488 GJ	6,859
Vehicle & Equipment Fleet	# vehicles unstated	Gasoline: 515,613 L / 17,887 GJ Biodiesel (B5): 1,523,748 L / 58,756 GJ CNG: 21,359 L / 0.81 GJ	Gasoline: 1,236 Biodiesel (B5): 3,877 CNG: 43	E3 Fleet submission	334 vehicles 1033 equipment	Gasoline: 517,584 L / 18,633 GJ Diesel: 756,870 L / 28,761 GJ CNG: 21,360 L / 0.81 GJ	Gasoline: 1,247 Diesel: 2,089 CNG: 43
Tier 2: Indirect Emissions							
Buildings (Electricity)	254	58,093,111 kWh	1,278	BC Hydro Account History Report (incomplete)	500+	56,882,292 kWh	1,510

¹⁸ The Cool Tool was reviewed using 2008 data because the 2009 corporate inventory was in draft form at the time of review. Regardless, the purpose of the Cool Tool review was not to confirm the accuracy of the data for any given year, but rather to ensure that the corporate inventory aligns with provincial requirements and other accepted protocols and produces a reasonably accurate profile of the City's corporate GHG emissions.

APPENDIX B: BUILDING ENERGY MANAGEMENT FRAMEWORK

The City of Surrey has actively undertaken lighting and HVAC retrofits in its building stock, with most of the significant activity concentrated on the largest energy consumers. While the City has been proactive in retrofitting selected buildings, this effort may be enhanced by integrating the projects within a comprehensive building energy management framework. Such a program would implement measures to monitor and analyze building performance, and provide a framework with which to identify and evaluate opportunities to most effectively reduce energy consumption.

Energy Retrofits to Date

A summary table of Surrey's building energy management activities to date is provided in Table 7. The top 20 energy consumers comprise 68% of the total building floor area yet consume 87% of the City's building energy consumption. Of the top ten largest consumers, eight buildings have had some level of HVAC and lighting upgrades – usually connected to a maintenance or replacement activity - while only three have had formal building energy audits conducted. Of the City's four indoor pools, all have had dehumidification and heat recovery systems installed and most have had boiler upgrades. Most of Surrey's five ice arenas have also had significant energy efficiency measures implemented, including HVAC upgrades, lighting retrofits, and the installation of low-e ceilings and pony motors.

Building Energy Performance Monitoring

To guide future energy management activities, energy consumption data for each major building should be tracked and evaluated periodically. For smaller facilities this could be annually and integrated with existing efforts such as the compilation of the annual energy and GHG emissions inventory or the preparation of the City's CARIP rebate application. Table 7 is a start on this effort as it compiles the total energy use and energy use per square foot for these facilities. For some larger facilities data analysis can be done more frequently – possibly with the aid of specialized software tools.

Building Energy Audits

More detailed information about each individual building's energy performance can be obtained from building energy audits. ASHRAE ¹⁹ defines three levels of audits - each

¹⁹ ASHRAE – the American Society of Heating Refrigeration and Air Conditioning Engineers.

studying the building's systems in increasing amounts of detail. While Level I audits may provide sufficient information to implement some energy conservation measures in buildings, BC Hydro is currently offering to provide up to 50% funding for Level II audits. Typical energy conservation measures recommended from building energy audits may reduce energy consumption by 10% to 15%.

The levels of effort and associated costs are shown below. Note that the costs are based on conducting single building audits. Assembling a package of buildings for auditing could in some cases (e.g. similar buildings) result in some discount.

Level I – “Walk through” Audit

- Review energy bills, brief on-site survey (“walk-through”), discussions with building operator, general assessment of age and condition of building and equipment
- High-level audit usually sufficient for identifying low-cost or no-cost measures
- Provides scoping, or budget level estimate of total costs and savings that may be suitable for future capital planning
- Approximate cost: \$0.08/ft² or minimum \$3,000 per building

Level II – Detailed Audit

- Thorough building survey of energy use within the building, with listing of equipment and conditions
- Detailed analysis of practical measures, including any changes to operation and maintenance procedures
- Estimated costs and savings of specific measures, with economic evaluation of recommendations
- May also identify potential capital intensive improvements that require further data collection and analysis
- Approximate cost: \$0.15/ft² or minimum \$10,000 per building

Level III – Investment Grade Audit

- Detailed engineering review for capital intensive projects
- Includes detailed costing and savings estimates
- May be required for major projects – particularly for large or complex facilities
- Approximate cost: \$0.20/ft² or minimum \$15,000 per building

Building Recommissioning

Building energy audits focus on defining more efficient physical, electrical, and mechanical equipment servicing the building. Recommissioning focuses on the operating set points to ensure that the building is operating at its most efficient. This is a continuous (or periodic) optimization process. To ensure the building's systems are being operated at maximum efficiency.

Energy focused recommissioning studies tend to be more effort intensive than audits, often involving monitoring of building performance over extended periods of time. Typical costs for continuous optimization studies are \$0.14/ft². Measures recommended by building recommissioning may result in building energy reductions typically in the range of 10% to 15%.

BC Hydro currently has a pilot program for continuous optimization of buildings. Through this program, BC Hydro funds the initial assessment, monitoring equipment and software, and training for the continuous optimization process as long as the facility manager commits to completing any recommendations with a two year payback or less. The participant is not obliged to commit to any recommendations with payback periods exceeding two years.

Assessing Opportunities

Given that much of Surrey's building energy consumption is concentrated in a relatively small number of energy intensive facilities, it is recommended that the City's building energy audits and recommissioning efforts be focused accordingly. Level I audits may be pursued to get scoping level assessments that will provide a high-level of analysis suitable for implementing "low hanging fruit" measures and for budgeting purposes.

Current BC Hydro programs may facilitate conducting Level II audits. The City of Surrey may wish to consider:

- Level II audits of the top ten energy consuming facilities responsible for 72% of total building energy use would cost approximately \$100,000 (without BC Hydro support), or approximately \$1.2 / GJ of energy consumption audited.
- Increasing the scope of an energy audit program to include the top twenty facilities responsible for 87% of total building energy consumption would cost approximately \$200,000, or approximately \$1.7 / GJ energy consumption audited.
- Level II audits for all facilities could cost \$830,000 (without BC Hydro support) for 1.6 million square feet of developed floor space. This cost is equivalent to approximately \$5.7 / GJ of energy consumption audited.

Recommissioning efforts should likewise be focused on energy demanding facilities that offer the most potential for energy savings. Facilities with intensive HVAC demands such as indoor pools, ice arenas and recreation centres, and buildings larger than 30,000 square feet would be candidates that may provide opportunities with the highest potential impacts on net energy consumption. Approximate costs to recommission facilities that fit the above criteria (14 buildings) would be on the order of \$170,000.

Costs and Paybacks

Energy conservation measures may range significantly in cost and in energy reduction impacts. The payback is the number of years to return the cost of a project through energy savings. Many activities are low or no-cost and have paybacks of 1-2 years. While short payback items may produce returns immediately, capturing a broad package of measures in one project can create efficiencies and greater long term savings.

Local governments have a unique position in that they are stable, and “not going anywhere”. Thus they can entertain projects with longer payback periods – commonly in the range of 10 years. Some longer term payback activities could also be considered for long life facilities.

Implementation

Audits and retrofits can be pursued by staff, or with the assistance of an outside energy services company (an “ESCO”). If City staff have the time, skills, and interest, they can contract and oversee the audits and retrofits themselves. As well, the City would have to find the capital costs for performing the retrofits from either reserve funds or borrowing.

Conversely, in an ESCO model, the City still provides the financing for the project (with some mark-up for the ESCO). The ESCO provides an initial energy study at low/no cost, brings expertise to the project, provides turn-key retrofits, assembles the engineering and contractors, and provides a guarantee of savings for a specified number of years. This process can be suitable to execute a large number of retrofits in a short period of time.

Recommendations (as outlined in Action 2 of the plan)

It is recommended that the City:

- A. Conduct Level II audits on those buildings consuming more than 2,000 GJ per year (18 facilities) over 3 years.
- B. Conduct Level I audits on all facilities consuming between 500 and 2000 GJ annually (25 buildings) over 3 years.
- C. Apply to BC Hydro’s Continuous Optimization Program to access funds for recommissioning of the 14 larger buildings.

Table 7. Building Energy Management Summary

Facility	Address	Date of Construction	Size (ft ²)	Energy Consumption Total (GJ)	BEPI Total (GJ/ft ²)	Energy Cost Total (\$)	Audit	Completed & Planned Retrofits (most done in the last two years)
Sports & Leisure/Fleetwood	16555 Fraser Highway	1995	175,200	45,334	0.26	503,369	X	Trane Centrifugal heat recovery chiller and associated heating / cooling coil scheduled for 2010. UV also scheduled for 2010.
North Surrey Recreation Centre	10275 - 135th Street	1965/85/2004	108,287	23,665	0.22	166,735		Pony motors / Dehumidification / heat recovery system / High efficiency boiler (complete)
Newton Leisure Wave Pool	13730 - 72 Avenue	1990	53,464	18,761	0.35	238,000	X	Dechamps 50 type dehumidifier. High efficiency boiler and UV system scheduled for 2010.
City Hall (aggregate)	14245 - 56 Avenue	1964/2007	132,498	12,607	0.10	153,790		Lighting retrofit / chiller / demand control ventilation / control upgrade.
Guildford Library and Recreation Centre	15105 - 105 Avenue	1980/2000	106,556	12,341	0.12	68,992		Lighting retrofit in design stage.
RCMP Surrey Detachment	14355 - 57 Avenue	1980	86,488	12,209	0.14	158,090		New boiler / heat exchanger / chiller / demand control ventilation (complete)
South Surrey/ White Rock Indoor Pool	14655 - 17th Avenue	1975/2004	26,315	10,672	0.41	134,618	X	Desert Aire SA 50 type dehumidifier / Boiler replacement / Electrical upgrade/UV (complete)
South Surrey Ice Arena	2199 - 148th Street	1975	52,171	9,259	0.18	115,033		Lighting retrofit / Pony motors
Fleetwood Civic Centre / Library	15988/15996 - 84 Ave	1995	93,315	8,105	0.09	72,941		New chiller, heat exchanger, upgrade (?) controls to digital.

Facility	Address	Date of Construction	Size (ft ²)	Energy Consumption Total (GJ)	BEPI Total (GJ/ft ²)	Energy Cost Total (\$)	Audit	Completed & Planned Retrofits (most done in the last two years)
Surrey Arts Centre	13750 - 88 Avenue	2000 (reno)	70,852	6,582	0.09	102,769		DDC system upgrade, lighting retrofit.
City Works Yard (aggregate)	6645 - 148 Street	1960	49,843	6,437	0.13	93,650		Scheduled to replace boiler in 2011.
Newton Ice Arena	7120 - 136B Street	1980	40,649	4,648	0.11	65,507		Low E ceiling / Pony motor / DDC
Newton Seniors' Centre	13775 - 70 Avenue	1990	12,332	4,196	0.34	11,630		New DDC system, lighting retrofit in 2010.
Fire Hall #10 ²	13530 - 72 Avenue	2007		3,995	-	112		Demand control ventilation by centralized DDC system.
Fire Hall #1	8767 - 132 Street	1977	23,873	3,648	0.15	49,336		Lighting upgrade (complete); demand control centralized DDC system.
Semiahmoo Library/SS Community Police	1815 - 152 Street	2002	40,603	2,778	0.07	41,375		
Newton Library	13795 - 70 Avenue	1990	15,225	2,346	0.15	35,157		Lighting retrofit. HVAC upgrade scheduled for 2011.
Fire Hall #9	14901 - 64 Avenue	1970	2,295	2,181	0.11	31,300		
Fraser Heights Rec Centre	10588 - 160 Street	2003	15,330	1,803	0.12	29,516		
Fire Hall #5	10042 - 176 Street	1991	8,735	1,750	0.20	21,136		
Cloverdale Ice Arena	6090 - 176th Street	1975	29,040	1,489	0.05	39,987		Low E ceiling / Pony motor / DDC

Facility	Address	Date of Construction	Size (ft ²)	Energy Consumption Total (GJ)	BEPI Total (GJ/ft ²)	Energy Cost Total (\$)	Audit	Completed & Planned Retrofits (most done in the last two years)
RCMP #1 City Centre Com. Policing	10720 King George Highway	1975	27,994	1,487	0.05	26,173		DDC upgrade in 2011.
Fire Hall #13	15155 - 18 Avenue	1982	7,829	1,391	0.18	6,626		
Fire Hall #17	15329 - 32 Avenue	1992	7,638	1,322	0.17	17,535		
Strawberry Hill Library	7399 - 122 Street	1999	10,906	1,296	0.12	22,573		Lighting upgrade
Fire Hall #11	12863 - 60 Avenue	1990	5,478	1,282	0.23	16,484		
Cloverdale Library	5642 - 176A Street	1990	12,069	1,282	0.11	21,473		High efficiency boiler
Parks Works Yard Building	14645 - 66 Avenue	1974	5,888	1,279	0.22	21,499		
Fire Hall #2	13079 - 104 Avenue	1999	12,583	1,212	0.10	19,097		
Fire Hall #18	8091 - 164 Street	1994	8,177	1,173	0.14	18,070		
Stewart Farmhouse (aggregate)	13723 Crescent Road	1894	13,732	1,162	0.08	19,621		
South Surrey Recreation Centre	14601 - 20 Avenue	2004	36,592	1,149	0.03	15,025		Lighting upgrade
Museum and Archives (old location)	6022 - 176 Street	1950	16,425	1,077	0.07	18,036		
Fire Hall #4	14586 - 108 Avenue	1962	7,205	984	0.14	15,332		

Facility	Address	Date of Construction	Size (ft ²)	Energy Consumption Total (GJ)	BEPI Total (GJ/ft ²)	Energy Cost Total (\$)	Audit	Completed & Planned Retrofits (most done in the last two years)
RCMP Guildford Substation	10395 - 148 Street	2003	12,170	982	0.08	18,137		
Fire Hall #8	17572-57 Avenue	1947	8,691	848	0.10	13,460		
Sunrise Pavilion	10341 - 135 Street	1970	5,600	831	0.15	12,124		
Fire Hall #15	18915 - 64 Avenue	1991	5,478	820	0.15	12,402		
Fire Hall #6	9043-152 Street	1962	5,056	752	0.15	11,826		
Ocean Park Library	12854 - 17 Avenue	1999	7,035	592	0.08	3,019		Lighting upgrade planned for 2011.
Fire Hall #12	2610 - 128 Street	1952	4,695	542	0.12	9,081		
Fire Hall #14	2016 - 176th Street	1982	2,033	510	0.25	7,735		
Pondside Cafe	14320 - 57 Avenue	1972	4,864	505	0.10	11,136		
Cloverdale Seniors' Centre	17671 - 56 Avenue	1950	9,234	486	0.05	10,967		
Crescent Beach Park (Beecher St. Comfort Station)	12160 Beecher Street	1980	4,423	454	0.10	10,520		
Cloverdale Curling Rink	6150 - 176 Street	1975	26,429	416	0.02	5,233		Lighting upgrade / Insulation
Fire Hall #7	18922-88 Avenue	1942	3,594	402	0.11	6,107		
Cloverdale Ball Park/Fieldhouse	17383 - 61A Avenue	1989	2,880	325	0.11	5,428		

Facility	Address	Date of Construction	Size (ft ²)	Energy Consumption Total (GJ)	BEPI Total (GJ/ft ²)	Energy Cost Total (\$)	Audit	Completed & Planned Retrofits (most done in the last two years)
Sunnyside (Bakerview) Community Centre	1845 - 154 Street	1980	4,014	323	0.08	5,119		Lighting upgrade
Fire Hall #3	11659 - 96 Avenue	1962	3,240	302	0.09	4,555		
Elgin Community Hall	14250 Crescent Road	1923	3,465	284	0.08	4,424		
Clayton Community Hall	18513 - 70 Avenue	1955	2,992	260	0.09	5,090		
Bear Creek Park Pavilion	13820 88th Avenue	1960	3,525	219	0.06	2,897		
Newton Youth Centre	13355 - 68th Avenue	1970	2,980	198	0.07	3,603		Scheduled for demolition in 2010.
Cloverdale Mini Rec Centre	17636 - 58 Avenue	1950	826	189	0.23	935		
Cloverdale Com. Recreation Centre / Youth Centre (aggregate)	6228 - 184 Street	1970	8,459	151	0.02	2,698		
Elgin Centre	3530 - 144 Street	1920	1,768	145	0.08	2,482		
Port Kells Library	18885 - 88 Avenue	1960	1,232	77	0.06	17,813		
Meridian Centre	2040 - 150 Street	1990	908	75	0.08	1,688		
RCMP COP #2 Fleetwood	15355 Fraser Highway	2000	9,451	0	0.00	26		Lease building (?)
Whalley Library	10341 - 135 Street	1970	16,968	N.A.	-	-		Scheduled for demolition in 2011.

Facility	Address	Date of Construction	Size (ft ²)	Energy Consumption Total (GJ)	BEPI Total (GJ/ft ²)	Energy Cost Total (\$)	Audit	Completed & Planned Retrofits (most done in the last two years)
Bridgeview Community Centre	11475 - 126A Street	1978	10,956	N.A.	-	-		
Green Timbers - Cape Cod East	14698 - 96 Avenue	1,938	1,318	N.A.	-	-		
Green Timbers - Cape Cod West	14698 - 96 Avenue	1,938	1,338	N.A.	-	-		
Green Timbers - Garage	14698 - 96 Avenue	1,938	658	N.A.	-	-		
Green Timbers Office	14698 - 96 Avenue	1,970	746	N.A.	-	-		
Green Timbers - Cooler/Classroom	14698 - 96 Avenue	1,970	4,760	N.A.	-	-		
Kensington Prairie Elementary	168 - 32nd Ave.	1950	4,902	N.A.	-	-		HVAC upgrade, lighting upgrade, insulation upgrade.
Kensington Prairie Elementary	168 - 32nd Ave.	1950	2,704	N.A.	-	-		Lighting upgrade, insulation upgrade.
Kensington Prairie Elementary	168 - 32nd Ave.	1912	6,034	N.A.	-	-		HVAC updated, lighting upgrade, boiler upgrade.
Port Kells Hall	18918 - 88 Avenue	1980	8,223	N.A.	-	-		
Cloverdale Fair Grounds/ Show Barn	6050 - 176 Street	1980	20,352	N.A.	-	-		
Cloverdale Fair Grounds/Product Bldg	6050 - 176 Street	1980	12,880	N.A.	-	-		

Facility	Address	Date of Construction	Size (ft ²)	Energy Consumption Total (GJ)	BEPI Total (GJ/ft ²)	Energy Cost Total (\$)	Audit	Completed & Planned Retrofits (most done in the last two years)
Cloverdale Fair Grounds/Shannon Hall	6050 - 176 Street	1980	11,565	N.A.	-	-		
Cloverdale Fair/Stetson Bowl	6050 - 176 Street	1980		N.A.	-	-		
Cloverdale Fairgrounds/Washroom/First	6050 - 176 Street	1990	1,444	N.A.	-	-		
Cloverdale Fairgrounds/Agrip lex	6050 - 176 Street	1980	43,630	N.A.	-	-		
Cloverdale Fairgrounds-Shop/Work Yard	6050 - 176th Street	1970	4,800	N.A.	-	-		
Stetson Bowl Washroom & Concession	6050 - 176th Street	2000	2,258	N.A.	-	-		
Newton Athletic Pavilion	7395 - 128th Street	1989/2002	7,344	N.A.	-	-		
City Yard Eng. North/Hemlock Yard	9355 - 160 Street	1996	2,089	N.A.	-	-		
City Yard Parks North/Hemlock Yard	9355 - 160 Street	1996	2,600	N.A.	-	-		
City Yard North Operations Building	9355 - 160 Street	1996	5,300	N.A.	-	-		