

2018 Corporate Energy and GHG Emissions Plan



This Energy Management Plan supports the goals, objectives and policies of the City of Kelowna Official Community Plan.

The City of Kelowna intends to be a sustainable city with the best balance between environmental protection, economic growth, social development and cultural vibrancy

Overview

Climate change is having and will continue to have a significant impact on ecosystems, economies and communities. The Okanagan is already being impacted, with 2015 seeing extreme weather conditions, including record snowfalls, a level four drought in late summer and new record high temperatures set throughout the year. Most recently, in 2017, the Okanagan experienced a historical flood event, followed by prolonged heat and dry weather, breaking temperature and low precipitation records.



The City of Kelowna requires the use of energy in order to operate and maintain a wide range of assets and infrastructure in order to provide services to a community with a population that is growing very quickly. This includes heating and cooling administrative and recreation facilities, fueling a large fleet operation, providing clean water and waste management, maintaining parks, and illuminating our roads and pathways for safety.

As indicated in the Official Community Plan (OCP), three of the City of Kelowna's goals for a sustainable future include:

- Improving Energy Efficiency and Performance of Buildings,
- Reducing Greenhouse Emissions, and
- Strong Financial Management

And doing this in a way so as to create a long-term, sustainable community.

From 2007-2016, the City of Kelowna has reduced corporate emissions by 7%.

2016 Corporate Info At A Glance

Total Energy Costs Total Energy Use Total Emissions Population

\$8.65 million 316,000 GJ 7,748 tonnes CO2e 127,380 The City of Kelowna is committed to being a leader, supporting local business, residents, and other local governments within the Okanagan in energy efficiency and strategic decision making, to preserve both the environment and the economy.

This plan provides the corporate framework to support and encourage City of Kelowna staff to affect the necessary change to become a sustainable city, and encourage energy reduction across the community. The nine principles of Corporate Sustainability provide the foundation for what this Corporate Energy Plan is based on.

Nine Principles of Corporate Sustainability (Council Policy 352)

- 1. Promote health, safety and respect in the workplace
- 2. Seek opportunities to collaborate with external groups in transparent relationships
- 3. Strengthen a shared corporate culture that demonstrates sustainability in policy and action
- 4. Protect biodiversity
- 5. Conserve resources and reduce pollution
- 6. Help restore the environment from harm already done
- 7. Maintain and enhance existing assets
- 8. Maximize use of physical infrastructure
- 9. Take a long-term, life-cycle and triple bottom line view for financial planning

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Introduction

This document outlines the City of Kelowna's Corporate energy and greenhouse gas emissions, which refers to all buildings and engineering assets owned by the City, for which the City has operational control. All community emissions are included under the Community Climate Action Plan (currently being updated), and is separate from corporate energy and emissions.

This energy plan is intended to be a living document that will evolve with changes to technology and the environment, which may result in changes to the City of Kelowna's energy use. The implementation of this energy plan begins with those who's roles within the organization have the ability to affect change to corporate energy use, but is ultimately the responsibility of all employees with the City of Kelowna.

	Total Energy (GJ)	Total Energy Costs (\$)	Population	GHG Emissions (tonnes CO₂e)	Energy Cost per Capita (\$/person)	GHG emissions per capita
2011	317,435	\$7,721,984	117,312	8,147	\$66	0.069
2012	316,665	\$7,794,069	119,312	8,083	\$65	0.068
2013	303,210	\$8,242,325	120,663	7,793	\$68	0.065
2014	318,660	\$8,679,103	122,000	7,918	\$71	0.065
2015	312,073	\$8,285,107	123,500	7,600	\$67	0.062
2016	316.234	\$8.654.099	127.380	7.748	\$68	0.061

This plan looks at historical trends beginning in 2007, with detailed energy use from 2011 to 2016.

DID YOU KNOW:

The average household in the FortisBC electric territory uses 914 kWh of electricity per month.

Background (2001 – 2015)

The City of Kelowna has been making efforts to reduce both corporate and community greenhouse gas emissions for many years

- In 2001, the City of Kelowna joined the Federation of Canadian Municipalities (FCM) Partners for Climate Protection (PCP).
- In 2008, the City of Kelowna signed on to the BC Climate Action Charter, a voluntary commitment to work towards carbon neutral corporate operations by 2012. By signing the Charter, the City committed to taking action and developing strategies to achieve the following 3 goals:
 - 1. Being carbon neutral in corporate operations by 2012 (the Province allows for "making progress towards becoming carbon neutral")
 - 2. Measure and report on community GHG emissions profile; and
 - 3. Create complete, compact, energy efficient rural and urban communities.
- In 2011, City Council adopted the 2011 Corporate Energy and GHG Emissions Plan, creating the framework for the energy and GHG reduction initiatives over the past six years. A 2007 energy and emission baseline was created, but by 2009, emissions had increased to 8,808 tonnes, due mainly to the addition of the H2O aquatic center.
- In late 2014, an Energy Committee was created, comprised of department managers and City staff, who collectively, oversee all energy use within the organization, and have the ability to affect change to this energy use
- In mid 2015, Council gave direction to hire an Energy Program Manager to oversee the Energy Committee and assist the efforts of City staff to further reduce corporate energy.



2016

Fast forward to 2016, and the City of Kelowna has become one of the fastest growing municipalities in British Columbia, with a population of 127, 380¹. Compare this to 2007, and the City has experienced growth of 16.8 percent over 10 years. The City of Kelowna has not only mitigated an increase in its corporate energy use resulting from this growth, but has reduced annual corporate emissions to 7,748 tonnes CO₂e, 7 percent below 2007 levels. Had the City not achieved any corporate GHG reductions since 2007, annual emissions would be approximately 9,000 tonnes CO₂e, 17% higher than they are today.



Corporate GHG Emissions (2007-2016)

Energy Conservation Measures Implemented since 2011

- City Fleet Addition of 20% Bio-fuel, 19 hybrid and 1 electric vehicles
- 2. City Fleet AVL Route Optimization and Anti-idling programs
- Wastewater Treatment Facility (2012) Process optimization reducing 660,000 kWh/yr
- 4. Glenmore Landfill Admin Building State of the art, low energy consuming facility
- Rutland Arena (2016) Heat Recovery, Boiler Upgrade and Controls Optimization resulting in 2500 GJ/yr savings
- 6. Capital News Center (2016) Partnered with operations staff at the Capital News Center to upgrade to LED lighting – 660,000 kWh/yr savings
- 7. Kelowna Police Services Building (2017) Energy Efficient Design (30% below ASHRAE 2010 energy model)
- 8. LED streetlight retrofit project (2018) is currently underway, which will reduce street light electricity by more than 4,400,000 kWh/yr (62% reduction).

2016

¹ Census data: 2007 – 109,090, 2016 - 127,380

The total energy use for the City of Kelowna has remained relatively the same since 2007. Since 2011 however, energy use resulting from natural gas (NG) and fleet fuel has decreased, and energy use from electricity has increased, mainly the result of a focus on reducing carbon based fuels. This is why GHG emissions have been reduced by 7% even though energy use has remained the same year over year.



While corporate energy use has remained the same since 2007, the City's utility costs have increased by 40%, resulting mainly from electricity rate increases. The City's utility costs include electricity, natural gas, and fleet fuels such as gasoline, diesel and propane. If the City had not implemented energy conservation measures over the last 10 years, 2016 costs are estimated to have increased to \$9.6M, approximately \$1.0M higher than 2016 actual costs, and a 53% increase since 2007.



Total Utility Costs (2007 – 2016)



Understanding COK Energy Use and Costs (2016)

Looking Forward (2018 and beyond)

Like all municipalities, one of the main factors that contributes to corporate energy use is population growth. As the community grows, the demand for infrastructure and services is increased, which is achieved through expanded or new facilities and infrastructure.

The population estimate for the City of Kelowna for 2022 is 145,972², a 34% increase from 2007. If the City chose to take no further steps in reducing its corporate emissions, a conservative estimate is that emissions would begin to grow at a rate of at least 1% per year³.

By 2022, all of the work that has been done since 2007 to reduce corporate emissions would be undone (dotted line in the chart below), with emissions returning to 8,300 tonnes CO₂e per year. Since 2011, when the 2011 corporate plan was first implemented, emissions have been reduced by approximately 1% per year, to 7,748 tonnes CO₂e, a 7% reduction from 2007. If the City keeps up this trend, total corporate emissions will be reduced to 7,300 tonnes CO₂e per year, **12% below 2007 levels by 2022** (solid line in the chart below).



² Population estimates from City of Kelowna Official Community Plan 2030

³ The GHG emission increase estimate is based on capital plans, population projections, and historical increases prior to 2011.

This energy use has a direct correlation to energy costs. The city spent \$8.65 million on energy in 2016, and if no further reductions are implemented, is projected to spend \$10.5 million per year by 2022⁴, resulting mainly from rising electricity costs.



Total Corporate Energy Costs per year

If, however, an annual 1% reduction is maintained, costs are projected to be \$9.3 million per year by 2022, a **reduction of \$1.2 million annually**.

As the City grows, and as energy prices continue to rise, the ongoing management of utility budgets is becoming increasingly important. Operational changes,

equipment upgrades, and building construction are going to have much greater impacts on these operational budgets moving forward, with a lot of potential for energy, cost and emissions reductions.

The City of Kelowna adopted the Community Climate Action Plan target in 2012 of reducing GHG emissions by 33 percent below 2007 levels by 2020 across the community. This was in response to the Federal and provincial mandates to reduce emissions by 2030 and 2050. City of Kelowna Community Target
33% below 2007 levels by 2020
Federal Target
30% below 2005 levels by 2030
Provincial Target
80% below 2007 levels by 2050

In order for the City of Kelowna to be a leader in the community, it's imperative that support for Energy and GHG emission reductions continues at the corporate level.

⁴ Following the current capital plan, and the same trend in utility rate increases since 2011

The Energy Committee recommends:

> Setting a target to reduce GHG emissions by 12% below 2007 levels by 2022.

A target of 12% below 2007 levels by 2022 is a pragmatic goal that will allow the Energy Committee to re-assess the potential for energy conservation measures in the future. It is considered an achievable goal, allowing the Energy Committee to spend the next few years evaluating the potential for energy savings, understanding the costs of achieving these savings, and creating a roadmap to a more ambitious target.

What this update to the corporate energy plan does not address, is that a lot of the simple and "low hanging fruit" opportunities have been addressed since 2011. As the easiest and most effective projects are completed, it becomes more difficult to achieve the same reductions year over year. Energy management for the City of Kelowna looking forward will require more in depth evaluation and a greater understanding if the City is looking to maintain its current trend in energy, cost and emissions reductions. An important next step in the Energy Program will be to undergo a more thorough and detailed energy auditing and benchmarking process, to ensure the City is successful with its energy management program.

DID YOU KNOW:

In 2016, Building Services implemented a Heat Recovery and Controls Optimization project at Rutland Arena, reducing energy use and costs at the arena by 25%.

How Do We Get There?

Green Building Policy

An important component to an energy program is policy around the design and construction of new civic facilities. Local municipalities operate a wide range of facilities, and for this reason, it can be difficult to follow a single energy policy or design standard, particularly as technologies and standards change. It will be the responsibility of the Energy Committee to continually update and implement new policies to ensure the City of Kelowna continues to be a leader in energy efficiency.

The province of BC is rolling out the Energy Step Code, which

DID YOU KNOW:

The new Kelowna Police Services Building uses the same amount of energy as the old building, but has 2.5 times the floor area.

provides incremental performance steps, to transition the BC Building Code towards *Net Zero ready*, which the province has committed to use as the base Building Code by 2032 for residential and commercial buildings. For now, the energy step code is not mandatory, and while the full roll out plan and implementation dates are not yet determined, it will not be long before the base BC Building Code is replaced with the Energy Step Code.

While an energy step code has not yet been created for institutional buildings, (the most common of the City of Kelowna's facilities), the principle for defining energy use is the same, and the City should work towards defining an energy use standard for the design of its facilities.

In order to be a leader in energy efficiency, it is the recommendation of the Energy Committee that:

The City adopt the same requirements as set out for commercial buildings in step 1 of the BC Step Code. The step one requirements include:

• Energy Modelling & Airtightness testing for new construction

This is a temporary standard, and the Energy Committee will begin evaluating an energy use target for new construction, that is similar to that of the BC Energy Step Code. See Attachment 2 - BC Energy Step Code for additional information.



Kelowna Police Services Building (2017)

Funding Sources

The Energy Committee is currently working with Finance to investigate options for funding energy conservation measures. Currently, energy projects are typically funded using the carbon tax refund the City receives from the province for participating in and reporting GHG emissions to the Climate Action Revenue Incentive Program (CARIP). This funding source may not be a secure long term source of funding however, so it is important to address other opportunities for the future.

DID YOU KNOW:

The LED Street Light Conversion will reduce electricity use by the same amount of electricity required to power 410 homes every year. The cost savings will pay for the project in under 4 years, with the LED's expected to last for up to 15 years. One approach to a long term funding strategy is known as a **Revolving Green Fund** strategy, a process that allows operational savings achieved through energy reduction projects to be re-invested towards additional energy reduction projects.

Since energy retrofit projects are one of the few mechanisms a municipality has to achieve such an appealing return on investment (ROI), it is prudent that the City of Kelowna take a long term approach when considering the re-allocation of operational savings from these projects. While reducing operating

budgets following retrofit projects may seem like a quick win, re-investing the operational savings into new retrofit projects will reduce the strain on capital budget requirements, and can become a revolving funding mechanism that has the potential to significantly reduce operational costs over time.

The Energy Committee will work with Finance to evaluate funding opportunities and anticipates bringing forward a recommendation to Council in 2019.

Long Term Capital Planning

Energy management needs to be a priority at all levels within the organization if it is to be successful. Design and decisions at early stages of planning often have the largest impact in determining energy use. Having energy as an important consideration in the capital planning process as well as the annual re-evaluation process will serve to reduce the chance that opportunities to reduce energy and GHG emissions are overlooked. The energy committee is reviewing opportunities to increase the focus on energy in the capital review process.

For all projects that are currently in the capital plan, it's important to evaluate opportunities to minimize increases to energy costs and GHG emissions as much as possible. Implementing this energy plan and exploring additional energy reduction opportunities, will minimize, and hopefully even

prevent, increases to energy, GHG emissions, and costs resulting from these projects. This will allow the City of Kelowna to increase and improve on the services provided to residents in a cost effective and sustainable way.

In addition, projects occasionally come along that are not included in the capital plan. It's important that the energy committee be involved in the evaluation process in order to recommend best practices and provide insight regarding energy use.



Glenmore Landfill Administration Building

DID YOU KNOW:

The Glenmore Landfill Administration Building was designed to be more than 40% more efficient than required by the building code, and includes underground earth tubes that air is passed through before entering the building to reduce heating and cooling requirements.

Greater Understanding of our Energy Use Profile

There are a number of initiatives that should be undertaken to develop a greater understanding of the corporate energy use within the City of Kelowna:

- 1. Weather normalizing energy use data, and gaining a better understanding of the variables that significantly affect energy use.
- 2. Performing Energy Audits in each operational sector to better understand how energy is used across different areas of the corporation. This will allow energy projects to be more easily prioritized.
- 3. Focus on measuring energy use before and after energy reduction projects to more accurately measure and report on the savings.
- 4. Creating sustainable funding strategies to ensure capital funding is available to implement projects that will reduce energy and GHG emissions. Grants and rebate programs will also continue to be leveraged whenever possible.
- 5. Increasing the focus on energy and its long term impacts when evaluating capital projects.
- 6. Creating policies that define energy use across each operational sector.

Energy Policy Recommendations

- 1. That the City of Kelowna will set a target to reduce corporate GHG emissions by 12% below 2007 levels by 2022.
- 2. That the City adopt the requirement of *Energy Modelling & Airtightness testing* for the construction of all new civic facilities.

The Energy Committee will return with recommendations on

- a. Energy use targets for the construction of new civic facilities,
- b. Energy use targets for existing civic facilities
- c. A funding strategy for achieving further energy, GHG and cost reduction initiatives,
- d. A strategy to ensure the long term impacts of energy as part of the capital planning process, and
- e. Additional policies that outline minimum energy standards for each operational sector (Buildings, Fleet, Parks, Lighting, Water Treatment, Solid Waste)

Attachment 1 – Roles of the Corporate Energy Specialist and Energy Committee

This corporate energy plan is a guideline to creating an Energy Management Program. For the City of Kelowna, the energy management program will be led by the Energy Program Manager, with support from the Energy Committee.

The Energy Program Manager is someone who:

- Is responsible for understanding the current state of Energy within the organization, as well as reporting this information to council, senior leadership, and all other stakeholders.
- Stays informed and knowledgeable of trends and changes to technology, energy prices and supply options within the local market.
- Stays apprised of changes to buildings codes, energy efficiency best practices and industry leading energy programs.
- Develops and evaluates business case opportunities for corporate energy projects.
- Supports all departments within the organization in their efforts to manage and reduce energy, costs, and greenhouse gas emissions.
- Manages the delivery of energy and greenhouse gas reduction projects.
- Provides regular updates to the Energy Committee.
- Is up to date on external funding opportunities such as rebates and grants from local utilities and government.

The Energy Committee shall be comprised of department managers and City staff, who collectively, should oversee all energy use within the organization, and have the ability to affect change to this energy use.

The Energy Committee's role is to support City Council and the Senior Leadership Team by recommending projects and best practices that will support the City of Kelowna's objective of "being the best mid-sized City in North America", while demonstrating strong financial management

Using the Multiple bottom line approach, the committee is to ensure that any and all energy projects have gone through the appropriate level of business case evaluation, and will prioritize projects based on their financial and corporate value.

Energy Committee

The focus of the Committee should be:

- Reducing Corporate energy use and GHG emissions
- Evaluating projects using the MBL approach (Policy 352)
- Measurement & verification of energy savings,
- Supporting the reduction of Community GHG emissions
- Educating City staff so that everyone contributes to energy efficiency

The committee will also put a focus on measuring and verifying estimated energy savings following project implementation. This will provide greater insight into the accuracy of energy savings estimates and business case development, and will also help track the progress of the energy management program over time.

Attachment 2 – BC Step Code

The BC Government has been working on the energy step code for a number of years. The step code has not yet been introduced as a mandatory requirement within the BC Building Code, but is intended to replace the current prescriptive building code requirements related to energy use. The province has not yet indicated when the step code will replace the current building code, however has indicated that step 5 will be mandatory by 2032.

The step code currently differs in its *Energy Use Intensity (EUI)* requirements for residential, commercial and industrial buildings. It also differs based on climate zone. The EUI is a measure of how much energy per square foot or energy per square meter a facility uses on average per year. The intent of the Energy Step Code is to define a maximum EUI for new construction, which will be used during the modelling and design stage prior to construction, to provide guidance to the designers and builders regarding building geometry and material selection. The second requirement of the Energy Step Code is that all new facilities must perform an energy model prior to construction, as well as an airtightness test following construction. The energy model ensures that the EUI has been achieved, and the airtightness test helps to understand if the building has been built as "air-tight" as necessary, to minimize energy losses through air leakage, to meet the design EUI.

Below is a graphic that briefly summarizes how the step code will improve energy efficiency over time when compared to the current BC Building Code.



For more information, visit <u>http://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/energy-efficiency/energy-step-code</u>