

# Climate Action Plan 2020

For discussion towards implementation





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## Territorial Acknowledgement

Quesnel is situated on the traditional territory of the Lhtako Dene Nation (Red Bluff Band). The Lhtako Dene Nation and the City of Quesnel entered into a Memorandum of Understanding on June 20, 2017 to attest to their mutual commitment to promote cooperative relationship building. The City respectfully acknowledges First Nations' long history of land stewardship and their traditional knowledge of the region and will look for opportunities to collaborate on climate change solutions and climate resiliency together.

## Quesnel Climate Action Plan Timeline

This climate action plan has been initiated as a result of the request of Quesnel City Council and has been funded in part by the Federation of Canadian Municipalities (FCM) under their Municipalities for Climate Innovation Program. This program guides municipalities through several milestones that include: developing a greenhouse gas (GHG) inventory, establishing emission reduction targets approved by City Council, writing a Climate Action Plan with participation from community members, and implementing that plan in ways that enable the City to track the success of each climate initiative. The development of the Climate Action Plan has proceeded with the following timeline:

**1) Greenhouse gas inventory completed:**

City corporate operations are creating 1,231 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) and are measured annually. The community of Quesnel's emissions are 91,273 tCO<sub>2</sub>e for the City residents and 209,928 tCO<sub>2</sub>e for the greater regional Quesnel area and was last completed in 2016.

**2) Targets for emissions reductions endorsed:**

The following Emission reduction targets were approved by Quesnel City Council on October 4<sup>th</sup> 2019:

*City Corporate emissions reduction = 3.5% annual reduction in emissions for 2020, 2021, and 2022.*

*Community emissions reduction target = 40% reduction of 2007 emission levels by 2030, 60% by 2040 and 80% below for 2050.* The community targets match those set by the Provincial government May 2018.

**3) Developing a Climate Action Plan:**

The Climate Action Plan is to be created for both City corporate operations and the greater regional Quesnel community as a whole. February 15, 2020 – draft Climate Action Plan Internal City staff review period. May 26, 2020 – Present the draft Climate Action Plan to Quesnel City Council seeking approval to engage the community with the ideas presented within it for discussion.



**4) *Public engagement process:***

For the remainder of 2020 the City wants to hear from as many members of the Quesnel community as possible on the best ways forward to address and adapt to climate change. This community engagement will gather all the feedback offered to the City by email and through an online survey. The City will also solicit feedback directly from First Nations, our business community, non-profit groups/organizations and individual residents of Quesnel.

**5) *Implementation of the Climate Action Plan:***

The implementation of the Climate Action Plan will be done once the community has had significant input into the Plan's development, the City staff and Directors have researched operationalizing the plan further and the Quesnel City Council has approved its final adoption for implementation. Implementation of the Climate Action Plan is scheduled for 2021.



## What is climate change?

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### **Climate is what you expect – weather is what you get!**

*There is overwhelming evidence that the Earth has warmed during the Industrial Era and that the main cause of this warming is human influence. Widespread warming is consistent with the observed increase in atmospheric water vapour and with declines in snow and ice cover. Global sea level has risen from the expansion of ocean waters caused by warming and from the addition of water previously stored on land in glaciers and ice sheets. The observed warming and other climate changes cannot be explained by natural factors, either internal variations within the climate system or natural external factors such as changes in the sun's brightness or volcanic eruptions. Only when human influences on climate are accounted for – changes in atmospheric greenhouse gases and aerosols, and changes to the land surface – can these observed changes in climate be explained. Of these human factors, the build-up of atmospheric greenhouse gases, principally carbon dioxide, has been dominant. It is extremely likely that human influences, especially emissions of greenhouse gases, have been the dominant cause of the observed global warming since the mid-20th century.<sup>i</sup>*

- Every year since 1998 has been warmer than the 20<sup>th</sup> century average.<sup>ii</sup>
- 17 of the 18 warmest years on record have occurred since 2001.<sup>iii</sup>
- There has not been a colder than average month on the planet since February 1985.<sup>iv</sup>

We call this human induced process global warming and all of its effects on the planet climate change. Science is telling us that the impacts of climate change are happening now, and faster than we had predicted. The United Nations now calls the challenge a climate crisis and says drastic action must be taken to avoid the worse consequences of climate change.

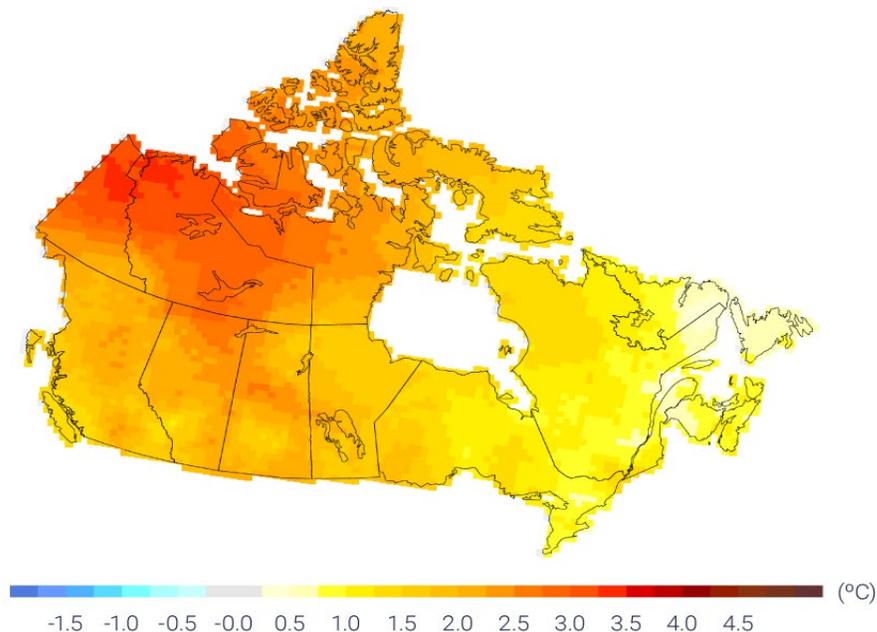
The Paris Agreement is intended to address climate change internationally. Its central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.<sup>v</sup> The task ahead is daunting - the last four years were the warmest on record and GHGs from human activities are still rising.<sup>vi</sup> The 2018 report by the Intergovernmental Panel on Climate Change (IPCC) *Global Warming of 1.5°C* had an unequivocal message: a path exists to 1.5°C, but the window for achieving it is declining rapidly.



## Climate change in Canada

As a northern country Canada has many current and future concerns about climate change.

- Past warming in Canada is, on average, about double the magnitude of global warming.
- Sea level rise will threaten to flood our coastal cities, will increase damage to current infrastructure and accelerates land erosion.
- Our oceans have become warmer, more acidic and less oxygenated and threaten the health of marine ecosystems on both coasts.
- Increased invasive species of pests will pose an ongoing and greater risk to our ecosystems and economy. The mountain Pine Beetle is an example if a climate caused epidemic with detrimental impacts locally.
- The variability in weather will continue to increase. More extreme wind, rain and snow events are expected as are more summer wildfires and heat waves.
- Melting permafrost is already posing concerns for northern economic activity but if this melting continues this release of methane will further exacerbate climate change.



Observed changes (°C) in annual temperature across Canada between 1948 and 2016, based on linear trends. Environment and Climate Change Canada. Canada's Changing Climate Report. April 2019.<sup>vii</sup>



In Canada, the effects of climate change on our health goes largely overlooked. The burning of fossil fuels is responsible for 7,100 early deaths and \$53.5 billion in health-related costs each year in Canada. By reducing our use of fossil fuels such as coal, oil, gasoline, diesel and natural gas, we can improve air quality, save lives, reduce chronic diseases, and cut healthcare costs while fighting climate change.<sup>viii</sup>

On June 17<sup>th</sup>, 2019 the House of Commons voted in favour of recognizing a climate emergency in Canada. The symbolic vote declares a national climate emergency and supports the country's commitment to meeting the emissions targets outlined in the Paris agreement.



## How is the climate changing in Quesnel?

Quesnel is a northern city that has warmed almost one degree from a 1961-1990 baseline and is projected to continue this warming trend.<sup>ix</sup> Climate patterns have changed with less predictable weather bringing increased variability to precipitation events (rain and snow), increased forest fire activity and invasive pests like the Mountain Pine Beetle. The effects of climate change are already undeniable in the community.



Aerial photo by BC Government



## Impacts of climate change on Quesnel

Summary of Climate Change for Quesnel in the 2050s			Summary of Climate Change for Quesnel in the 2080s		
<i>Projected Change from 1961-1990 Baseline</i>			<i>Projected Change from 1961-1990 Baseline</i>		
Climate Variable	Season	Ensemble Median	Climate Variable	Season	Ensemble Median
Mean Temperature (°C)	Annual	+1.8 °C	Mean Temperature (°C)	Annual	+2.7 °C
Precipitation (%)	Annual	6%	Precipitation (%)	Annual	8%
	Summer	-7%		Summer	-6%
	Winter	7%		Winter	11%
Snowfall* (%)	Winter	-9%	Snowfall* (%)	Winter	-11%
	Spring	-55%		Spring	-74%
Growing Degree Days* (degree days)	Annual	+280 degree days	Growing Degree Days* (degree days)	Annual	+478 degree days
Heating Degree Days* (degree days)	Annual	-630 degree days	Heating Degree Days* (degree days)	Annual	-946 degree days
Frost-Free Days* (days)	Annual	+23 days	Frost-Free Days* (days)	Annual	+35 days
					

The above tables show projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the 2050s and 2080s for the Cariboo region. The ensemble median, chosen from a PCIC standard set of Global Climate Model (GCM) projections.\* \*Definitions of Growing Degree days, Heating Degree Days, and Frost-free days are included in the appendix.

The Pacific Climate Impacts Consortium (PCIC) is a regional climate service centre housed at the University of Victoria. PCIC conducts quantitative studies of climate change and climate variability in the Pacific and Yukon region to help decision makers develop climate plans and reduce climate risks. For Quesnel and the Cariboo region the following impacts of climate change were outlined by PCIC.

- *Decrease in annual snowpack.* This means that the winter logging season may become shorter and the stockpiling of logs will need to increase. Alpine and subalpine species range may move up slope. Lower elevations and key tourist industries such as ski hills, resorts and back country recreation may all be negatively affected by reduced snow fall.
- *Increase in temperature.* This means a higher likelihood and magnitude of forest fires. Increases in temperature may also increase growing seasons making southerly tree species and crops more suitable for cultivation. Annual heating costs may be reduced but air condition use may increase.
- *Possible flooding impacts.* Flooding may increase in frequency and magnitude causing seasonal water quality issues and increasing bank erosion. Existing drainage infrastructure may need capacity increases. More flooding may require the City to abandon frequently flooded lands. Natural area parks with streams and creeks may flood requiring greater local budgets to manage the storm waters.



## Quesnel: An Industry Town

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Quesnel has long been a center for industry and today that tradition carries on with agriculture, mining, tourism and forestry. Forestry continues to be the leading industry for the community and as with other industrial operations they produce greenhouse gases that contribute to climate change. In order to save costs and stay competitive most of Quesnel's industries are actively seeking ways to reduce energy use and utilize energy sources not under the carbon tax. Industry in our region produces about as much greenhouse gas pollution as the City corporate operations and all of its citizens do combined. Since forestry is our leading industry the level of climate pollution produced has been significantly mitigated already.

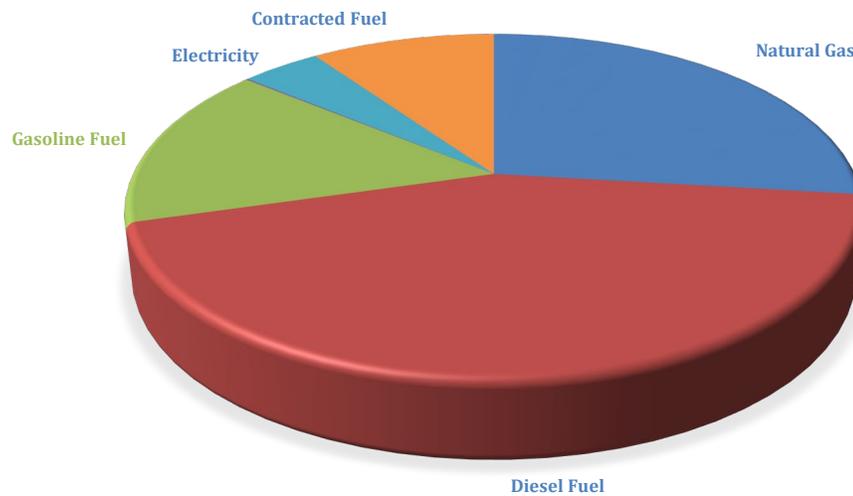
Lumber is a renewable building product that stores carbon in its final use and the wood waste produced from operations can provide carbon neutral energy reducing the amount of fossil fuel needed during production. As an example, in West Fraser's 2018 Responsibility Report they state that in one year their products stored an incredible 1.6 million metric tonnes of carbon and that 75% of their total energy use now comes from renewable energy sources. The bioenergy they produce and use is equivalent to 7.6 million barrels of oil (in 2018). West Fraser has also built a \$30 million lignin processing plant to support the next generation of sustainable forest products. These lignin bio composites can become plastic bags or car parts and are sustainable and carbon neutral compared to their fossil fuel based competitors. In addition to this, the company reforested 58 million trees in 2018 re-establishing forests on all of the harvest sites ensuring their lands are fully renewable. There are even Quesnel agricultural facilities making use of waste heat from West Fraser's operations and investigations are currently underway to see if more waste heat can be utilized by industry and the community through district energy.

The forest industry in Quesnel is one of the world's most sustainable and globally-competitive. As the use of wood is advanced and promoted as climate friendly there is no reason for this to change. Most companies will work to avoid the increasing carbon tax by reducing energy use through efficiencies and seeking a greater mix of renewable energy sources, but there are challenges to do so. As with the City and Community of Quesnel, Industry here has shown its ability and desire to do its part to reduce its impact on the climate. With a collaborate effort between the City, Industry and its community members we can do our part to address the climate change challenge.



## City Corporate Emissions Inventory

Total emissions in 2019 for City operations = 1,231 tonnes CO<sub>2</sub>e



### **Transportation & Equipment – 69%:**

Diesel – 44%

Gasoline – 15%

Contracted Services Fuel – 10%

Propane – .1%

(See appendix – What is a tonne of CO<sub>2</sub>e?)

### **Buildings – 31%:**

Heat (natural gas) – 27%

Electricity – 4%



## **City climate actions. Leading by example!**

This section of the report will outline the climate actions planned, proposed or to be investigated further by the City of Quesnel corporate operations. The City hopes to lead by example and highlight the actions it takes to address and adapt to climate change to the community at large. The climate actions outlined in this plan will take considerable planning to implement and integrate into current City practices and processes. City leadership at all levels will be integral in ensuring that the climate actions taken are in unity with other plans such as the 5 year Capital Plan and Official Community Plan. If climate actions are done in concert with other City initiatives then services can continue to improve in the City while at the same time addressing the climate challenge.

The community of Quesnel as a whole is also taking action on climate change and the second section of this report will overview the provincial actions intended to help the broader community meet emissions reduction goals. It will also highlight climate actions unique to the community of Quesnel that could be taken to reduce emissions and adapt to a changing climate.

Across Canada, local and regional governments influence approximately 60 per cent of the nation's overall energy use and 50 per cent of its GHG emissions. City leadership can use the tools at their disposal to enable their residents and businesses to cut emissions but it will take significant planning and integration. If local governments are to succeed, they will need leadership and support from other orders of government, as well as commitments from their own residents and businesses.<sup>xi</sup>



## **Direct Emissions – Mobile Fuel Use**

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***69% of annual City carbon footprint.***

**Climate actions to reduce mobile fuel emissions:**

***Use telematics to track and reduce fuel use and identify inefficient vehicles or drivers.***

***Anti-idling.*** Putting telematics on fleet vehicles will allow the City to be able to identify inefficient vehicles and could result in substantial fuel savings. By educating drivers on fuel efficient driving techniques and implementing and enforcing an anti-idle policy other jurisdictions have saved as much as 20% on fuel. Fuel can also be saved by maintaining and tuning City vehicles for the highest fuel efficiency possible by inspecting fuel filters, O<sub>2</sub> sensors, air filters and checking tire pressures often.

*Next steps: Purchase and implement the first phase of telematics that were budgeted for in 2020. Closely track all costs and savings to see if further expansion of telematics is justified in future years.*

***Purchase an electric vehicle for the City and follow development of electric trucks***

***closely.*** Purchase an electric vehicle for use by the City staff and management and utilize the vehicle as much as possible. In the City fleet, it is recommended to start with cars that come up for replacement to exchange with electric vehicles. 3.5 - 7 tonnes of CO<sub>2</sub>e reductions are realized for every electric car added to the fleet in exchange for an internal combustion engine. The lower cost of ownership of these vehicles due to the less expensive energy source and significant reduction in maintenance and service requirements make these vehicles extremely cost competitive over their life spans. Electric trucks can dramatically reduce the GHG emissions created by the City fleet. Ford, GMC and Tesla all expect to have electric trucks ready for purchase by 2021 or 2022. Electric trucks have the potential to reduce the City's carbon impact considerably as they make up the vast majority of the current fleet.

*Next steps: Budget for a pilot electric test vehicle for City Hall. There may be further grants available in the future in addition to the Federal and Provincial rebates currently available. In 2022, watch for the arrival of electric trucks and research: are they too expensive at first? How has the electric truck pilot in Vancouver gone? Do our local dealerships have the ability to service these vehicles?*

***Use trenchless technology when and where possible.*** In contrast to traditional trenching (cut and cover), which involves digging a trench, hauling extracted material to a disposal site and replacing with new material, trenchless technologies involve drawing a new pipe (or pipe lining) along the path of an existing pipe or boring for new constructions. In turn, it requires removal of less material than conventional trenching, with consequent reductions in diesel fuel consumption and related GHG emissions. Trenchless technology can reduce costs by 20-50%, reduce carbon emissions by 70-90%, reduce the



disturbance to the public and environment, and helps keep asphalt strong as every time is in cut into its strength degrades. With trenchless technology the asphalt remains unopened.

*Next steps: The City has used trenchless technology in the past and will continue to seek opportunities to do so whenever underground service work is required. Research into other local governments' use of trenchless technology and its evolving capabilities will be undertaken as the City attempts to increase its use.*

***Seek non-emitting solutions to small equipment used and processes using propane.***

Electric options for small equipment are increasing and where possible (leaf blowers, portable heaters, lawn equipment, small yard vehicles, forklifts, etc.) should be investigated for use by the City. There are even electric Zambonis available for ice resurfacing now available. These electric options are often quieter and do not require the use and carrying of fuel and oil.

*Next Steps: As electric products become available the City will be ready to measure the costs and benefits of changing. Grants and subsidies for small electric equipment will be researched and local governments questioned on their experiences so far with electric equipment (such as Prince George and Saanich with their electric Zambonis).*



## **Direct Emissions - Stationary Fuel Use**

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### ***27% of annual City carbon footprint***

#### **Climate actions to address stationary fuel emissions:**

**Purchase a portion of renewable natural gas (RNG) to reduce emissions.** Renewable Natural gas is bio-methane that is similar in structure to fossil fuel but is carbon neutral. Purchasing a portion of natural gas as renewable the City will reduce annual emissions (RNG is carbon neutral) and help to support this developing renewable energy option. As one of the more popular emission reduction strategies within municipal governments in British Columbia FortisBC is currently fully subscribed and is selling all the RNG it can currently produce.

*Next steps: Seek clarity with Fortis when more RNG may be available for sale. Compare the cost of RNG and the carbon reductions against other carbon reduction projects. Choose the project with the lowest cost and the highest carbon reduction. If more RNG becomes available in 2021 and the City was to purchase 10% of its natural gas as renewable to meet its emissions reduction goals it would be an additional cost of \$4,676 annually.*

**Commit to energy modelling on all new planned City owned construction.** Energy modelling is a soft-cost of construction that cannot be forgone. Without this energy data the cost of ownership of a building including the power, heating, hot water, and cooling demands are not known with any accuracy. In order to move away from fossil fuel heating (the current standard) to more climate friendly options this energy data is essential for all new City construction. Fossil fuel heating has lower upfront costs but many renewables are cost competitive or advantageous over time.

*Next Steps: Research examples of energy modelling used by other local governments on new construction or retrofit projects. Were the forecasted energy savings achieved and at what cost? Investigate the capacity of our region to supply these energy models in the community. Investigate a possible collaboration with the university or college to energy model a future proposed project.*

**Commit to Step Code use on all new planned City owned construction.** If the City is to ask local builders to embrace Step Code one day then the City should lead by example. Step 1 of Step Code is anything more energy efficient than basic code. This first step is often achieved through better planning (avoiding thermal bridges, using smaller window spaces, etc.) without any additional costs whatsoever. The following are case study results provided by the BC government on Step Code builds to highlight that higher upfront costs are not always cost prohibitive:

- *Victoria home build – 2% higher costs to achieve Step 3 of Step Code! 20% more efficient.*



- *Whistler home build – 2% higher costs to achieve Step 3 of Step Code! 20% more efficient.*
- *Invermere home build – 1% higher costs to meet Step 3 of Step Code! 20% more efficient.*
- *Campbell River home build – 0% increase in costs to meet Step 3 of Step Code! 20% more efficient.*
- *Kamloops home build – 4% increase in costs to meet Step 4 of Step Code! 40% more efficient.*

64 Local governments in BC have now implemented Step Code in some way.<sup>xii</sup>

*Next steps: The City can investigate an internal policy for its own construction while developing a bylaw to implement step code community wide for new building. Speak with builders and tradesperson to seek implementation pathways that are the least costly and disruptive to their businesses. Ask if training is required that the City can facilitate or provide to them. Research the best voluntary approach to implementation local governments have taken in BC. Who had the most uptake in the province with the voluntary approach? Why was it successful?*

***Test nightly setbacks of temperature (government buildings are ideal).*** City hall is currently equipped with programmable Wi-Fi enabled thermostats. The Facilities Manager is willing to test nightly setbacks at City Hall by lowering the temperatures at night when the building is unoccupied to see if the energy reduction is significant and can replicated in other City owner buildings. The comfort of the building's occupants will also be analyzed to ensure the set backs are not inhibiting the work or comfort of staff.

*Next steps: With some planning between the Facilities Manager and the IT department the City should be able to implement a setback testing program for January 2021. The annual comparisons of energy use will take into account heating degree days (balance for a colder or hotter winter) to properly assess the energy reductions. Staff will also be asked about any issues that arise during testing a setback program.*



## Indirect Emissions - Electricity Use

### ***4% of annual City carbon footprint***

#### **Climate actions to address electricity emissions:**

***LED lighting replacement policy for all street lights and building lighting.*** There is a current City policy to replace incandescent lighting indoors and high-pressure sodium street lights with LED lighting when replacement is needed. The LED lights not only use a fraction of the energy to operate, they last much longer saving considerable money in labour dollars for exchange. The City can also be mindful of any grants or rebates offered to exchange lighting for LED in advance of replacement needs. It has also been identified that solar powered LED lighting may be more cost effective in areas not serviced by current electrical infrastructure but that still require lighting.

*Next steps: As this policy is already in place at the City the next steps would be to seek additional funding, grants and rebates for LED light exchanges where most cost effective to do so. Encourage the use of LED Christmas lighting in the community similar to the choice the Downtown Business Association made for the City street lights.*

***Develop computer and technology policy for electricity savings.*** As the IT department expands there should be capacity to institute a computer energy savings policy for City buildings and City employees. The policy will have to take into consideration any processes or current IT procedures to find the best policy to reduce electricity use from computer and technology use without compromising performance and security. The increases use of video conferencing can also support the reduction of travel demands of employees. The City IT department was extremely successful in expanding video conferencing capabilities and the ability for staff to work from home securely during the Covid19 pandemic. Without the efforts of the IT department the City would have struggled to have so many workers away from their office and their advice on energy savings will be just as valuable in a constantly changing field with such high importance and demands.

*Next steps: Work with the IT department to determine the best technology energy savings policy that does not reduce capabilities, expansion options, security or other issues unique to the Quesnel City technology requirements. Actions like supporting the use of videoconferencing, buying the lowest energy use technology, defaulting to double side printing and efforts to go paperless will also be included in the computer and technology policy. The policy must be developed with purchasing if the energy demands of technology will now be required by the IT department to assess during procurement.*



## Other Indirect Emissions

### **Climate Change policies the City can use to reduce other emissions:**

**Green procurement process enhanced.** The City of Quesnel will endeavor to acquire goods and services that minimize impacts on the environment and perform efficiently and effectively. While evaluating goods and services for purchase (including all aspects related to the production, transportation, use or operation, and replacement or disposal of goods) the following environmental factors will be considered in addition to the specific requirements of the good or service:

- Reduce greenhouse gas and air pollutant emissions
- Durable and reusable, as opposed to single use or disposable items
- Non-toxic or least toxic option, preferably compostable or biodegradable
- ENERGY STAR rated if available or most energy-efficient option
- Recyclable, but if not, may be disposed of safely, or, vendor will take back good at its end of life
- Made from recycled materials. If made from raw materials, they have been obtained and manufactured in an environmentally sound, sustainable manner
- Results in minimal or no environmental damage during normal use or maintenance
- Minimum packaging, preferably made of reusable, recycled or recyclable materials

*Next steps: Develop a pilot procurement policy to test integration with current purchasing procedures and requirements. The policy may be developed to only request sustainability information (as listed above) to a certain value of procurement or type of item requested. Asking suppliers to submit information about greenhouse gas impact, toxicity of their product, or energy-efficiency may only be possible for certain items or projects. The policy cannot be so invasive suppliers do not respond due to a lack of information being asked. While researching the success or failures of other green municipal procurement policies the City pilot policy could be as simple as making one request to suppliers when seeking items or bids: If an energy consumption rating is known for your product please include it.*

**Set an internal price on carbon emissions of \$100/tonne.** This is a paper exercise and the cost of the carbon price is not paid by the City. The assessment is used to highlight the value of items that do not cause carbon pollution. If all else is equal between two choices then the City can select the least carbon option by using this internal carbon pricing. Example: An electric car may be more expensive initially than an internal combustion engine (ICE) equivalent. Both vehicles will meet all the requirements and demands the City needs of them equally. Without an internal carbon price the lowest initial cost ICE may be chosen. Yet, if the City factors into the carbon savings of the electric vehicle and put a value on those carbon savings of \$100/tonne then the electric car may now be the lowest cost option and purchased instead. This type of carbon price



policy has been used by Metro Vancouver (\$150/tCO<sub>2</sub>e), Vancouver (\$150/tCO<sub>2</sub>e) and Dawson Creek (\$100/tCO<sub>2</sub>e) for some time.

The objectives of the Carbon Price Policy are to:

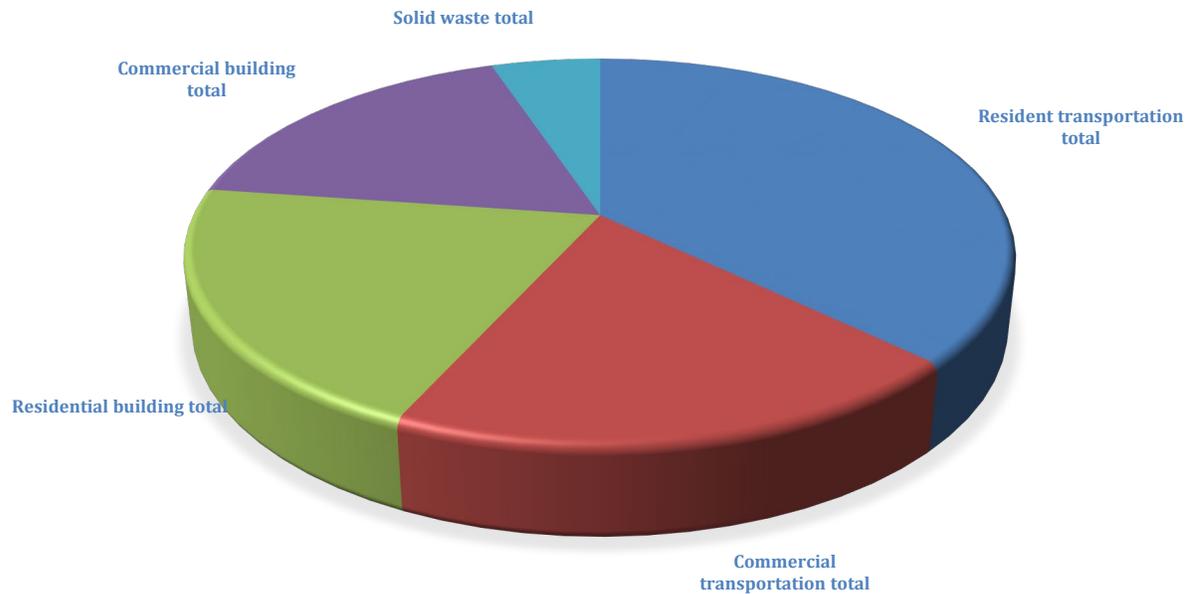
- Incorporate consideration of climate change mitigation (greenhouse gas emissions reductions) into options analysis for all Quesnel projects or initiatives.
- Provide a mechanism to reduce the financial risk of increased operating costs associated with rising external carbon taxes over the lifetime of a Quesnel project or initiative.

*Next steps: Investigate the internal city capacity to assess carbon impacts of different processes and items. The BC Methodological Guidance for Quantifying Greenhouse Gas provides details on converting energy and fuel use into carbon dioxide equivalents and can be used for a trial period internally. If the policy is deemed useful then integration into procurement policies can be attempted. This would request the carbon impact of projects or items from the possible proponents or suppliers and avoid the internal conversion and skillset required.*



## Community Emissions Inventory

Total emissions for the community of Quesnel  
(23,146 population) = 209,928 tCO<sub>2</sub>e



### **Transportation – 57%**

Resident fuel for transportation – 37%  
electricity – 20%  
Commercial fuel for transportation – 20%  
and electricity – 18%

### **Buildings – 38%**

Resident buildings heat and  
Commercial buildings heat

### **Solid Waste – 5%**



## Community climate actions.

### A Cariboo community making a difference!

This section of the report will outline the climate actions planned, proposed or to be investigated further by the entire community of Quesnel. The residents of Quesnel are taking action on climate change and this section of the report will overview the City and provincial actions intended to help the broader community meet emissions reduction goals. This section will also highlight climate actions unique to Quesnel that could be investigated to reduce emissions and adapt to a changing climate.

### CleanBC and the Province's climate strategy

CleanBC is the provincial climate plan that identifies initiatives that should result in emissions reductions that meet 75% of the committed targeted reduction for 2030 (40% lower than 2007 emissions levels).



CleanBC is a pathway to a more prosperous, balanced, and sustainable future. Over the next decade and beyond, we must grow the use of clean and renewable energy in how we get around, heat our homes, and fuel our industry – making things better and more affordable for people. Our work is already underway, and we are making the most of it to benefit people and communities everywhere – from rural and remote B.C. to Indigenous communities and our growing urban centres.<sup>xiii</sup>

The Provincial Government acknowledges that as we move towards the 2030 reduction goals a further 25% of emissions reductions will have to be made in addition to those climate actions already listed in CleanBC below. This additional reduction of emissions will be made by embracing innovative policies or technologies and uncovering other novel local ways to reduce emissions.



## BC Government Emissions Reductions – Transportation



The Province wants to reduce emissions from transportation in several clear and distinct ways:

- Provide an after-tax point of sale incentive to encourage the adoption of zero emission vehicles by making them more affordable. Current incentives are up to \$3,000 provincially and \$5000 federally for each vehicle (under \$45,000).
- The low carbon fuel standard will ensure the fuel supplied for transportation is less carbon intensive over time. The fuel suppliers in the province must provide a blend of 20% renewable content in all fuels distributed by 2030.
- Tail pipe standards will increase in 2025 to ensure that internal combustion engine (ICE) vehicles continue to improve their fuel economy over time. Instead of focusing only on the fuel used (and its carbon intensity) this policy focuses on the manufacture of the new ICE vehicles and their improved efficiency per kilometer.
- All new vehicles sold in British Columbia beyond 2040 must be zero emissions vehicles!



## Quesnel Transportation

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### ***Residential is 37% and Commercial is 20% of Community Emissions***

#### **Quesnel Climate Actions to Reduce Emissions from Transportation:**

**Electrify transportation.** Encourage additional fast electric car chargers in town and follow development of hydrogen vehicles as they commercialize. January 2020 BC Hydro opened Quesnel's first fast car charger (Level 3) after Billy Barker Casino Hotel led the way in our City by installing the first electric car charger (Level 2). The City is also expecting more car chargers at the Quesnel Visitor Centre in the near future through a grant from the Northern Development Initiative Trust (NDIT) Strategic Initiatives Fund called Charge North.

*Next steps: Research any current and upcoming grants or subsidies for electric car charging – for public use and home installations. Highlight the experiences of the City with electric vehicles to the broader community. Encourage automobile dealers to sell more and ensure service of electric vehicles if the community demand is present.*

**Promote Active transportation in the City.** Active transportation means using your own power to get from one place to another. As a community we can attempt to make it easier to walk, bike and snowshoe to work and for getting to needed services. We can promote our vast trail systems and ensure the main walking trails are cleared of snow, are well lit and are made available for use all year. We can also promote the many benefits that come from active transportation especially the health benefits to individuals and environmental benefits to us as a community.

*Next steps: Speak with Quesnel citizens and ask what they would like to see in the City for trails and active transportation. Most residents speak highly and with pride about the number and quality of trails Quesnel currently has but if there is anything further that can be done to encourage active transportation will be investigated.*

**Drive less kilometers annually.** Set goals for the community and track the number of people living within 15 kilometers of work. Living close to where you work is one of the easiest ways to reduce your annual emissions from transportation and people in Quesnel already benefit from these short commutes. Due to the recent Covid19 pandemic people are aware of the cost savings from driving less and working from home. The response to the pandemic and this gained knowledge could result in more people working from home and going to public places less.



*Next steps: Promote carpooling by facilitating an online platform or by promoting active transportation on the City trail system. Seek annual data from ICBC on people living within 15km of work to track improvements.*

**Public transit use increased.** As more people use the transit system here in Quesnel more routes may be developed and a greater frequency of stops may occur. If we work with BC transit to track the usage increase over time we can ensure the system is providing the greatest benefit to our citizens and continue to increase ridership. There are also opportunities to electrify some busses or bus routes where possible or seek lower emissions vehicles such as biodiesel or hydrogen options for the community of Quesnel.

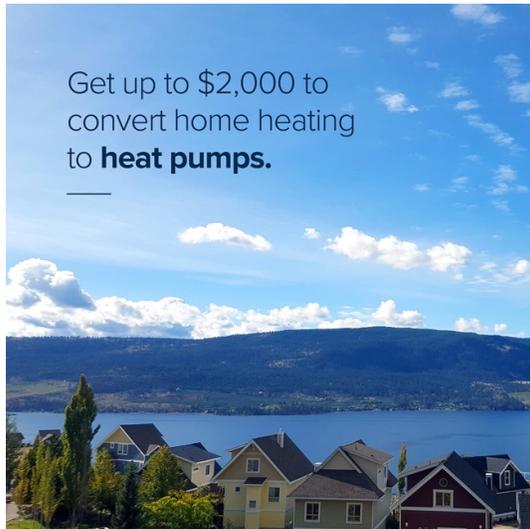
*Next steps: Research BC transits next climate plan for details of relevance to Quesnel. Speak with BC Transit and express City support for low emissions transit options as a form of climate action and to bolster the efforts of the Quesnel Air Quality Roundtable to reduce local particulate emissions.*

**Seek efficiency gains in commercial transportation.** Commercial transportation fuel reductions are happening and have been promoted through the Central Interior Logging Associations fuel reduction project. The project installed GPS devices into logging trucks and provided drivers training of fuel reductions. There are increasing opportunities for biodiesel use and electrifying shorter haul transport routes (and longer haul as battery or hydrogen technology advances). There are also ways citizens can help reduce emissions associated from commercial transportation by supporting locally produced and manufactured goods therefore reducing the shipping miles associated with our consumption.

*Next steps: Speak with local trucking companies about fuel reduction projects and research biodiesel for use at the City and within industry. Coop is currently investigating the purchase of biodiesel and has asked if the City may also be interested. More information on the biodiesel being sourced by Coop is required for the City to determine its effectiveness in its fleet and has been requested.*



## BC Government Emissions Reductions – Buildings



The Province wants to reduce emissions from buildings in several ways:

- Better built buildings! The Province will continue to improve the efficiency guidelines for buildings over time therefore reducing the emissions from our housing stock.
- The Step Code in BC was developed for uptake by local governments looking for energy efficiency guidelines. The Step Code features increased efficiency steps towards zero emissions homes (ZEHs) in 2032. <http://energystepcode.ca/>
- The Province will encourage and provide subsidies for the installation of electric heat pumps. Ground source or air to air heat pumps use clean BC electricity for heating and cooling instead of fossil fuels.
- A commitment from the Province to have 15% renewable natural gas in our residential supply will not only reduce emissions but will encourage the development of more renewable natural gas (RNG).



## Quesnel Buildings Heat and Electricity

### ***Residential is 20% and Commercial is 18% of Community Emissions***

#### **Quesnel Climate Actions to Reduce Emissions from Buildings:**

**Clean heating options encouraged for current and future building stock.** The City is currently working with West Fraser to determine the feasibility of a Community Energy System. The District Energy (DE) system would first supply downtown Quesnel with the possibility of expanding to other residential areas. The Community Energy System would be utilizing waste heat from West Fraser operations and would not increase the burning of biomass in our community. The heat produced would be carbon neutral (as it is derived from bio-fuel and waste heat) and the energy dollars spent by citizens would be staying in our community instead of leaving it.

Until such time a DE system is up and running and for areas DE will not be able to service the increase use of Renewable Natural Gas (RNG) can also help to lower emissions. In addition to the 15% RNG mandate made by the Provincial Government citizens can also choose to buy an additional portion of RNG for their needs through FortisBC. As heat pumps increase in efficiency and decrease in costs they will also be an important option for the community of Quesnel. The more we can electrify the heating demands in the community the less carbon emissions. Just as important to the community, the particulate levels affecting our health will also be decreased in our air shed through the use of electric heat pumps. BC Hydro has been planning for the increase in electrical demand from heating sources and electric vehicles for some time. They are predicting there will be an additional 1,050 gigawatt hours of electrical load per year by 2030 and can meet that demand.

*Next steps: West Fraser is in currently doing a waste energy audit to see if a district energy system may be possible. If there is deemed sufficient heat to continue investigation the City can apply to the Federation of Canadian Municipalities for funding to produce a full feasibility study. Funding is currently available for 76% of the capital required of such projects if they are deemed worthy. A similar scale of funding was secured by the City of Prince George and is a large reason for its success, early payback period and facilitating the current expansion underway there.*

*The City can also investigate supporting a model of heat pump exchanges with the current wood stove exchange program. This will require provincial funding as heat pumps can range from \$4,000 - \$7000 dollars for air to air and double that cost for a ground sourced heat pump.*

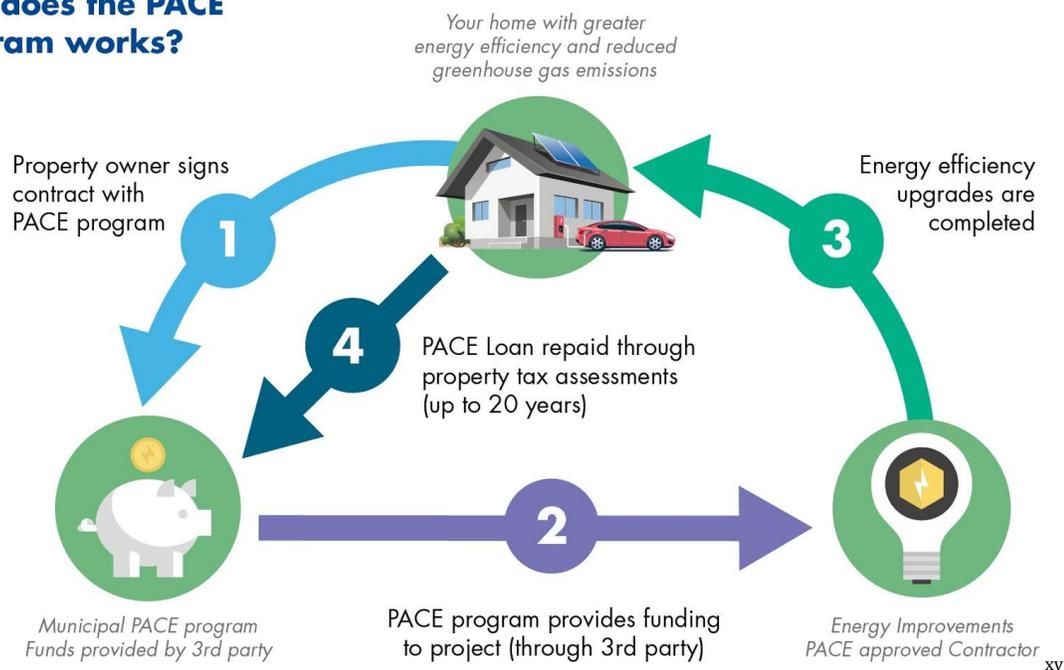
**Increase Efficiency of the current building stock.** PACE stands for Property Assessed Clean Energy and these programs offer financing for home energy improvements. The



loan amount stays with the house not the individual and is paid out over time with property taxes. If the Province passes legislation to enable this type of program, and the City provides tax liens that provide security to the lender and collects payments from the owner through an assessment on the property tax bill a PACE program could be developed right here in Quesnel. The success of PACE south of the Canadian border has been impressive with over \$4 billion in loans for over 150,000 projects in more than 36 states.

In BC we'll need to retrofit a whopping 30,000 homes, 17,000 apartments, and 3 million square meters of commercial space every year until 2050 in order to meet our new provincial climate targets! The development of a robust and thriving PACE program, would have unprecedented potential to deliver the number of retrofits needed, resulting in deep and swift reductions in greenhouse gas emissions, while creating thousands of new green jobs. This could all be achieved without additional government subsidies.<sup>xiv</sup>

### How does the PACE program works?



*Next steps: Provincial legislation is required in advance of any implementation by local governments. If the City Council and the community believe PACE financing can encourage a cleaner energy transition then the Province should be made aware of this. The PACE financing idea is no longer new and the Province is currently studying what it may look like within BC.*



**Thermal Imaging of buildings to see heat loss.** To further increase the efficiency of our current building stock the City could provide thermal imaging of homes to citizens requesting it. It has been proven that seeing the heat loss visually increases the uptake of energy audits and energy home improvements. The summer environmental ambassadors could be brought back over the Christmas holiday and drive to residential homes wanting a thermal image taken. Energy audits could also be subsidized by the City to encourage more uptake and encourage the use of programmable thermostats, LED lighting replacements and upgrades, old window replacement, or adding insulation where needed.

*Next steps: Research the City capacity to promote the availability of thermal images as a way to investigate a home's heat loss and to actually take the thermal image and provide it to the home owner. Thermal image cameras are now under a thousand dollars but the capacity to develop, promote and deliver the program internally may be a challenge.*

**New buildings improved efficiency and lower energy demands.** Implement Step Code for all new building in stages. As mentioned earlier in the report Step Code is an optional compliance path in the BC Building Code that local governments may use, if they wish, to incentivize or require a level of energy efficiency in new construction that goes above and beyond the requirements of the BC Building Code. Builders may voluntarily use the Step Code as a new compliance path for meeting the energy-efficiency requirements of the BC Building Code.<sup>xvi</sup> The City could start by subsidizing the energy audits required, increase density, give rebates on building permits or provide other incentives to encourage the use of Step Code.

*Next steps: There should be a timeline developed for making the Step Code program voluntary at first and then mandatory when required by the province. It should also be in line with net-zero building standards legislated by the Province for 2032. The City could also show leadership by researching zoning an entire area or neighborhood for net zero development including connection to the proposed Community Energy System. Any research or implementation efforts will be done only with local builders involved to ensure the issues unique to our community are understood and included in any final policy choice.*



## **BC Government Emissions Reductions – Solid Waste**

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The Province wants to address emissions from solid waste in several ways:

- A Province wide goal to help communities divert 95% of their organics from agriculture, industrial, and municipal waste away from landfills and turn it into a renewable good by 2030.
- Have all landfill gas capture systems in BC be capturing at minimum 75% of the methane emissions (for landfills emitting more than 1,000 tonnes/year).
- Waste less! The Province wants to encourage people to buy items with less packaging, use all of what you do buy (especially food) and buy less to start with. We can also make better use of waste across all sectors of our economy, like forestry, agriculture, and residential areas.



## Quesnel Solid Waste

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### ***5% of Community Emissions***

#### **Quesnel Climate Actions to Reduce Emissions from Solid Waste:**

**Organics diversion away from landfill and into compost.** There are several ways the community can work towards diverting organics away from the landfill and into a renewable resource. Yet, to reach the goal of a 95% diversion rate the community will either need to fully embrace home based options or demand bi-weekly curbside pickup in a green bin. Here are some of the options other communities are taking to reduce the organics going to landfill.

- 1) Encourage home based composting by subsidizing composters for backyard use and providing education on how best to use them. (least diversion, lowest cost)
- 2) Develop more organics drop off locations/containers throughout Quesnel. (issues with odor, still requires composting facility to convert organics)
- 3) Bi-weekly organics curbside green bin pickup to alternate weekly from garbage pickup. (highest diversion rate, highest cost)

The option that will allow for the greatest organics diversion rate is a residential green bin curbside pickup every two weeks. To reduce the costs with this option communities (Nanaimo and Squamish for example) have encouraged private composters to come and handle the diverted organics. Diverting organics and making compost not only reduces greenhouse gas emissions it takes those materials that would be stored in the landfill for 50-100 years and turns them into a usable soil amendment within 8 weeks. In BC communities that have diverted their organics an increase in recycling levels usually follows! This increase in recycling further reduces the burden on landfills. As a forestry based community Quesnel can be a leader in reducing the amount of waste from forestry by utilizing that waste for value added items such as pellets and even making use of pulp sludge and ash from production as options increase for doing so.

*Next steps: The Landfill Manager is assessing the current organics options for the Quesnel community. A cost benefit analysis will be done on possible policies to increase organics diversion and provincial funding will be requested for any plan as it is there stated 95% organics diversion goal. The City can also invite a composting expert used by Sperling Hansen to provide an outline of what would be needed to encourage a private composter to enter Quesnel. If the City can provide an inexpensive lease on an appropriate site and agreement for the diverted organics a private entity may design, build and operate the composting facility like they have in Nanaimo and Squamish making the financial case for organics diversion even greater for the community.*



## Other Indirect Emissions

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### **Climate Change policies the Community can use to reduce other emissions:**

**Implement Community Based Social Marketing Campaigns.** These campaigns could be used to address any number of community climate actions, and would require the assistance of the City Communications department to reach as many citizens as possible. For example:

- 1) *Implement a campaign to encourage active transportation:* use tools to reduce barriers and enhance the convenience of active transportation such as surveys, prizes, competitions, and informational messaging.
- 2) *Implement a campaign to encourage transit use:* The campaign could offer free trial bus passes, provide bus schedules, and help advertise “take the bus week” at Quesnel workplaces.
- 3) *Implement a campaign to promote Green Energy Stories in Quesnel:* The campaign could highlight the green innovations in forestry and wood use, feature energy efficient or net zero houses in the area, or feature stories from residents driving electric vehicles.

These community based social marketing campaigns will allow Quesnel to celebrate its successes in reducing emissions, allow for conversations on what has worked and what has not, and will promote a greater discussion on our community efforts moving forward in a climate constrained world.

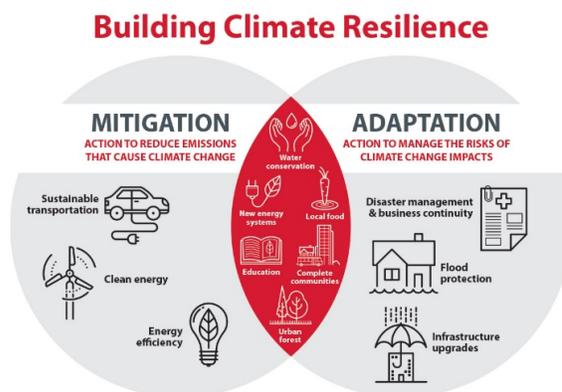
*Next steps: Research the internal capacity to develop and promote these community based social marketing campaigns. The City Communications and Economic Development offices have vast social marketing experience and may be able to help facilitate these campaigns internally if staff time exists to do so. If they do not have the capacity to do so they will be able to advise on the level of effort and time these campaigns would require of additional staff like the environmental ambassadors.*



## Adaptation to Climate Change in Quesnel

Adaptation includes any actions taken in response to observed or expected impacts of climate change; it is the way we prepare for and react to the changes in our climate. Adaptation is an essential response to climate change.<sup>xvii</sup> It complements mitigation efforts (measures that reduce greenhouse gas emissions) and is focused on reducing the negative impacts of climate change. Municipalities are uniquely positioned to undertake adaptation efforts, as they are on the front lines of responding to impacts and therefore, have an interest in preparing for them.<sup>xviii</sup>

The impacts of climate change that Quesnel has experienced and will face in the future were outlined on page 6. Decreases in snow pack, increase likelihood of forest fires, greater possibility of floods, and more extreme weather events are all impacts that we must prepare for in order to avoid their worst consequences. Ensuring a fire interface exists in our community, ensuring infrastructure is built stronger to withstand these changes, and preparing for flood waters are all actions that will greatly reduce the impacts of these changes when they become ever more severe. Although this climate action plan focuses on mitigation (the reduction and/or elimination of carbon emissions) adaptation cannot be ignored or facilitated in isolation. Climate action must consider the changes we cannot avoid as we try and evade the worst case scenarios of climate change.



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Land use planning can be one of the most effective processes to facilitate local adaptation to climate change. Historically, local governments have used land use planning tools – official plans, zoning, development permits and others – to minimize risks to communities from floods, wildfires, landslides and other natural hazards.<sup>xx</sup> As the climate changes, so will the frequency and magnitude of climate-related hazards, posing a challenge for community planners.



## **Implementation of this Climate Action Plan**

To realize the level of GHG emission reductions committed to by the City, it will take action at the community, provincial and national level. Locally, we will need to leverage our collective knowledge, partnerships, networks, resources and leadership. The development of this plan is a considerably step and we want the community to be a part of the process towards determining what climate actions will be undertaken here in our northern forestry based community. As a community we need to continue the conversation and increase stakeholder involvement and participation in existing and novel ways.

Community engagement may look different than was originally planned for Quesnel in 2020 due to the Covid19 pandemic but all efforts will be made to hear from as many people as possible on how to move forward meeting our emissions reduction targets. Online meetings, climate planning information pages and citizen feedback surveys will be employed in 2020. We will also encourage citizens to phone the Carbon Review Coordinator directly to discuss the climate plan or climate actions proposed. Speaking individually with as many stakeholders as possible will ensure the community voice is heard and reflected in the final document that will guide the Climate Action Plan implementation in 2021. That implementation will be done in a way to ensure we can track the success of individual climate actions and measure our progress meeting the emissions reductions targets set by City Council in the coming years.

The City of Quesnel looks forward to your feedback!



## Budget for items identified for City climate action

City Climate Actions	Estimated Costs	Estimated Emission Reductions
Telematics on vehicles	\$50,000 one time and \$10,000 annually.	42 – 53 tonnes of CO <sub>2</sub> e annually
Electric vehicle and charger for City Hall	\$53,000	3.5 – 7 tonnes CO <sub>2</sub> e annually
Trenchless Technology	Project dependent	70-90% reduction in emissions
Renewable Natural Gas (RNG)	\$4,510 for 10% of NG demand, \$6,766 for 15%	33 tonnes CO <sub>2</sub> e at 10% and 50 tonnes CO <sub>2</sub> e at 15%
Energy Modelling on new builds	\$600 - \$60,000 depending on building size and complexity	Project reduction of emissions estimate possible with modelling
Step Code implementation	2-5% increase in initial building costs (Step 2)	20% less emissions from buildings energy use (Step 2)
Temperature Set-backs and efficiencies	Staff time to collaborate	2 – 4.85 tonnes CO <sub>2</sub> e annually
LED lighting/lights out/computer policy	Staff time for policy development	.75 tonnes CO <sub>2</sub> e annually
Reduce propane use for electric options	10-25% premium for equip.	1.28 tonnes CO <sub>2</sub> e



## Budget for items identified for Community climate action

Community Climate Actions	Estimated Costs	Estimated Emission Reductions
Electric car charging infrastructure	\$3000 for Level 2 chargers \$10,000 for Level 3 chargers	10% electric vehicle use would reduce 1985 tonnes of CO <sub>2</sub> e
Active transportation promoted	Staff time and promotional materials cost	3% reduction in vehicle use will reduce 600 tonnes of CO <sub>2</sub> e
Transit use encouraged	Staff time, subsidies and promotional materials cost	2% reduction in vehicle use to the bus - reduce 400 tonnes of CO <sub>2</sub> e
Community Energy System	Considerable funding required. Payback in 8 years.	A 5% reduction in NG use would reduce 560 tonnes of CO <sub>2</sub> e
Thermal Imaging Camera	\$450 for camera and staff time to facilitate	A 1% reduction in heating fuel use would reduce 126 tonnes of CO <sub>2</sub> e
Step Code implementation	\$10,000 builder workshop, training and marketing.	Buildings account for 38% of emissions and Step Code will help
Organics Diversion – composters	\$3,000 annually to subsidize composters	If user rates are high composters may reduce 80 tonnes of CO <sub>2</sub> e
Organics Diversion – area pick-ups	\$2 million composter*, \$10,000 for area pick up containers.	If user rates are high composters may reduce 120 tonnes of CO <sub>2</sub> e
Organics Diversion – Curbside pickup bi-weekly	\$2 million composter*, \$30,000 bins, bi-weekly costs of curbside pickup.	Bi-weekly curbside pickup may reduce 400-500 tonnes of CO <sub>2</sub> e



## Appendix 1 – Impacts on Quesnel explained.

\* Growing Degree-Days (GDDs) is a variable that indicates the amount of heat energy available for plant growth. It is calculated by multiplying the number of days that the mean daily temperature exceeded 5°C by the number of degrees above that threshold. For example, if a given day saw an average temperature of 8°C (3°C above the 5°C threshold), that day contributed 3 GDDs to the total. If a month had 15 such days, and the rest of the days had mean temperatures below the 5°C threshold, that month would result in 45 GDDs.

\* Heating Degree-Days (HDDs) is a variable that can be useful for indicating energy demand (i.e. the need to heat homes, etc.). It is calculated by multiplying the number of days that the average (mean) daily temperature is below 18°C by the number of degrees below that threshold. For example, if a given day saw an average (mean) temperature of 14°C (4°C below the 18°C threshold), that day contributed 4 HDDs to the total. If a month had 15 such days, and the rest of the days had average (mean) temperatures above the 18°C threshold, that month would result in 60 HDDs.

\* Frost-free days is a variable referring to the number of days that the minimum daily temperature stayed above 0°C, useful for determining the suitability of growing certain crops in a given area. An increase in frost free days will extend the growing season allowing for changes in crop and tree species production.



## Appendix 2 - What is a tonne of CO<sub>2</sub>e?

The Provincial Carbon Neutral Government Regulations list six distinct gasses or groups of gasses that contribute to global warming and climate change: carbon dioxide (CO<sub>2</sub>); methane (CH<sub>4</sub>); nitrous oxide (N<sub>2</sub>O); hydrofluorocarbons (HFCs); Sulphur hexafluoride (SF<sub>6</sub>); and Perfluorocarbons (PFCs). Each of these gasses have different Global Warming Potentials (GWP); meaning the gasses vary in their ability to trap heat in the atmosphere.



Volume of one ton of CO<sub>2</sub> - photo by klimakempen (flickr) - CC-BY-NC-2.0, Copenhagen

To ensure we measure the effects equally we convert these gasses to a carbon dioxide equivalent (CO<sub>2</sub>e). CO<sub>2</sub>e is the standard unit for measuring and comparing emissions across greenhouse gasses of varying potency in the atmosphere. We base this measurement on CO<sub>2</sub> as it is the most dominant greenhouse gas in the atmosphere. For most carbon footprints or greenhouse gas inventories the standard unit of measure is in tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e).



## Endnotes

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- <sup>i</sup> Environment and Climate Change Canada. Canada's Changing Climate Report. April 2019. Found here: <https://www.nrcan.gc.ca/maps-tools-publications/publications/climate-change-publications/canada-changing-climate-reports/canadas-changing-climate-report/21177>
- <sup>ii</sup> Prairie Climate Centre. "Seeing is Believing: Temperature Records Prove Canada is Warming"
- <sup>iii</sup> Government of Canada. Historical Climate Data
- <sup>iv</sup> National Oceanic and Atmospheric Administration (NOAA) U.S. Department of Commerce. Climate Data Online found here: <https://www.ncdc.noaa.gov/cdo-web/>
- <sup>v</sup> The Paris Agreement. United Nations Climate Change 2015. Found here: [https://unfccc.int/files/essential\\_background/convention/application/pdf/english\\_paris\\_agreement.pdf](https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf)
- <sup>vi</sup> The Heat is On Taking Stock of Global Climate Ambition. United Nations Development Programme (UNDP) and the United Nations Framework Convention on Climate Change (UNFCCC). NDC Global Outlook report 2019. Found here: [https://www.undp.org/content/undp/en/home/librarypage/environment-energy/climate\\_change/ndc-global-outlook-report-2019.html](https://www.undp.org/content/undp/en/home/librarypage/environment-energy/climate_change/ndc-global-outlook-report-2019.html)
- <sup>vii</sup> Environment and Climate Change Canada. Canada's Changing Climate Report. April 2019. Found here: <https://www.nrcan.gc.ca/maps-tools-publications/publications/climate-change-publications/canada-changing-climate-reports/canadas-changing-climate-report/21177>
- <sup>viii</sup> Canadian Association of Physicians for the Environment (CAPE). Sign on to our Call to Action on Climate Change and Health. Found here: <https://cape.ca/take-action/call-to-action/>
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- <sup>x</sup> Ibid
- <sup>xi</sup> The Climate Leaders Playbook. Produced by the Community Energy Association on behalf of the BC Municipal Climate Leadership Council (BCMCLC). Found here: <https://bcclimateleaders.ca/>
- <sup>xii</sup> Energy Step Code. Building Beyond the Standard. Building and Safety Standards Branch of the Government of British Columbia. Found here: [https://energystepcode.ca/implementation\\_updates/](https://energystepcode.ca/implementation_updates/)
- <sup>xiii</sup> Clean BC Our Nature. Our Power. Our Future. Province of British Columbia December 2018. Found here: [https://blog.gov.bc.ca/app/uploads/sites/436/2019/02/CleanBC\\_Full\\_Report\\_Updated\\_Mar2019.pdf](https://blog.gov.bc.ca/app/uploads/sites/436/2019/02/CleanBC_Full_Report_Updated_Mar2019.pdf)
- <sup>xiv</sup> PACE BC. What is PACE financing? Found here: [https://www.pacebc.ca/what\\_is\\_pace\\_financing](https://www.pacebc.ca/what_is_pace_financing)



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<sup>xv</sup> Ibid

<sup>xvi</sup> Energy Step Code. Building Beyond the Standard. Building and Safety Standards Branch of the Government of British Columbia. Found here: <https://energystepcode.ca/>

<sup>xvii</sup> Warren, F.J. and Lemmen, D.S. (2014): Introduction; in Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation, (ed.) F.J. Warren and D.S. Lemmen; Government of Canada, Ottawa, ON, p. 19-22

<sup>xviii</sup> ICLEI (2010). Changing Climate, Changing Communities. Toronto, ON. Retrieved from [http://icleicanada.org/images/icleicanada/pdfs/GuideWorkbookInfoAnnexes\\_WebsiteCombo.pdf](http://icleicanada.org/images/icleicanada/pdfs/GuideWorkbookInfoAnnexes_WebsiteCombo.pdf)

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<sup>xx</sup> Burby, R. J. (1998). (Ed.) Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities. Washington, D.C.: Joseph Henry Press