Town of Fraser, Colorado
Sustainability Plan

February 2016

Produced by Alison Schwabe, McKinstry
in collaboration with the Town of Fraser, Colorado

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Town of Fraser, Colorado - Sustainability Plan

Table of Contents

Executive Summary

The Town of Fraser, Colorado (Town of Fraser) recognizes that greenhouse gas (GHG) emissions from human activity are catalyzing profound changes in climate and weather, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of our community. In response, the Town of Fraser has taken action to understand the sources of these emissions within our community through the completion of a greenhouse gas emissions inventory. The results of that study are included in this report. The Town of Fraser has multiple opportunities to benefit by acting quickly to reduce GHG emissions, both through local government operations and by inspiring action throughout the community.

The Town of Fraser is doing its part. We have committed to ICLEI's Five Milestones for Sustainability Process:

Milestone 1: Conduct a Sustainability Assessment
Milestone 2: Set Sustainability Goals
Milestone 3: Develop a Sustainability Plan
Milestone 4: Implement the Sustainability Plan
Milestone 5: Monitor/Evaluate Implementation Progress

We have so far completed Milestones 1, 2, and 3, and are committed to implement the Sustainability Plan over the next year or so.

Town of Fraser's Sustainability Plan
The findings of this report provide a profile of GHG emissions sources within the Town of Fraser and establish a benchmark or emissions baseline that the Town of Fraser can later use to evaluate the success of our efforts. The Town of Fraser has also committed to a goal of 20% reduction in GHG emissions from 2014 by 2025 and has laid out initial strategies to help achieve this goal. In addition, the Town of Fraser will be repeating this analysis annually to annually assess programs and evaluate overall progress.

I. Introduction

A. Developing the Sustainability Plan

Background

The Town of Fraser has worked to increase sustainability for a number of years. The reason for developing this plan is to consolidate various efforts into a formal sustainability program, set goals, implement strategies, and measure progress.

In 2015, the Town of Fraser engaged McKinstry, an energy services company, in a Technical Energy Audit to evaluate the energy use of its facilities and develop opportunities for the town to reduce energy use and save money on utility bills. To complement this effort, the town also engaged McKinstry in developing a sustainability plan that included a GHG emissions inventory baseline for town operations and the community, goal setting, scenario modeling, and recommended actions to achieve the goals set. Also in 2015, the Town of Fraser was awarded a grant for over $30,000 from the Colorado Department of Health and Environment to undertake a regional solid waste diversion planning initiative.

Process

The first step in this process was to define sustainability in a way that resonated with the Town of Fraser's staff and community. Early on, it was decided that outreach to staff and the local community was an important part of the process.

In late 2015, town staff were presented an initial analysis of GHG emissions impact and asked to help define sustainability and brainstorm opportunities. Town staff decided that defining sustainability using the triple bottom line made the most sense and that other good ways to message sustainability include increasing "quality of life" and responsibility" as well as "making viable business decisions". Staff expressed interest in learning more about transit, housing, and what other communities are doing.

Part of the analysis revealed that thirteen commercial utility accounts accounted for over half of the commercial electricity use. Since the Town of Fraser is relatively small, a few weeks later town staff and McKinstry met with a number of local businesses to talk about energy and sustainability efforts and get a general sense of their awareness of these issues. It turns out that some entities are engaging in comprehensive sustainability including Grand Park Community Center, Fraser Valley School District, and a few businesses have done various one-off projects including Fraser Valley Shopping Center and Fraser Marketplace. That said, for the most part, there has been limited action, engagement, or even interest in sustainability. One barrier seems to be up-front cost and not many businesses knew about utility (MPEI or Xcel) rebates to help mitigate this. A few businesses did seem interested in learning more about rebates including LED parking lot lighting and also expressed interest in more recycling options.

B. Context for Sustainability

Sustainability and climate change are important community and issues that more and more cities and towns are addressing. At a global level, commitments around climate change have strengthened due to the successful Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 21) in Paris this year. A two-decade-old global climate agreement was revised to become a common framework the commits all countries to

strengthen their commitments and report regularly on GHG emissions and implementation progress.

At the national level, the U.S. has made some progress on climate change legislation including the Clean Power Plan which requires GHG emissions from power plants to be reduced by 32% from 2005 levels by 2030. Fuel economy standards (CAFÉ) are the highest in history and are set to double the efficiency of cars and trucks by 2025. Over the last decade, clean energy has risen substantially; solar generation has increased by twenty times and electricity produced by wind has tripled. In 2012, U.S. GHG emissions were the lowest on record in 20 years. There is still a lot of work to be done; states, cities and towns can move these efforts forward and set higher local standards through collaborations such as the Compact of Mayors and other state- and locally-driven collaborative climate efforts.

The State of Colorado has formed a Greening Government Leadership Council to lead by example and has committed to one and five year goals in the areas of energy, water, renewable energy, transportation, and GHG emissions. Regionally, Fraser is ahead of the curve and hopes to collaborate with other nearby towns to increase impact and regional sustainability. Other mountain communities such as Breckenridge, Vail, Steamboat Springs and Aspen have engaged in sustainability efforts as have the ski resorts through a “Save Our Snow” campaign. Town of Fraser “sister cities” such as Ouray and Nederland have set up advisory boards and developed sustainability action plans; there is no need to reinvent the wheel with so many great examples of sustainability in action here in Colorado.

C. ICLEI and the Five Milestones for Sustainability

ICLEI-Local Governments for Sustainability (ICLEI) is a membership association of local governments committed to advancing climate protection and sustainable development. Since its inception in 1990, ICLEI has grown to include over 1,000 cities in the world, more than 600 of which are in the United States. ICLEI's mission is to build, serve, and drive a movement of local governments to advance deep reductions in greenhouse gas emissions and achieve tangible improvements in local sustainability.

ICLEI developed its Five Milestones for Sustainability to guide local governments through the process of developing a sustainability plan. The Five Milestones are defined below and illustrated in Figure 1.

- Milestone One: Conduct a Sustainability Assessment
- Milestone Two: Set Sustainability Goals
- Milestone Three: Develop a Sustainability Plan
- Milestone Four: Implement the Sustainability Plan
- Milestone Five: Monitor/Evaluate Implementation Progress

Figure 1: Five Milestones for Sustainability, ICLEI-USA

D. Relationship to Other Plans

The Town of Fraser has already laid the groundwork for incorporating sustainability into its culture and community. Sustainability is a common thread in the Town of Fraser's 2010 Comprehensive Master Plan. The Town of Fraser defines sustainability as a triple bottom line within this plan by stating "The Town of Fraser believes in and encourages sustainable development, which is defined as a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present but also for future generations. **Incorporating sustainability concepts into the development review process would involve evaluating the triple bottom line, economic prosperity, environment quality and social equity (people, planet and profit)."** Having this foundation is helpful in engaging the community in this effort and setting meaningful goals going forward.

D. Sectors to be addressed in the Plan

Below are the specific sectors addressed in this plan, both at a local government and community-wide levels.

- Buildings Energy Use
- Transportation Fuel Use
- Water and Wastewater Energy Use
- Materials
- Solid Waste Generation

II. Sustainability Assessment and Challenges

A. Greenhouse Gas Emissions Inventory for Community and Government Operations

GHG emissions inventories are utilized to gauge overall sustainability at both the community level and within government operations. The impact of all GHG emissions sources are converted into carbon dioxide equivalent (CO_2e) and measured in metric tons. This allows a community to map its activities in one common unit which provides insight into where opportunities for emissions reductions exist. For more information on the methodology and process used to conduct GHG emissions inventories see Appendix A.

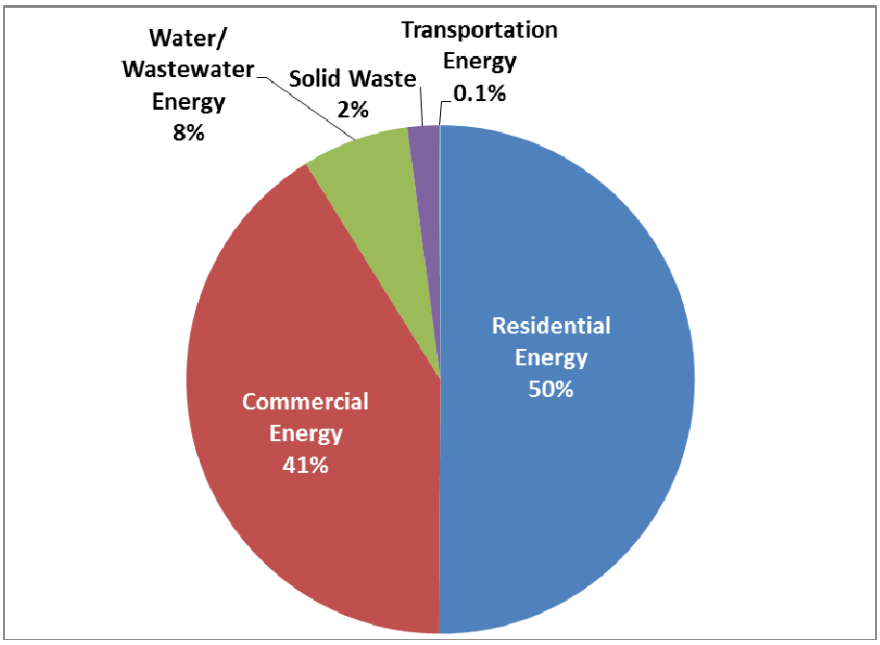
1. Community GHG Emissions Inventory

In the base year 2014 the community of Fraser emitted approximately 23,675 metric tons of CO_2e, or about 20 metric tons per capita. This is consistent with other similar communities, however many opportunities exist for Fraser to reduce its impact. Residential energy contributed the most to GHG emissions at 50%, followed closely by commercial energy (41%), energy from water and wastewater treatment and distribution (8%), solid waste generation (2%) and energy from transportation (<1%). Table 1 and Figure 2 below show the breakdown of community emissions by sectors.

Table 1: Town of Fraser Community Emissions Summary

Emissions Source Sectors	CO_2 Equivalent (metric tons)
Residential Energy	11,868
Commercial Energy	9,709
Water/Wastewater Energy	1,607
Solid Waste	465
Transportation Energy	26
TOTAL	**23,675**

Figure 2: Town of Fraser Community Emissions Summary



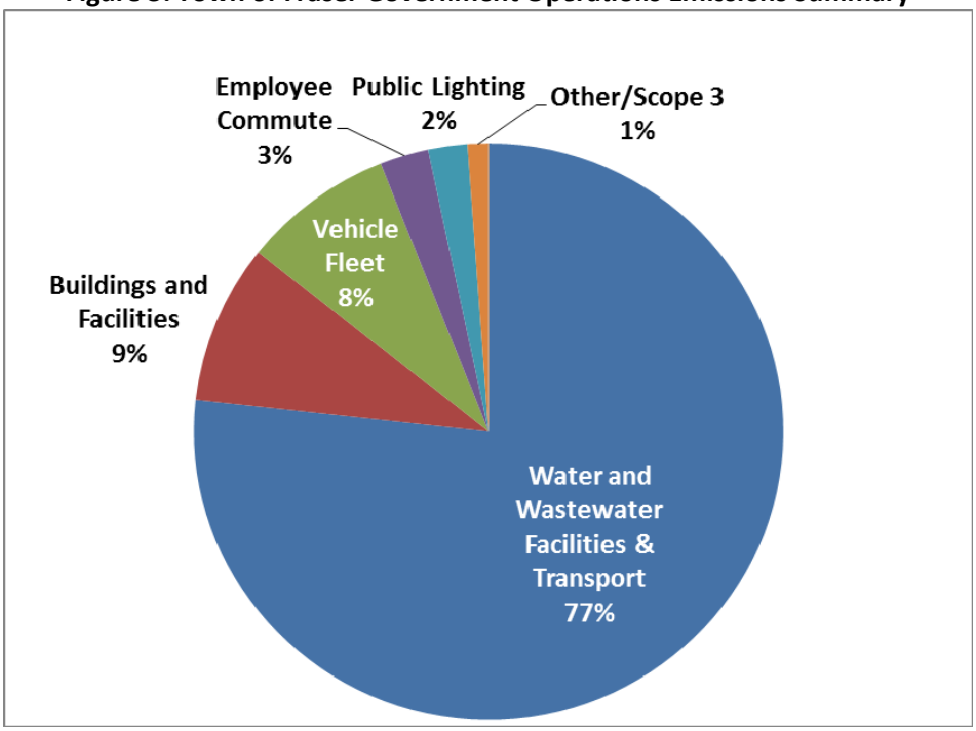
2. Government Operations GHG Emissions Inventory

In the base year 2014, the Town of Fraser government operations emitted approximately 2,094 metric tons of CO_2e. Water and wastewater facilities contributed the most to GHG emissions at a whopping 77%, followed by buildings and facilities (9%), vehicle fleet (8%), employee commute (based on survey results-3%), public lighting (2%) and other emissions (1%). Table 2 and Figure 2 below show the breakdown of government operations emissions by sectors.

Table 2: Town of Fraser Government Operations Emissions Summary

Emissions Source Sectors	CO_2 Equivalent (metric tons)
Water & Wastewater Facilities	1,607
Buildings & Facilities	188
Vehicle Fleet	174
Employee Commute	56
Public Lighting	45
Other Process and Fugitive Emissions	24
TOTAL	**2,094**

Figure 3: Town of Fraser Government Operations Emissions Summary



Government operations emissions in Fraser constitute about eight percent (8%) of the town's total GHG emissions. Local government emissions typically fall between 2 to 10 percent of overall community emissions. As a minor contributor to total emissions, actions to reduce municipal energy use may have a limited impact on Fraser's overall community emissions levels. However, government action has symbolic value and demonstrates leadership that extends beyond the magnitude of emissions actually reduced.

B. Community Greenhouse Gas Emissions Forecast

Based on the community and government operations emissions inventories developed for the Town of Fraser for the base year 2014, the next step was to forecast future emissions generated in the community. The emissions forecast represents a business-as-usual prediction of how GHG emissions may change in the community over time.

The year 2025 was chosen as the forecast/target year as a mid-range goal year (not too short- or long-term). The forecast was based on average population growth over the last decade and assumed a 5% growth rate in GHG emissions. Other assumptions include small GHG emissions reductions due to regulations and policies that will come into effect over this time including the Clean Power Plan and CAFÉ standards. Table 3 below demonstrates the increase in GHG emissions or "business-as-usual" forecast that accounts for growth and regulations if no action was taken.

Table 3: Town of Fraser GHG Emissions and Forecast Summary

	Community
Quantity of CO_2e emissions in base year 2014 (tonnes)	23,675
Business-as-usual projection of CO_2e emissions in 2025 (tonnes)	23,993

Source: ICLEI ClearPath

C. Focus Areas and Key Challenges

Based on the above assessment, the Town of Fraser decided to focus primarily on the buildings energy sector including exploring ways to reduce energy use at the wastewater treatment plant.

There are a number of key challenges in this focus area. The wastewater treatment facility is actually owned by three different entities and so making a decision to do any type of project there is difficult. There is a lot of opportunity in the residential energy sector, however targeting all town residents can be challenging and requires a significant increase in awareness and education. It is easier to target the commercial building energy sector, as 13 entities account for over 50% of commercial electricity use; that said, there are complications around ownership and a split incentive when it comes down to actually implementing strategies.

III. Summary of Sustainability Goals

A. Greenhouse Gas Emissions Reduction Target for the Town of Fraser Community

Many factors were considered when selecting the Town of Fraser's reduction target. The town strove to choose a target that is both aggressive and achievable given local circumstances. Local factors considered in selecting the reduction target included estimation of the effects of implemented and planned programs and policies, an approximate assessment of future opportunities to reduce emissions, targets adopted by peer communities, and emissions reductions expected to be consequences of policies mandated by the state and the federal government. The Town of Fraser is proposing a community GHG emissions reduction target of 20% below 2014 levels by the year 2025. To reach this target, the Town of Fraser must reduce annual emissions by 4,735 tonnes by the year 2025. See Table 4 below for a summary of these goals.

Table 4: Town of Fraser GHG Emissions Summary and Reduction Target

	Community
Base year	2015
Quantity of CO_2e emissions in base year (tonnes)	23,675
Target year	2025
Business-as-usual projection of CO_2e emissions in 2025 (tonnes)	23,993
Percent CO_2e reduction targeted by target year relative to base year (%)	20%
Quantity of CO_2e reduction targeted relative to base year (tonnes)	18,940

Source: ICLEI ClearPath

B. Focus Area Goals and Solutions

It is clear that in order to meet the goals above, the Town of Fraser needs to implement actions within the focus area that have a significant impact and are relatively easy to implement in the near-term. The strategies outlined in the next section have all been vetted taking this into account.

The Town of Fraser and McKinstry have identified some initial solutions for the key challenges listed above. It would be helpful to engage all three entities that own the wastewater treatment plant and walk them through the benefits (both from a cost and energy perspective) of implementing an energy project at the wastewater treatment plant. A residential energy awareness program could go a long way in communicating the benefits of no-cost behavioral strategies that could reduce energy up to 10% in every home. A similar commercial energy awareness program could be beneficial, as would promoting current rebates that would buy down the upfront cost of more capital-intensive measures.

IV. Initiatives and Implementation Matrix

A. Recommended Community Strategies

The strategies below were developed collaboratively with the Town of Fraser and presented to the Town Board. These strategies are initial actions for the town to implement in order to meet their overall goal. Details about the strategies are presented below and Table 5 is a summary of the strategies in the form of an implementation matrix.

1. Community Solar

According to the National Renewable Energy Laboratory, community solar is defined as "a solar-electric system that, through a voluntary program, provides power and/or financial benefit to, or is owned by, multiple community members." Community solar is an alternative to on-site generation, as many homes are not positioned or equipped to have rooftop panels nor are all homeowners interested in buying or leasing a photovoltaic (PV) system.

In the case of the Clean Energy Collective (CEC) and other LLCs that have been set up to develop community solar projects, this member-owned model allows individuals to buy solar panels in a common installation. The utility credits these owners, or members, for the power produced at or above the retail rate (net metering) directly on their bill. If they move outside of the territory, members can resell their ownership at fair market value.

The Town of Breckenridge, Colorado, purchased a total of 1,134 panels (~200 kW) in two community solar arrays developed by CEC. They spent less than $1 million and are expected to save over $150,000 the first year and over $1.8 million over 20 years. As an example, if the Town of Fraser installed half of what Breckenridge did, or a 100kW system, according to PVWatts, the town could save 150,000 kWh annually which is equivalent to around 2% of total residential electricity use.

2. Residential Energy Awareness and Education

Many communities are targeting and engaging the residential sector through energy awareness and education programs. These programs can save households up to 10% in energy through no-cost measures. Many communities partner with their utility to pair these programs with rebates so that once the no-cost measures have been implemented, the rebates help with the upfront cost of any additional more costly measure the homeowner may be interested in as a next step.

Since there are limited town resources to implement this type of a program, it would make sense to partner with another nearby community such as Winter Park or Granby. The first step for the Town of Fraser could be to form a "Green Team" that is made up of staff and community members that could increase awareness in a number of ways including setting up a sustainability website, adding energy saving tips to the monthly newsletter, and helping to educate households about the benefits of energy savings. For example, we assumed that if 20% of households reduced their energy consumption by 10% through this effort, this would reduce overall residential electricity use by around 6%.

3. Commercial Retro-commissioning

Commercial retro-commissioning is similar to getting your car serviced regularly. There are systems in the buildings (heating, air conditioning, lighting etc.) that may be performing well when they are installed but over time things go wrong and may or may not be fixed. That is, unless you perform a regular analysis and inspection of the equipment. Retro-commissioning is a systematic process that identifies performance issues with a buildings' equipment and creates a plan or process to rectify these issues. The most important recommendations that usually come out of this type of a program include modifying equipment scheduling and setpoints. Reducing the time that a building is heated or cooled and changing the temperature settings to hotter or colder (depending on the season) can have an enormous impact on energy use. The Grand Park Community Recreation Center practices ongoing commissioning, so they actually look at these types of issues on a regular basis and make adjustments frequently.

For the purpose of this analysis, we assumed that the Town of Fraser could retro-commission ~100,000 square feet of commercial space (about the size of two recreations centers) which would have an overall impact of about a 5% reduction in commercial energy use.

4. Expanding Participation in Residential & Commercial Rebates

As mentioned previously, the Town of Fraser and surrounding Grand and Jackson counties are not utilizing many utility rebates. An energy awareness and education program could help with this problem, including promoting rebates to get the word out more.

Xcel Energy (Xcel) has a number of rebates for new boilers, boiler tune-ups, furnaces, water heaters, pipe insulation, etc. (see Appendix B for the list and associated rebate amounts). Mountain Parks Electric, Inc. (MPEI) also has a number of rebates also listed in Appendix B; they also reported out on participation and impact.

From our outreach efforts, there seemed to be an interest in an LED parking lot lighting rebate, which we have included in this analysis and assumed that around ten small LED parking lot lighting projects would be implemented. In addition, we found that heat pump water heaters provided a great payback and so we assumed with some additional promotion, potentially 20% of households would take advantage of this rebate.

5. Residential Weatherization

Weatherization, or "weatherproofing" your home involves making sure a significant amount of air isn't leaking in or out of your home. If it is, some techniques to weatherize include sealing cracks/air ducts/lighting fixtures/window/doors, adding insulation, wrapping pipes, etc. Doing so will better keep warm or cold air in and save homes on utility costs. Xcel Energy and other utilities have rebates for low income "weatherization kits" to target low income populations that often spend the most on utility costs. According to the Office of Energy Efficiency & Renewable Energy, average annual savings from weatherization amount to around 30%; for this analysis we assumed that 20% of households would participate in this effort saving over 4,000 therms annually.

6. Increase Public Transit

In November, measure 2A and 2B passed, approving a one percent increase in sales tax in the Town of Fraser and a two percent increase in sales tax in Winter Park, respectively, to fund a year-round transit (bus) system in the upper Fraser Valley. While the details are still being worked out and most of the system will serve Winter Park, for the purpose of this analysis we assumed a 10% decrease in vehicle miles traveled (VMT) due to this measure. Another option to explore in the future would be to use electric buses instead of gas- or diesel-run buses.

B. Recommended Government Operations Strategies

Though not an official goal, the Town of Fraser government operations could strive to meet the same goal it is setting for its community. In fact, the recommended project at the wastewater treatment plant that came out of the Technical Energy Audit would reduce annual electricity use by 700,000 kWh or over 25% of total government operations GHG emissions (beating the goal!). While the solid waste and recycling grant project is still in development and not included in this analysis, this regional effort led by the Town of Fraser will reduce solid waste sent to landfill thus reducing GHG emissions.

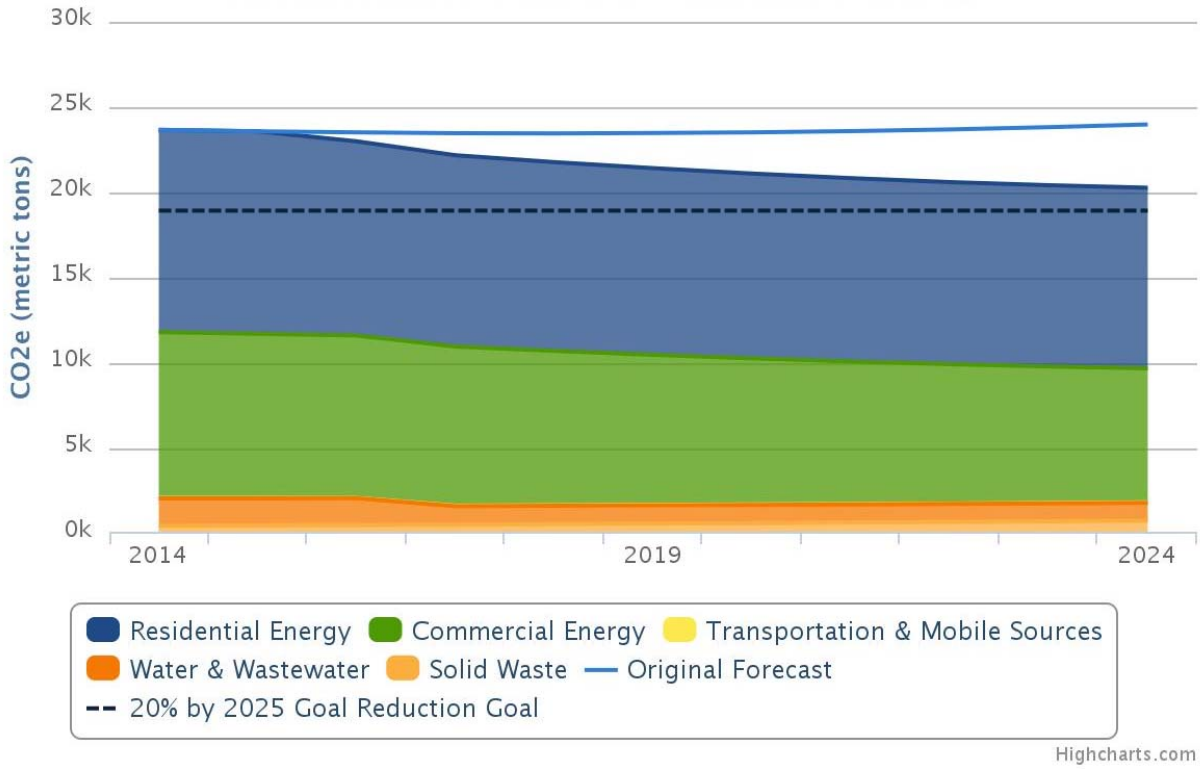
Table 5: Town of Fraser's Sustainability Plan Implementation Matrix

	Description of Initiative	Assumptions	Responsible Parties	Timeline	Funding
Overall Goal: *Reduce Community GHG emissions 20% below 2014 by 2025*					
1. Community Solar	Solar	100 kW system	Town of Fraser and partner	2018	CEC model
2. Residential Energy Awareness/Education	Education	10% reduction in 20% of homes	Town of Fraser	2016	N/A
3. Commercial Retrocommissioning	Rcx	100,000 sq. ft.; 5% reduction in energy use	Town of Fraser and partners	2017	N/A
4. Residential & Commercial Rebates	Rebates	TBD; 20% participation	Town of Fraser	2016	Rebates
5. Residential Weatherization	Weatherization	30% reduction in 20% of homes	Town of Fraser and utilities	2016	Rebates
6. Increase Public Transit	2A	10% reduction in VMT	Town of Fraser	2017	2A
Sub goal: *Reduce Government Operations GHG emissions 20% below 2014 by 2025*					
Energy Savings Performance Contracting at the WWTP	ESPC	700,000 kWh reduction/over 25% GHG emissions reduction	Town of Fraser and McKinstry	2017	Energy Savings Performance Contracting
Solid Waste Reduction and Diversion	Solid Waste and Recycling Grant	N/A	Town of Fraser and region	2016	CHPHE Grant

V. Forecast and Impact of Strategies

Taking into account the business-as-usual forecast, the overall goal set, and if the strategies above are all implemented, Figure 3 below demonstrates how close the Town of Fraser would get to achieving its GHG emissions goal of a 20% reduction below 2014 by 2025. It is important to note that the assumptions listed above are conservative, and so it is more than possible to meet the town's overall goal by implementing these strategies. Of course, as implementation and progress is monitored, changing course or adding strategies to meet the goal is highly recommended.

Figure 4: Forecast, Goal, and Strategies Summary and Impact



VI. Process for Monitoring Implementation Progress

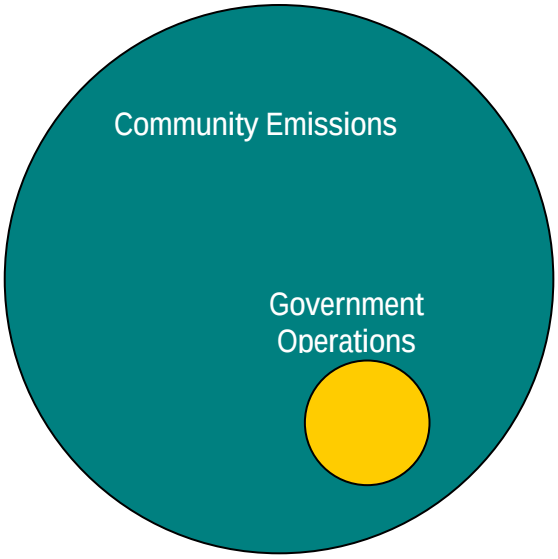
The Town of Fraser has developed a progress tracking system based on the Implementation Matrix included in this plan, and the staff and resources available. Staff was trained on this analysis and will be responsible for updating the GHG emissions information using ICLEI ClearPath and any progress on strategies and implementation in the form of an annual report.

VI. Next Steps

The next step for the Town of Fraser is to bring a sustainability plan resolution to the Town Board, committing the town to the goal of 20% reduction in GHG emissions from 2014 by 2025. After that, the town should consider forming a team of staff and community members and begin implementing the recommended strategies.

VII. Appendices
Appendix A – GHG Emissions Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory



The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline levels and sources of emissions in the community. As local governments have continued to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. Standard processes of accounting for emissions have been developed to which our inventory adheres. McKinstry used the Local Government Operations Protocol (LGOP) and U.S Community Protocol to inventory GHG emissions from the Town of Fraser's community and government operations and activities. The government operations inventory is a subset of the community inventory; for example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles. By analyzing emissions in this manner, the Town of Fraser's local government is enabled to understand its own impact within the community and lead by example to reduce its impact on climate change.

GHG Emissions Protocols

In 2008, ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) released the LGOP to serve as a national appendix to the IEAP; the community protocol was developed in 2013.[1] These protocols serve as the national standards for quantifying and reporting greenhouse emissions. The purposes of these protocols are to provide the principles, approach, methodology, and procedures needed to develop a local government or community greenhouse gas emissions inventory. McKinstry used these protocols to conduct the government operations and community GHG emissions inventories.

Quantifying Greenhouse Gas Emissions

Establishing a Base Year

A primary aspect of the GHG emissions inventory process is the requirement to select a base year with which to compare current emissions. The Town of Fraser selected 2014 as the base year to be consistent with the Technical Energy Audit baseline.

[1] http://icleiusa.org/ghg-protocols/

Establishing Boundaries

According to the LGOP, a government can use two approaches to define its organizational boundary for reporting greenhouse gas emissions: 1) activities and operations that the jurisdiction controls operationally; and 2) activities and operations that the jurisdiction controls financially. McKinstry estimated government operations emissions based on activities and facilities for which the town maintains operational control; the exception is the wastewater treatment plant which is owned by three entities. The community boundary is more straight-forward, it includes any activities that are within the boundaries or limits of a community.

Emission Types

The protocols recommend assessing emissions from the six internationally recognized greenhouse gases regulated under the Kyoto Protocol as listed in Table A1. Greenhouse gas emissions are commonly aggregated and reported in terms of equivalent carbon dioxide units, or CO2e. This standard is based on the Global Warming Potential (GWP) of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat, so one metric ton of methane emissions is equal to 21 metric tons of carbon dioxide equivalents. See Table A1 for the GWPs of the commonly occurring greenhouse gases.

Table A1: Greenhouse Gases

Greenhouse Gas	Chemical Formula	Global Warming Potential
Carbon Dioxide	CO_2	1
Methane	CH_4	21
Nitrous Oxide	N_2O	310
Hydrofluorocarbons	Various	43-11,700
Perfluorocarbons	Various	6,500-9,000
Sulfur Hexafluoride	SF_6	23,900

Quantification Methods

Greenhouse gas emissions can be quantified in two ways; the second method was used to generate this inventory:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- **Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation is used:**
  Activity Data x Emission Factor = Emissions (method used for these inventories)

Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity

consumption, and annual vehicle miles traveled. See Appendix B for a detailed listing of the activity data used in composing these inventories.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO2/kWh of electricity). Table A2 demonstrates an example of common emission calculations that use this formula. In addition, the Master Data Workbook that was used to collect and process activity data for this inventory was included with the submission of this report.

Table A2: Basic Greenhouse Gas Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kWh)	CO2 emitted/kWh	CO2 emitted
Natural Gas Consumption (therms)	CO2 emitted/therm	CO2 emitted
Gasoline/Diesel Consumption (gallons)	CO2 emitted /gallon	CO2 emitted
Vehicle Miles Traveled	CH4, N2O emitted/mile	CH4, N20 emitted

ClearPath Emissions Software

To facilitate community efforts to reduce greenhouse gas emissions, ICLEI-USA developed the ClearPath emissions management software in 2014. ClearPath is designed for compatibility with the protocols and determines emissions by combining activity data (energy consumption, waste generation, etc.) with verified emission factors. ClearPath also has the ability to forecast emissions and create a plan to reduce emissions by modeling out various strategies.

Evaluating Greenhouse Gas Emissions

Greenhouse Gas Emissions by Scope

For both community and government operations, emissions sources are categorized relative to the geopolitical boundary of the community or the operational boundaries of the government. Emissions sources are categorized as direct or indirect emissions – Scope 1, Scope 2, or Scope 3. The prevention of double counting for major categories such as electricity use and waste disposal is one of the most important reasons for using the scopes framework for reporting greenhouse gas emissions at the local level.

Similar to the community framework, the government operations scopes are divided into three main categories:

Scope 1: Direct emissions from sources within a local government's organizational boundaries that the local government owns or controls.

Scope 2: Indirect emissions associated with the consumption of purchased or acquired electricity, steam, heating, and cooling. Scope 2 emissions occur as a result of activities that take place within the organizational boundaries of the reporting entity, but that occur at sources owned or controlled by another entity.

Scope 3: All other indirect emissions not covered in Scope 2, such as emissions from up-stream and downstream activities that occur as a result of activities within the operational boundaries of the local government, emissions resulting from the extraction of and production of purchased materials and fuels, contracted services, and waste disposal.

Scope 1 and Scope 2 sources are the most essential components of a local government greenhouse gas analysis because these sources are usually significant in scale and are directly under the control of local governments. Local governments typically have indirect control over Scope 3 emissions. For example, solid waste generated from government operations is included as Scope 3 because of the unique circumstances in which emissions are generated – emissions from waste are generated over time as the waste decomposes and not directly in the base year.

Greenhouse Gas Emissions by Sector

In addition to categorizing GHG emissions by scope, this inventory examines emissions by sector. Many local governments find a sector-based analysis more relevant to policy making and project management, as it assists in formulating sector-specific GHG reduction measures and sustainability plan components. These inventories evaluate emissions by the sectors listed in Table A3.

Table A3: Sectors

Government	Community
Buildings and Facilities	Residential Energy
Materials	Commercial Energy
Vehicle Fleet	Transportation
Employee Commute	Water & Wastewater Treatment
Water & Wastewater Treatment	Solid Waste
Public Lighting	
Solid Waste	

Appendix B – Utility Rebate Programs

Xcel Energy Commercial Rebates

- For a limited time (before December 15) our rebates can cover up to 75% of your project's cost, which lowers out-of-pocket expense and speeds up the return on your investment. We offer several types of heating efficiency rebates:
    - Qualifying energy efficiency equipment rebates for new or upgraded boilers, furnaces and water heaters
    - Boiler tune-up rebates are available every two years
    - Boiler efficiency improvement rebates for pipe insulation, modular burner controls, outdoor air reset controls, stack dampers, and steam trap replacement and repairs
    - Custom rebates may be available for heating equipment not listed within the qualifying equipment section—pre-approval is required
    - To qualify, rebate applications must be submitted to Xcel Energy after installation of the equipment and within one year of the date of invoice and start-up

Rebate Limits:

Heating Efficiency bonus rebates cannot exceed 75% of the project cost (including equipment and labor). This limit has been expanded to provide more money back during the bonus rebate period (before December 15). On December 16, Heating Efficiency rebate limits will return to 60% of project cost (for equipment and labor). The minimum rebate is $5. Rebate qualifications do not imply any representation or warrant of such equipment, design or installation by Xcel Energy. Xcel Energy shall not be responsible or liable for any personal injury or property damage caused by this equipment. Xcel Energy does not guarantee any energy savings. In any case, Xcel Energy's potential liability shall be limited to the amount of the rebate paid.

Eligibility

To qualify for the rebate program, you must:

- Be a business retail natural gas customer of Xcel Energy in Colorado
- Install new or upgrade non-working equipment that uses natural gas as fuel (you may have dual-fuel as back-up)
- Use heating equipment devoted to either space heating or domestic water heating purpose
- Customers who use Gas Transport are not eligible for Heating Efficiency rebates.
- Call our Business Solutions Center at 1-855-839-8862 to verify qualification.

Qualifying equipment

Rebate

			Rebate
Hot Water Boiler	Replace a non-working or upgrade a functional hot water boiler, or install a new boiler where none existed	PLAN A-1 85% min efficiency	$750 per million BTUh
		PLAN A-2 92% min efficiency	$3,500 per million BTUh
Furnace greater than 150,000 BTUh and greater than 92% efficiency	92% AFUE		$80 per unit
	94% AFUE		$120 per unit
Water Heaters	Tankless or with storage		$200 per 100,000 BTUh
Pipe Insulation	Based on pipe diameter and R value		$3–$5 per linear foot
Boiler Tune-Ups	Must meet tune-up requirements on application		$250 per million BTUh[1] per boiler
Improvements and Add-ons (Only eligible if a breakout of the equipment costs is clearly indicated on the invoice)	Modular burner controls ≥ 5:1 turndown ratio		$750 per million BTUh[1]; $2,000 maximum
	Outdoor air reset controls		$250 per million BTUh[1]
	Stack dampers		$250 per million BTUh[1]
	Steam trap replacements		25% of trap cost up to $250 per trap; maximum $10,000 per facility

[1] Rebate dollar values shown reflect the rebate amount for qualifying boilers with input capacity of 1 MMBTUh (1 million BTU per hour). Rebate amounts will be prorated based on boiler input capacity. For example, a qualifying boiler with input capacity of 500,000 BTUh (half the size of 1 MMBTUh) would earn half the value of the designated rebate shown. Similarly, a boiler with input capacity of 2 MMBTUh would earn twice the value of the designated rebate shown.

How to get started

1. Prior to purchase or installation, check that your equipment and/or improvements meet all eligibility requirements listed on the rebate application.
2. Purchase and install your equipment. (Note: For Custom Efficiency, the project must be approved before purchase and installation. See Custom Heating Efficiency under Additional Information.)
3. After installation, complete and submit the rebate application per the requirements and instructions listed on the form. All information needs to be supplied before a rebate check can be issued; incomplete applications will delay processing.

4. Include a copy of your paid invoices (with the appropriate level of detail required) with the submitted application. Any missing information will cause a delay or denial of the rebate application.
5. If you've conducted a Boiler Tune-Up, use the Express Boiler Tune-Up application below.

2014 MPEI RUS Form 7 Part P: Energy Efficiency Programs Calculation Justifications

1. Residential

Energy Star Clothes Washers

- Total units: 38
- MMBTU saved per unit = 0.23 (per RUS calculator)
- TOTAL MMBTU saved = 8.74
- 2014 dollars invested: $1,520

Unique customers: 28.15

Energy Star Dishwashers

- Total units: 65
- MMBTU saved per unit = 0.163 (per RUS calculator)
- TOTAL MMBTU saved = 10.6
- 2014 dollars invested: $ 1,950

Unique customers: 46.5

Energy Star Refrigerators

- Total units: 104
- MMBTU saved per unit = 0.423 (per RUS calculator)
- TOTAL MMBTU saved = 44.00
- 2014 dollars invested: $7,680

Unique customers: 93.65

Energy Star Refrigerators (with RECYCLED)

- Total units: 87
- MMBTU saved per unit = 4.386 (per RUS calculator)
- TOTAL MMBTU saved = 381.6
- 2014 dollars invested: $7,000

Unique customers: 79.25

Energy Star Refrigerators (RECYCLED ONLY)

- Total units: 10
- MMBTU saved per unit = 3.96 (per RUS calculator)

- TOTAL MMBTU saved = 39.6
- 2014 dollars invested: $400

  Unique customers: 3

Electric Water Heaters

- Total units rebated: 43 *(18 Marathons, 25 non-Marathon per T-S spreadsheet & MPE 2014 sales records)*

  (18 Marathons, MPE paid an additional $20 rebate)
- MMBTU saved per unit = 0.548 (per RUS calculator, inputs: existing EF 0.88, new EF 0.91)
- TOTAL MMBTU saved = 23.6
- 2014 dollars invested: $2,675
  = $3,035 TOTAL
  Unique customers: 35.75 (per Rosie's report)

Heat Pump Water Heaters

- Total units rebated: 1
- MMBTU saved per unit = 9.0 (per RUS calculator)
- TOTAL MMBTU saved = 9.00
- 2014 dollars invested: $350

  Unique customers: 1

LED Lamps/Fixtures

- Total bulbs: 2,746
- MMBTU saved per unit = 0.185
- TOTAL MMBTU saved = 508.00
- 2014 dollars invested: $16,614
  Unique customers: 201.3

Air-Source Heat Pumps

- Total tons: 0
- MMBTU saved per unit = 1.57
- TOTAL MMBTU saved = 0
- 2014 dollars invested: $0
  Unique customers: 0

Ground-Source Heat Pumps

- Total tons: 0
- MMBTU saved per unit = 3.24
- TOTAL MMBTU saved = 0
- 2014 dollars invested: $0
  Unique customers: 0

2014 RESIDENTIAL TOTALS:

Unique customers: 488.6
2014 amount invested: = $37,677
2014 MMBTU Savings: 1,025.14
***NOTE: Not calculated: energy audits*

2. Commercial

LED Refrigerated Case Lighting

- Doors: 0
- MMBTU saved per door = 0.00445
- TOTAL MMBTU saved = 0
- 2014 dollars invested: $0

  Unique customers: 0

Lighting Retrofits

- TOTAL MMBTU saved: 524.1
- 2014 dollars invested:: $13,426

  Unique customers: 7

Pole-Mounted Parking Lot Lights

- TOTAL MMBTU saved: 14.4
- 2014 dollars invested: $646

  Unique customers: 2

2014 COMMERCIAL TOTALS:

Unique customers: 9
2014 amount invested: = $14,072
2014 MMBTU Savings: 538.5
***NOTE: Not calculated: energy audits & energy consumption data reporting*