City of La Crosse

2019 GREENHOUSE GAS EMISSIONS INVENTORY AND SUMMARY REPORT

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RUBY CANYON ENVIRONMENTAL

Ruby Canyon Environmental
743 Horizon Court, Suite 385
Grand Junction, Colorado 81506

(970) 241-9298

www.rubycanyonenv.com

Table of Contents

1. Introduction

1.1. City Goals

In 2009, the La Crosse County Board and La Crosse Common Council adopted the City of La Crosse & La Crosse County Strategic Plan for Sustainability.[1] The plan identifies multiple sustainability indicators and targets that the City and the County can track and monitor on an ongoing basis. Some of these indicators include electricity and natural gas usage, water usage, green product purchasing, bus ridership, education, poverty rates, and waste and recycling. The earliest year in which reliable data could be gathered for the indicators to determine the "base year" was 2007. Since 2007, some of the original indicators and goals have changed as the City and County have continued to grow and as La Crosse has incorporated more robust data into decision making.

1.2. City of La Crosse Goals

The main sources of energy utilized by government facilities are natural gas and electricity. The City has developed four long-term goals to reduce energy consumption in government facilities.

- **Goal 1A:** By 2025, the City will reduce overall energy consumption as measured by square foot within City facilities from 2007 by a minimum of 25%.
- **Goal 1B:** By 2025, at least 25% of the City's energy needs in City facilities will be generated from renewables.
- **Goal 1C:** The City will consider LEED equivalent ratings in all major renovation projects and new buildings.
- **Goal 4H:** By 2025, at least 25% of the City's residents will receive energy generated from renewables.

There are four long-term goals regarding fuel consumption in fleet vehicles and fuel related emissions.

- **Goal 1D:** By 2025, the City will consume at least 25% less fossil fuel for its vehicle fleet.
- **Goal 1E:** By 2025, at least 25% of the fuel consumed for the City's fleet will come from renewable sources and alternative fuels.
- **Goal 1F:** The City will consider policies to reduce fossil fuel used by employees for commuting.
- **Goal 1G:** The City will enhance our community's transportation system.

There are two long-term goals regarding waste generation.

- **Goal 3A:** By 2025, the City will reduce the total amount of waste generated by at least 25% and the amount that is recycled will increase by at least 25%.
- **Goal 3B:** The City will reduce its paper consumption by at least 10% each year for five years.

1.3. Next Steps

La Crosse is committed to its goals and further reducing community and government emissions. In 2019, the Common Council adopted the goal of achieving government and community carbon neutrality by 2050, and to obtain 100% renewable energy by 2050 for both the government and the city. The

1 For more information go to: http://sustainablelacrosse.com/PDF/Final%20Joint%20Plan%2005-14-09.pdf

carbon neutrality goal included incremental targets based on 2015 data for greenhouse gas emissions. In order to stay on track with this goal, the City contracted Ruby Canyon Environmental, Inc. (RCE) to complete a 2019 community and government greenhouse gas (GHG) inventory. This is La Crosse's first GHG inventory. The City already tracks its energy usage, water usage, and government fleet operations, and will be using the inventory as a primary tool for tracking its progress toward carbon neutrality. Officials in the departments of solid waste, airports, wastewater, municipal transit, and environmental planning contributed to this effort and will continue to compile relevant GHG data on an annual basis. Future inventory updates will be streamlined efforts in comparison to this initial inventory. The scope of annual updates will be to collect and input data in the ClearPath software and perform an analysis of results against the prior year and comparing emissions trends to established goals and metrics. Ongoing improvements in data collection procedures will clarify and more accurately represent the City's overall emissions profile.

2. Methodology

2.1. Criteria

The 2019 GHG inventory was completed using the Global Protocol for Community-Scale Greenhouse Emission Inventories[2] (GPC) and ICLEI's ClearPath software. The GPC provides a strong framework for reporting city-wide GHG inventories while ICLEI serves as the database where La Crosse's emissions data is generated. La Crosse plans to voluntarily report its emissions inventory to the Global Covenant of Mayors[3] (GCoM) and the Carbon Disclosure Project[4] (CDP). ICLEI's software provides the correct structure and supports GPC-compliant emissions reports that can be submitted to GCoM and CDP in the future.

2.2. Scope

The scope of this inventory was to create two inventories: one for government operations and one for community-wide emissions. Both inventories capture Scope 1 and Scope 2 emissions and include sources from electricity, natural gas, water consumption, solid waste generated, public transit, wastewater treatment, and power generation. According to the EPA, Scope 1 emissions are direct emissions from sources that are owned or controlled by the City (i.e. on-site fossil fuel combustion and fleet fuel consumption) and Scope 2 emissions are indirect emissions from sources that are owned or controlled by the City (i.e. emissions that result from the generation of electricity from a utility provider)[5]. Scope 1 sources in the City's inventory include: stationary combustion of natural gas and propane; mobile combustion of gasoline, diesel, jet fuel, and blended biofuels; as well as process and fugitive emissions from water, wastewater, and solid waste. Scope 2 sources in the City's inventory only includes purchased electricity from the grid as there were no purchased heating, steam, or renewable energy sources reported. This inventory captures Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), and Carbon Dioxide Equivalence (CO_2e) based on the global warming potential (GWP) of each gas.

The community-wide inventory captures data that is included the government operations inventory in addition to all emissions generated by the residents in order to create a more wholistic view of the emissions generated by the city. The government inventory only focuses on emissions generated by government operations. This inventory report provides the City with a more in-depth view of the

2 For more information go to: https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities
3 For more information go to: https://www.globalcovenantofmayors.org/
4 For more information go to: https://www.cdp.net/en
5 See: https://www.epa.gov/greeningepa/greenhouse-gases-epa

economic, community, and government sectors on which to focus so as to most effectively reduce overall emissions. It is a snapshot in time for La Crosse's GHG liabilities and can and should be built upon as more information becomes available.

2.3. Data Sources

The following table (Table 1) outlines the sources of emissions within the community and operated by the government of La Crosse. Emissions data was compiled in part by interviews with City and County staff responsible for local transit, solid waste, and the airport. Xcel Energy, the local energy and gas supplier, provided summaries of energy use by sector. Additionally, as the operator of the French Island Generating Station, Xcel representatives described the operations and distribution break down of the energy generated via refuse derived fuels (RDF) by locality. Community wide transportation emissions were approximated using data provided by staff at the Southwest Region of WI DOT, as explained in Section 2.4.1.4.

Table 1. La Crosse Sources of Emissions

Community		
Category	**Emission Source**	**Units**
Residential	Electricity Natural Gas	kWh Therms
Commercial	Electricity Natural Gas	kWh Therms
Transportation and Mobile	Diesel and gasoline	Gallons, VMT
Bus Fleet	Diesel and gasoline	Gallons
Airport	Jet Fuel	Gallons
Water and Wastewater	Gallons delivered Gallons treated Electricity Natural gas Digester gas	Gallons Gallons kWh Therms SCF and CH4%
Solid Waste	Waste generated Landfill gas	Tons SCF and CH4%
French Island Generating Station	Waste incinerated	Tons
Government		
Buildings and Facilities	Electricity Natural gas	kWh Therms
Streetlights and Signals	Electricity	kWh
Government Vehicles	Gasoline, diesel, and propane	Gallons
Bus Fleet	Diesel and gasoline	Gallons
Water and Wastewater	Gallons delivered Gallons treated Electricity Natural gas Digester gas	Gallons Gallons kWh Therms SCF and CH4%

2.4. Uncertainties

Where it is difficult to calculate exact GHG emissions generated by the city, estimating current GHG emissions helps to capture the magnitude of the problem and creates focal points that the city can use to create targets for reductions.

Not all Sinks, Sources, and Reservoirs (SSRs) are included in this inventory. Some of the excluded SSRs include Agriculture, Forestry, and other Land Uses (AFOLU); composting, and Municipal Employee Commuting (Scope 3). The SSRs that are not included are due to a lack of data or practical methodologies to support high-level estimates. RCE strived to use consistent methods to allow La Crosse to create meaningful comparisons over time.

2.4.1. Estimations

2.4.1.1 Solid Waste Generated

The solid waste facility that serves the city is operated by the County—La Crosse County Solid Waste (Landfill). Because this Landfill receives waste from multiple counties and cities in the surrounding area, GHG emissions for solid waste were estimated based on the quantity of waste generated by the city. The Landfill tracks data for total waste generated by the County but does not specify waste generated by the city. In order to estimate the City's total contribution of waste to the Landfill, RCE determined the City's fraction of the County's population, multiplying this value by the total waste delivered to the Landfill by the County. Based on this estimate, the City is responsible for 43.41% of the County's waste and subsequent emissions from decomposition of that waste. La Crosse is also responsible for 31% of combusted municipal solid waste (MSW) at the French Island Generation facility.

Emissions from solid waste were determined as follows:

$$E_{sw} = C_{sw} * T_{sw}$$

Where:

E_{sw} = Total emissions from solid waste generated within City

C_{sw} = La Crosse's fraction of total County population

T_{sw} =Total waste delivered to the Landfill by the County

2.4.1.2. Combustion and Flaring of Landfill Gas (LFG)

There are two streams of combustion of landfill gas incorporated into the GHG inventory – in an open flare and a Gundersen electric generator. Total waste delivered the Landfill is known, as well as how much was landfilled by La Crosse County. Waste generated by the City must be estimated. To estimate the City's GHG emissions from the combustion and flaring of LFG, RCE divided total waste generated by the County by total waste delivered to the Landfill. The City's population was then divided by the County's population. Lastly, these two fractions were multiplied together to determine that the City is responsible for 26.83% of the LFG.

Emissions from Combustion of LFG were calculated as follows:

$$LFG_e = (W_{county} / W_{total}) * (Pop_{city} / Pop_{county}) * \sum (LFG_{eFlare} + LFG_{eelec})$$

Where:

LFG_e = Total emissions from combustion of landfill gas combustion and flaring

W_{county} = Total waste generated by the County

W_{total} = Total waste delivered to the Landfill

Pop_{city} = Population of City of La Crosse

Pop_{county} = Population of La Crosse County

LFG_{eFlare} = Annual emissions from combustion of landfill gas by the open flare

LFG_{eelec} = Annual emissions from combustion of landfill gas for onsite generation of electricity

2.4.1.3. Water and Wastewater Treatment

The treatment plant serves a total population of 90,955 from within the County. The population of the City is 51,227. RCE divided the City's population by the population served. This fraction was multiplied by the quantities of electricity and natural gas delivered to the treatment center to get a more accurate representation of which emissions are attributable to the City.

N2O emissions from treatment and effluent discharge as well as CO2e from the combustion of digester gas are estimated using the City's portion of the total population. ICLEI provides default values and equations when there is not enough data available to help cities capture all emissions sources.

Emissions from water and wastewater treatement were calculated as follows:

$$\mathbf{WWT_e = (Pop_{city} / Pop_{served}) * \sum (Elec_{ewwtp} + NG_{ewwtp} + N_2O_{etreat} + CO_2e_{digester})}$$

Where:

WWT_e = Total emissions from wastewater treatment facility

Pop_{city} = Population of City of La Crosse

Pop_{served} = Total population served by wastewater treatment plant

$Elec_{ewwtp}$ = Annual emissions from combustion of landfill gas by the open flare

LFG_{eelec} = Annual emissions from combustion of landfill gas for onsite generation of electricity

2.4.1.4. Government and Community Mobile Emissions

This sector includes calculated emissions generated from the Municipal Transit (MTU) bus fleet along with an estimation for total mobile emissions by all citizens within the city boundary. MTU data relies on clean diesel and diesel-electric hybrid fuel usage data for the bus fleet. The data is of high quality with low material risk.

A medium-high degree of uncertainty exists, however, in the quantification methodology for emissions from community-wide mobile transportation. RCE assessed proxy data available through the Energy Information Administration (EIA) as well as data compiled by the Wisconsin Department of Natural Resources (WDNR) and determined that a population-based estimation using the 2020 State of Wisconsin Greenhouse Gas Emissions Inventory Report was the best available data. The most recent data available

is from 2017, requiring a conservative extrapolation of emissions based on population growth between 2017 and 2019. In 2017, the population of WI was 5.79 million, increasing 0.05% to 5.822 million in 2019. The City's population, 51,227 in 2019, was divided by the State of WI's 2019 population to determine the City's fraction of the state population. Total transportation emissions (29,400,000 MtCO2e) were multiplied by the City's fraction of the state population, and subsequently multiplied by the population growth factor to approximate 2019 transportation emissions.

Emissions from community mobile sources were calculated as follows:

$$\mathbf{Mob_{ecomm} = (Pop_{city} / Pop_{state}) * Mob_{state} * G_{state}}$$

Where:

Mob_{ecomm} = Total mobile emissions for City of La Crosse community

Pop_{city} = Population of City of La Crosse in 2019

Pop_{state} = Population of State of Wisconsin in 2017 (5.79 million)

Mob_{state} = Mobile emissions for State of Wisconsin in 2017 (29.4 million MtCO2e)

G_{state} = Growth rate in State of Wisconsin between 2017 and 2019

3. Key Findings

3.1. Community-Wide Emissions

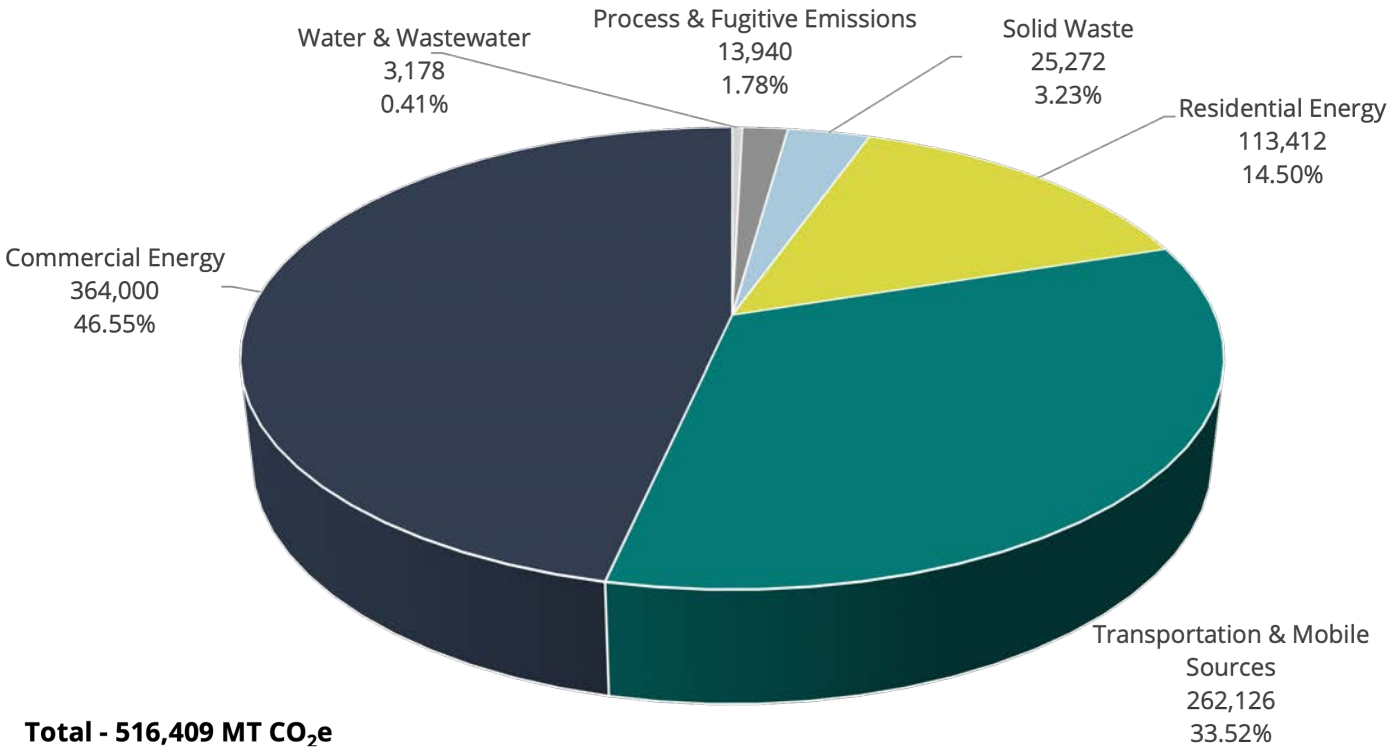
La Crosse's community-wide emissions summary (see Figure 1 on page 10) aligns with previous years' energy usage data. Community wide emissions for all categories for 2019 was 516,409 MT CO_2e. Total GHG emissions from the largest sector for the community is commercial energy use. This category incorporates all non-residential building emissions, including emissions from the category of Government Operations. According to the City's historical Xcel data and the *City of La Crosse & La Crosse County Sustainability Indicators 2018 Report*[6] (Sustainability Indicators Report), commercial energy usage made up more than 70% of all non-transportation energy usage within the city since at least 2010. In 2019, commercial energy (all scopes) generated just below half (46.5%) of all GHG emissions within the city or 364,000 metric tonnes of CO_2e (MT CO_2e), representing the largest category of emissions. Transportation and Mobile sources represent approximately one-third (33.5%) of all emissions, which was a previously underestimated component of the City's emissions profile. Residential Energy is the third largest emissions source in the City. The residents of the City generated 22% of all GHG emissions through electricity and natural gas usage.

3.2. Government Operation Emissions

La Crosse's government operations (see Figure 3 on page 11) generate significantly fewer emissions than the community as a whole. Total government emissions for 2019 were 14,378 MT CO_2e. Buildings and Facilities are the largest sources for government operations, generating 6,234 MT CO_2e. This was followed

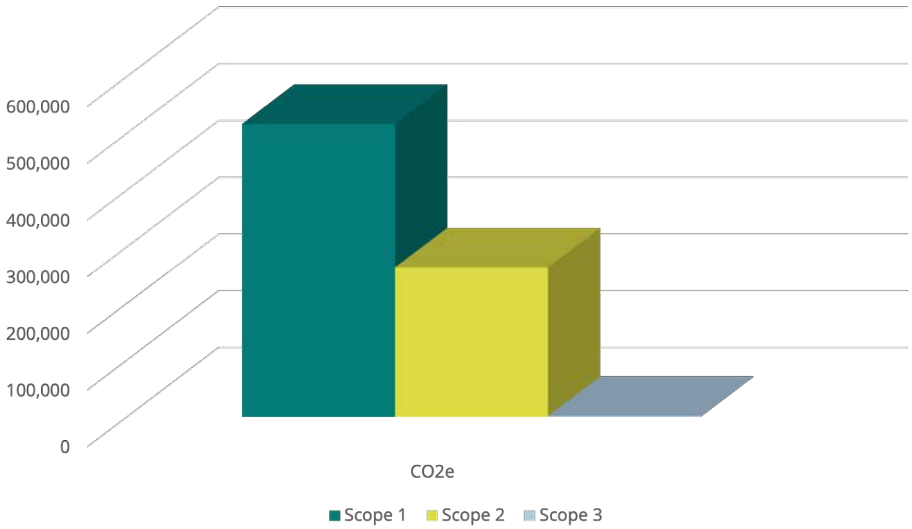
6 For more information go to: http://www.sustainablelacrosse.com/PDF/sustainabilityIndicatorsReport.pdf

Figure 1. Community-Wide CO_2e Emissions



Total - 516,409 MT CO_2e

Figure 2. Community-Wide All Scope CO_2e Emissions



by Water and Wastewater with 3,776 MT CO_2e and Vehicles with 2,174 MT CO_2e. The relative breakdown of emissions by each sector of government operations is shown in Figure 4 (page 11).

It is important to note that the City does not operate its own landfill, but rather sends its waste to the La Crosse County Solid Waste Management Facility, which is why Solid Waste generates no emissions in the government portion of this inventory. This sector is one of the largest emitters for government operations in many cities that do operate their own landfill. Emissions from landfill gas combustion, fugitive methane, waste collection, composting, and energy generation from solid waste at the French Island Generating Station are accounted for in the community-track inventory as these components are outside of the operational control of the government of the City of La Crosse. See recommendations for accounting for solid waste emissions in Section 4.1.

Figure 3. Government Operations CO_2e Emissions

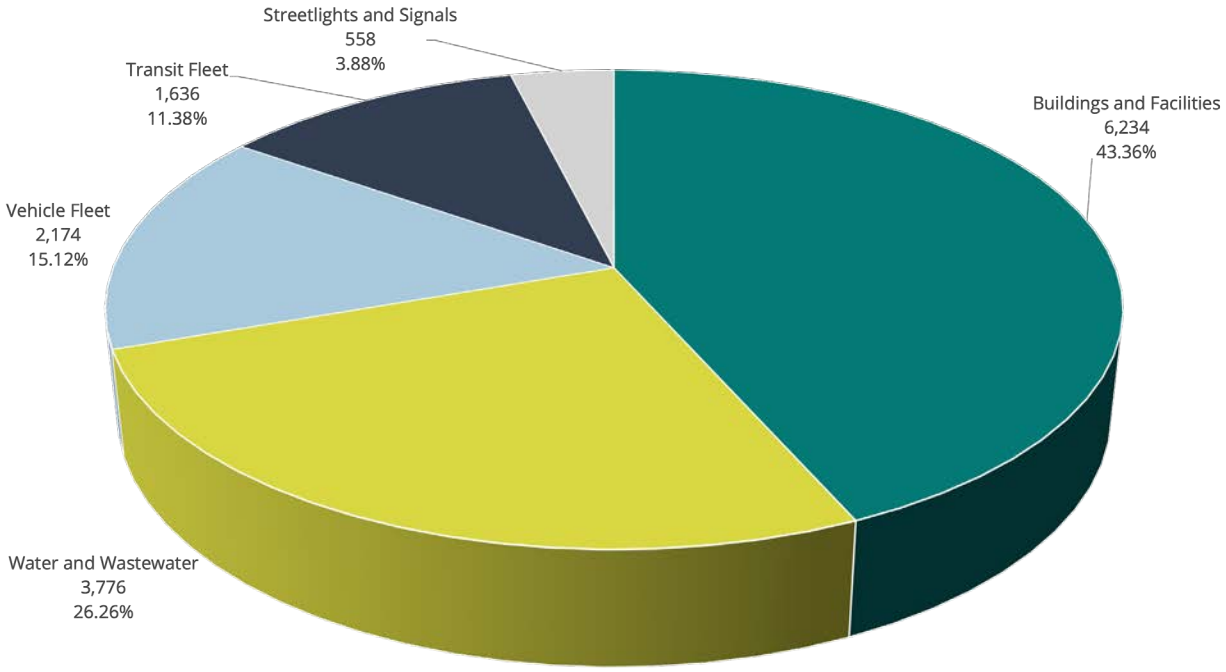
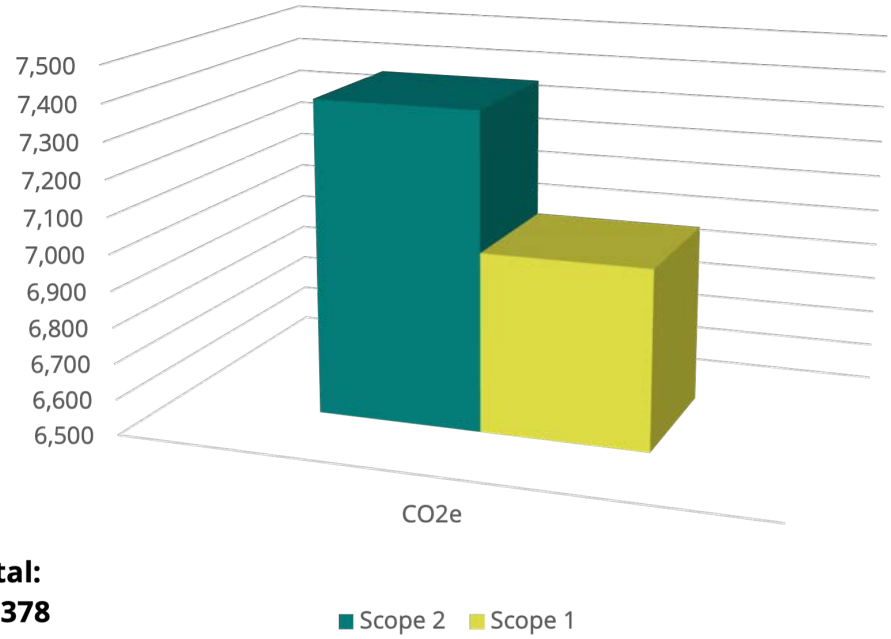


Figure 4. Government Operations CO_2e By Scope

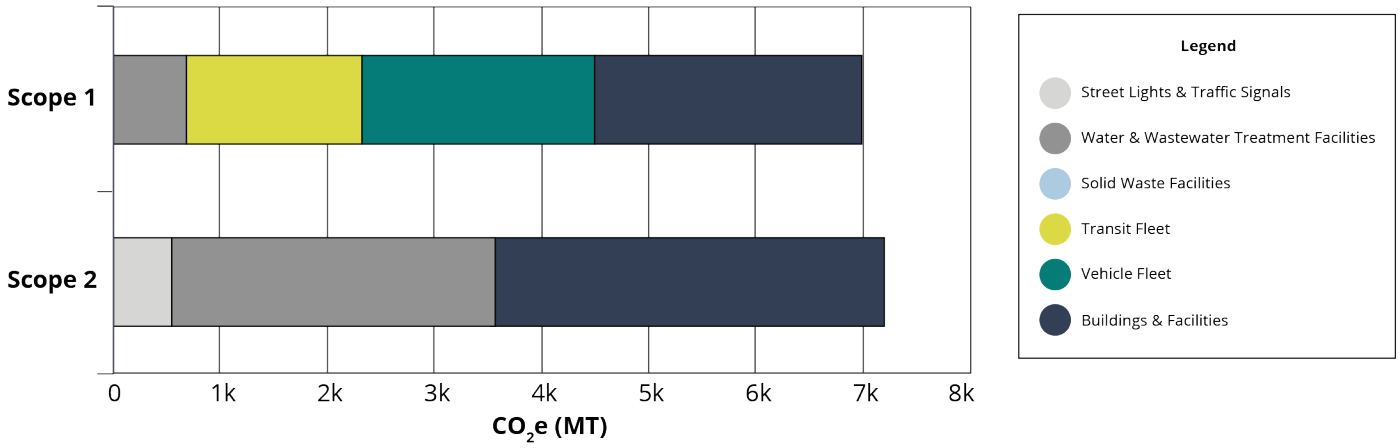


3.3. Comparison Between GHG Inventory and Sustainability Analysis

3.3.1. Community-Wide Comparisons

The outcomes of RCE's analysis of the community's GHG emissions align with the previous sustainability analyses. Relative emissions levels across both Scope 1 and Scope 2 sources remain consistent with the trends from the Sustainability Indicators Report. According to Xcel data from 2015 to 2019, commercial

Figure 5. Government Emissions by Sector and Scope



electricity averages 77.9% of total electricity and commercial natural gas averages 74.7% of total natural gas used by the city. When breaking down community-wide emissions by scope, commercial natural gas usage accounts for nearly 31% of all Scope 1 emissions. This is followed by residential natural gas usage at 10.8% (see Figure 6). For Scope 2, commercial electricity accounts for 77.5% of GHG emissions. This is followed by residential emissions, which total 21.9% of Scope 2 emissions (see Figure 7). These emissions values closely align with those previously described in the Sustainability Indicators report.

Figure 6. Community Wide Scope 1 Emissions

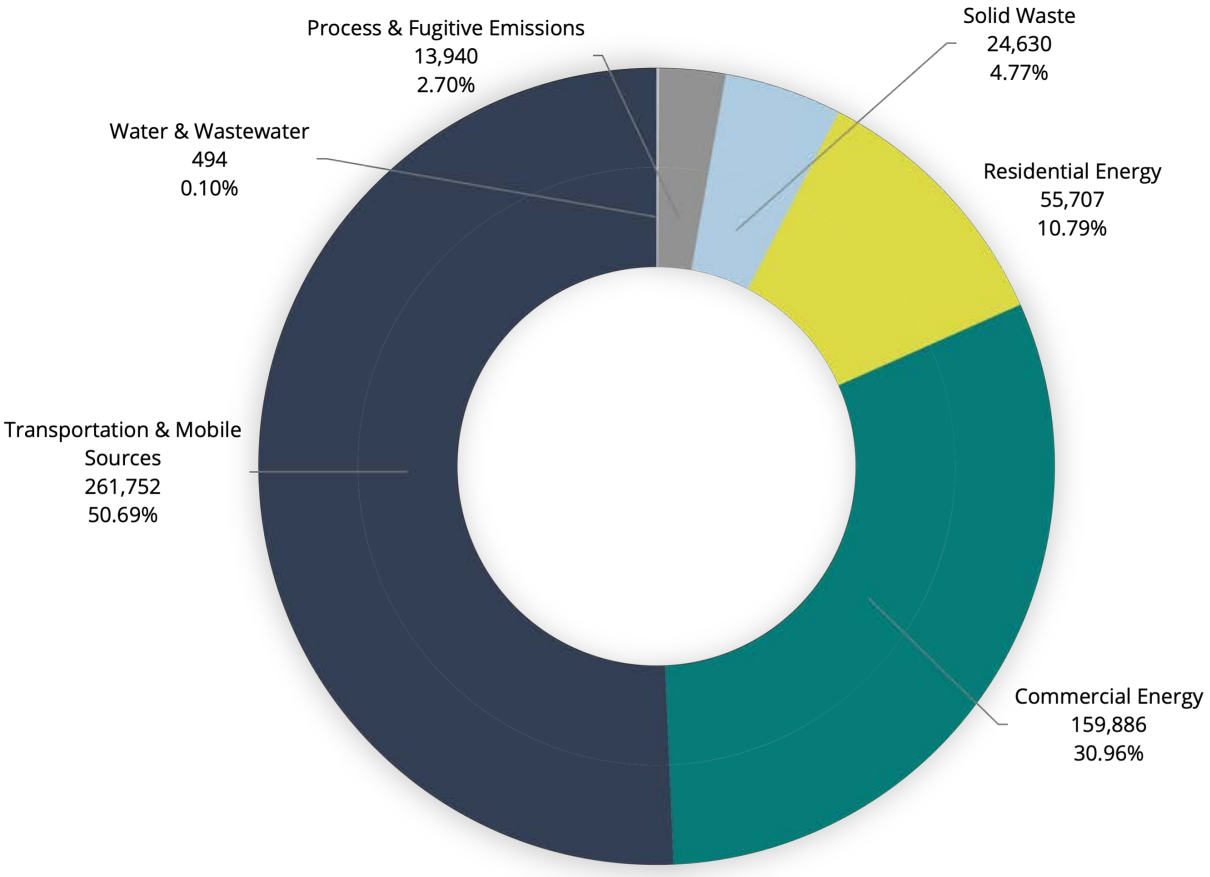
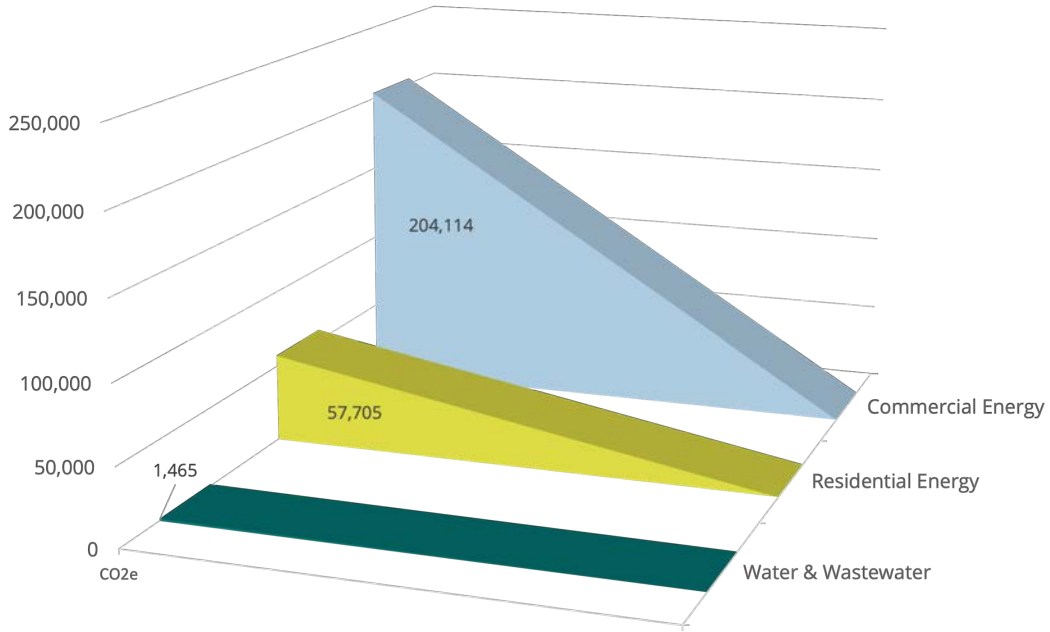


Figure 7. Community-Wide Scope CO_2e Emissions



The main difference between the previous analysis and the results of this inventory is the inclusion of all community transportation emissions sources. While the methodology used in the determination of the exact value of CO_2 emissions from transportation is imprecise, as discussed in Section 2.4.1.4., the relative scale of this category comprising the greatest fractional percentage of Scope 1 emissions follows trends in many local, state, and national level inventories across the US.

3.4. Sustainability Indicators Report Trends

The Sustainability Indicators Report tracks trends in the City's energy, water, waste, and fuel usage. In the introduction to that report, the City has discussed to what degree these goals have been met. An overview is provided of metrics selected by the City as most relevant to GHG emissions reporting and subsequent policy actions.

3.4.1. Goal 1A – Reducing energy consumption 25% by 2025

Energy consumption is a measure of electricity and natural gas use. In terms of electricity, municipal facilities used 22.1 million kWh in 2019. That is a 6.7% reduction since the 2007 baseline (23.7 million kWh). To meet their goal, La Crosse will need to reduce their kWhs by 4.3 million in six years. In terms of natural gas, municipal facilities consumed 534,932 therms in 2019. That is a 4% increase since the 2007 baseline (514,468 therms). To meet their goal, La Crosse will need to reduce their therms by 149,097 in six years. Electricity and natural gas use have not shown a steady trend downward in the last 12 years.

3.4.2 Goals 1B and 4H – Increasing renewable energy use 25% by 2025

Increasing the City's renewable energy supply can have a major impact on overall emission reductions. In 2018, the City's energy purchases were 28.5% renewable, which exceeds the original target of 25%. While the City did not have any renewable sources within the City limits in 2019, there are multiple opportunities to install and increase renewable energy usage in the future.

3.4.3 Goals 1D and 1E – Reducing fossil fuel use 25% and increasing renewable fuel use 25% by 2025

Both goals 1D and 1E regard the City's fuel consumption. The City consumed 3.2% less fuel than in 2008. 11.8% of the total fuel used came from alternative fuel sources such as propane. As fully electric cars and buses decrease in price, the City can make considerable advancements on these goals.

3.4.4 Goals 1F and 1G – Reducing emissions from commuting and Enhancing the Community's transportation

The general goal of enhancing the community's transportation system is a step in the right direction towards reducing both vehicle miles travelled and fuel consumption while increasing public health. La Crosse's MTU ridership decreased by 4.4% in 2018 when compared to 2007. However, the City has added 1.2 lane-miles of on-road biking infrastructure and 0.2 lane-miles of off-road biking infrastructure increasing total on-road infrastructure to 27 lane-miles and off-road infrastructure to 18.6 lane-miles.

Moreover, the U.S. Census Bureau's American Community Survey (ACS) shows that from 2013 to 2017 12.4% of people walked or biked to work, 7.6% carpooled, and 1.9% used public transit.

3.4.5 Goal 3B – Reducing paper consumption 10% per year

The City has reduced its paper consumption by 30.9% since 2007. Its paper usage, on average, has declined 4% per year from 460 cases in 2007 to 318 cases in 2016. Although the City's 2016 target of 178 cases used was not met, paper purchasing methods changed in 2017.

4. Recommendations

4.1. Annual GHG Inventory Updates

As La Crosse moves forward with its climate action goals, completing annual GHG inventories will be another tool the city can use to track its progress. GHG inventories help to reduce large datasets into more manageable segments so that the City can more easily target specific areas of GHG emissions.

In order to accurately account for fugitive emissions from landfill waste, RCE recommends instituting a tracking protocol for waste collection from within the geographic boundaries of the City. This would require a code attached to all weight tickets from within the City, or otherwise metering the weight and composition (as available) from all routes primarily servicing City residents and businesses.

4.1.1. Critical Emission Sources

Electricity and natural gas emissions are the largest emitters for both the community wide and municipal GHG inventories. As the City moves forward with its climate change mitigation and adaptation, reducing these two sources will have a tremendous effect on the City's overall GHG emissions. Electricity consumption can be reduced by retrofitting old buildings, installing solar panels, purchasing low-to-no emission energy sources, or purchasing low-energy use appliances and fittings. Natural gas emissions can be reduced by switching gas-powered appliances and heaters to electric power, so that these can be

powered by renewable power technologies in the future.

Because RCE estimated community-wide gasoline and diesel use emissions using a WI state transportation emissions proxy, the exact emissions total is unknown, though the magnitude is understood as being the largest, single source of Scope 1 emissions for the community (see Figure 6). Transportation is generally one of the largest sources within other community GHG inventories as well and is among the most difficult to mitigate. Changing driving habits relies on community members to change their driving habits, utilize public transit, walk, bike, or purchase electric vehicles. The City of La Crosse can consider methods to incentivize the purchase electric vehicles (e.g. preferred parking spots for EVs with free charging stations, local government tax incentives, free services to help calculate long-term EV $ savings) as a means of lowering this category of emissions. Even though it is hard to change people's habits, as climate change and climate mitigation become more prevalent issues the City may have an easier time convincing its citizens to utilize other forms of transportation.

As described in Section 4.3., developing, implementing, and building policies based on the conclusions of this inventory and a directed Climate Action Plan will allow for science and policy to guide decision making in mitigation of emissions from key sources.

4.2. Setting Targets

The City of La Crosse has already laid out multiple goals from the *City of La Crosse & La Crosse County Strategic Plan for Sustainability* document. However, as this was written in 2009, the original goals and targets should be updated to align with the most recent community and municipal data. These goals and targets will be easier to set and assess as the City becomes more familiar with its GHG emissions.

Most of the goals from the *City of La Crosse & La Crosse County Strategic Plan for Sustainability* end in 2025, which is four years away. Being only four years away makes it difficult for the city to try and meet these goals. RCE recommends setting targets that extend out to 2050 with interim year goals, which aligns with the most common climate action goals and targets set forth by the Intergovernmental Panel on Climate Change (IPCC), GPC, and GCoM. The interim year targets will foster accountability, realistic yet aspirational goal setting, and achievement of these goals.

4.3. Climate Action Planning

RCE recommends that the City also begins developing a Climate Action Plan (CAP). CAPs serve as technical documents that the City can utilize in reducing their emissions, planning for future climate mitigation, and creating equitable access to climate mitigation and action processes. The City of La Crosse & La Crosse County Strategic Plan for Sustainability document will be a great tool and starting place for creating a CAP, as this document mirrors the contents of a CAP. Completion of this GHG inventory establishes a baseline year for calculating future emissions, providing the City with a preliminary understanding of GHG sources within the community. The CAP will translate this GHG inventory, annual updates to the inventory, and emission reduction targets into a substantive and concise directory for community climate action.