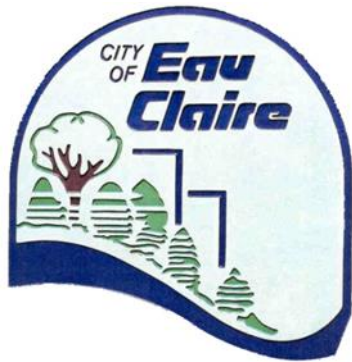


# City of Eau Claire Municipal Operations Carbon Footprint Report

## Year 2015



**May 31<sup>st</sup>, 2016**

Report Authors:  
Michaela Leach, Sustainability Intern  
Ned Noel, Associate Planner

## **Executive Summary**

The carbon footprint for the City of Eau Claire’s municipal operations for year 2015 was estimated at **24,791 metric tons of carbon dioxide equivalents (CO<sub>2</sub>e)**. This resulted in a 1.6% decrease or 393 MT CO<sub>2</sub>e from the 2013 report and a 13.1% decrease or 3,723 metric tons of CO<sub>2</sub>e decrease from the baseline year, 2011. The following table details the changes by sector.

Table 1: CO<sub>2</sub>e Comparison

<b>Sector</b>	<b>CO<sub>2</sub>e produced, metric tons (2015)</b>	<b>CO<sub>2</sub>e produced, metric tons (2013)</b>	<b>CO<sub>2</sub>e produced, metric tons (2011)</b>
Buildings & Facilities	5,293	5,414	5,800
Streetlights & Traffic Lights	4,042	3,419	5,075
Water Delivery Facilities	4,503	5,300	5,252
Wastewater Facilities	6,288	7,315	6,832
Solid Waste Facilities	171	198	200
Vehicle Fleet	1,969	2,689	2,564
Employee Commute <sup>1</sup>	1,112	1,105	1,138
Transit Fleet	1,306	871	1,383
Process and Fugitive Emissions	107	0	270
<b>Totals</b>	<b>24,791</b>	<b>25,184</b>	<b>28,514</b>

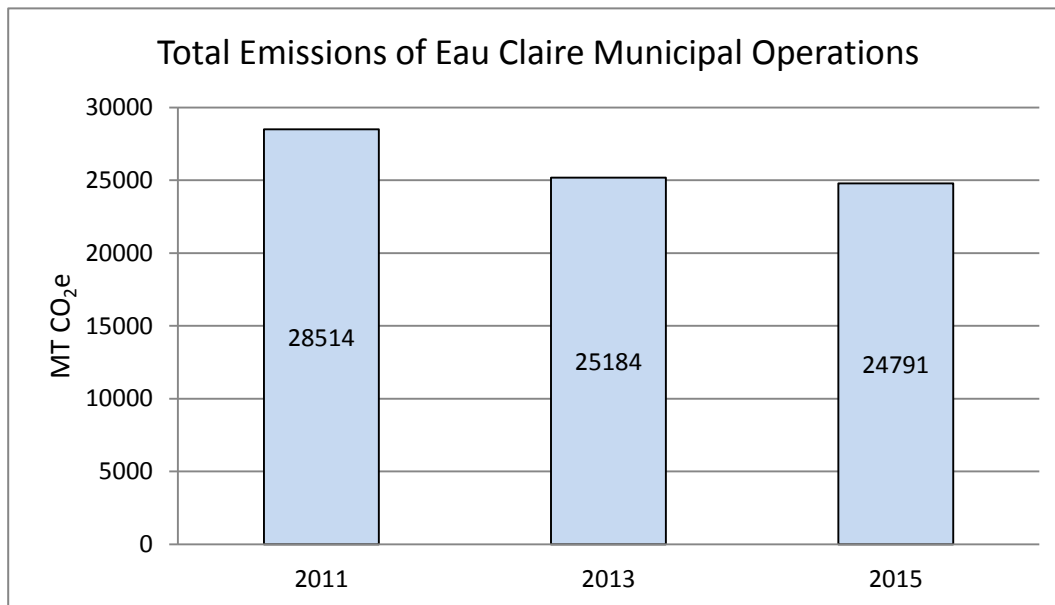


Figure 1. Comparison of emissions from the three biennial Carbon Footprint Reports for the Municipal operations of the City of Eau Claire.

<sup>1</sup> Employee commute now contains emissions from air travel to be consistent with the new ClearPath software.

## **Purpose & Background**

During November and December 2015, the United Nations Climate Change Conference, or COP 21, was held in Paris, France. The goal of this conference was to come to a binding and universal agreement on climate change from all world nations and to reduce greenhouse gas emissions (GHG) in order to limit the global increase in temperature<sup>2</sup>. As result, 177 countries, including the United States, have signed the Paris Agreement, which involves committing to reducing emissions to hold the increase in global average temperature below 2°C above pre-industrial levels<sup>3</sup>.

The United States have been making efforts to reduce GHG emissions. In November 2014, The United States and China came to a joint agreement where the US would emit 26%-28% less GHGs in 2025 than it did in 2005<sup>4</sup>. This, combined with the Environmental Protection Agency's Clean Power Plan, has helped to accelerate the reduction of greenhouse gas production in the United States.

According to the cited International Council for Local Environmental Initiatives (ICLEI) Report, US communities and local governments play an increasingly vital role in reaching the national targets for emission reduction because they have great influence over buildings, transportation, and other large emissions sources in cities. By completing GHG inventories, local governments are now able to identify problem areas, set emissions reduction goals, and implement innovative and cost-effective solutions to meet them. Examples of solutions cities can take include:

- Energy conservation, efficiency and renewable energy projects
- Low-emission development such as compact mixed use and green buildings
- Multimodal transportation (public transit, passenger rail, bike, and pedestrian)
- Sustainable procurement of goods and services
- Waste stream diversion and recycling efforts
- Water conservation, reuse, and efficiency practices
- Manage and increase urban tree canopy
- Government and private sector business partnerships
- Combine goals and solutions into a comprehensive climate action plan

Eau Claire has been focused on implementing many of the above strategies. For example, our managed public tree resource sequesters a net 6,694,955 pounds and avoids 5,775,364 pounds of CO<sub>2</sub> at a total value of \$91,122 per year.<sup>5</sup>

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<sup>2</sup> "COP21." Sustainable Innovation Forum 2015. United Nations.

<sup>3</sup> United Nations Framework Convention on Climate Change. *Conference of the Parties*. Adoption of the Paris Agreement, Paris, France.

<sup>4</sup> Steinhoff, Mike, Juan Wei, Melissa Higbee, Brian Holland, and Kevin Taylor. *Measuring Up 2015: How US Cities Are Accelerating Progress Toward National Climate Goals*. ICLEI- Local Governments for Sustainability USA.

<sup>5</sup> *Urban Forest Management Plan, City of Eau Claire*. 2010, Page 17.

## **Year in Review**

Since the last carbon footprint analysis was conducted in 2013, there has been a change in inventory methods. While the previous reports utilized the Global Warming Potentials (GWP) from the Intergovernmental Panel on Climate Change's (IPCC) Second Assessment Report, this inventory utilizes values from the Fourth Assessment Report. In addition to this change, the tracking system provided by ICLEI has shifted from the Clean Air Climate Protection 2009 desktop software to a cloud-based web application called ClearPath™. One new feature of this program is the inclusion of Factor Sets. These are used to get more accurate estimates of emissions by allowing the user to enter emissions factors customized to the specific situation.

Overall, the carbon footprint for 2015 is smaller than in previous years. This reflects the steady progress the City has made working to reduce emissions. However, many city-run facilities and processes are influenced by weather. Use of electricity and natural gas for heating and cooling can be dependent on the severity of the weather during summer and winter months. The variability in temperature and precipitation in the summer can also cause water usage to change, thereby effecting energy use. Additionally, temperature and amount of snow during the winter can influence transit use, snow plow usage, and more. Because of weather fluctuations, it is difficult to determine general energy usage trends; however there are specific tools such as EPA's Energy Star Portfolio Manager® that can normalize weather trends for buildings.

One noticeable reduction in 2015 emissions is a result of the upgrades completed on the Wastewater Treatment Plant. These improvements have decreased the effluent discharge of ammonia into the Chippewa River from 735 kg/day to 36 kg/day. Due to increased efficiency of treatment, the result is a 95% decrease in emissions from effluent discharge. Since water management and treatment is such a large portion of the City's emissions, this is a great success.

The City should continue to work to reduce fugitive emissions. In 2015, refrigerant leaks that were not observed in 2013 occurred. While the leaks were relatively small, these chemicals have high GWP, and can be avoided by identifying and fixing the cause of the leaks.

Based on the findings of this report, it is recommended that the City continue to implement measures that will reduce GHG emissions for its municipal operations. This report can be used to assist policy-makers to continue sustainability efforts. A list of next steps is outlined in the City's original Carbon Footprint Report. It contains detailed recommendations for the City in pursuit of GHG mitigation efforts<sup>6</sup>. These recommendations, as well as implementation of new goals and strategies, will help the City reduce its own carbon footprint while aiding the nation in meeting the Paris Agreement.

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<sup>6</sup> Suntsov, Vladislav, and Ned Noel. *City of Eau Claire Municipal Operations Carbon Footprint Report Year 2011*.

## Sector Analysis

### Summary

This section presents emission sources grouped by sectors, along with the methods used to convert activity data into emissions. Included are the references on who provided the activity data. This will help identify the responsible entity to collect source information for future carbon footprints. The City of Eau Claire’s municipal operation in 2015 resulted in **24,791 metric tons of CO<sub>2</sub>e**. The following figure and table note the emission breakdown per sector.

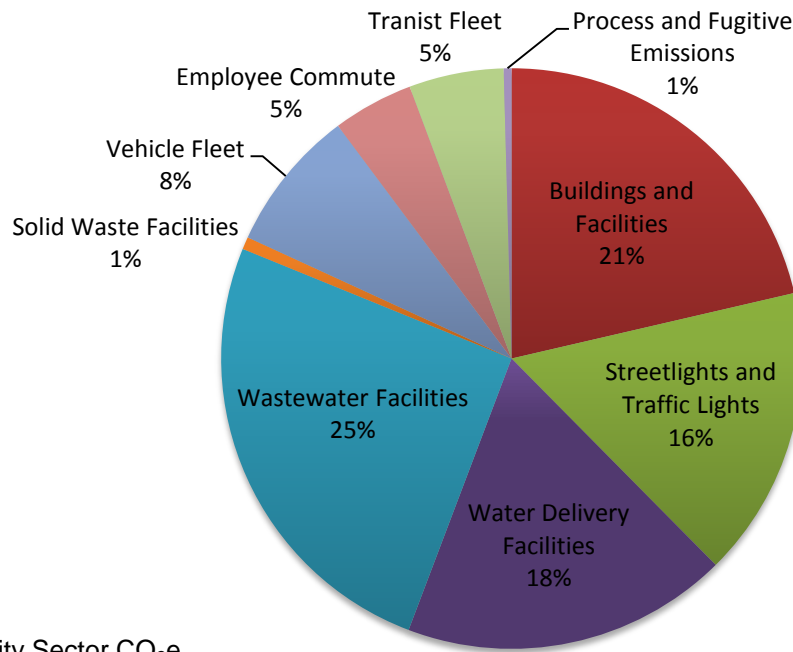


Figure I: City Sector CO<sub>2</sub>e

Table 2: City Sector CO<sub>2</sub>e

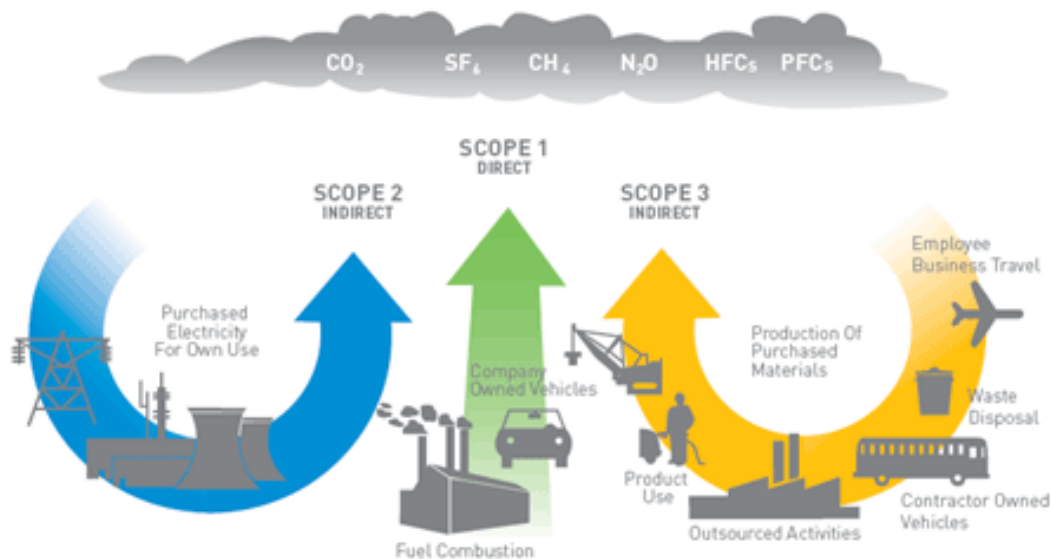
Sector	CO <sub>2</sub> e produced, metric tons	Energy consumed, MMBtus
Buildings & Facilities	5,293	46,443
Streetlights & Traffic Lights	4,042	19,560
Water Delivery Facilities	4,503	23,174
Wastewater Facilities	6,288	67,546*
Solid Waste Facilities	171	835.49
Vehicle Fleet	1,969	27,190
Employee Commute	1,112	15,579
Transit Fleet	1,306	17,650
Process and Fugitive Emissions	107	0
<b>Totals</b>	<b>24,791</b>	<b>217,977</b>
Public Trees (partial inventory)	-3,037	0

\*Higher than previous footprints due to plant reconstruction and more significantly, adding in energy produced by biogas operations. Emissions however are less due to biogas being a renewable energy.

## Scopes

In accordance with Local Government Operational Protocol (LGOP), three scopes were used to classify and report the activity data<sup>7</sup>. Scopes are used to classify emissions in order to avoid potential double counting of emissions. It is important to note that reporting of Scope 3 emissions under LGOP is voluntary. Select Scope 3 emissions were included in this report to identify inefficiencies that can be resolved with minimal investment.

- **Scope 1:** All direct emissions from sources within the geopolitical boundary of the City of Eau Claire, including stationary combustion of fuels to produce heat, mobile combustion of fuels in fleet vehicles, and fugitive emissions, such as refrigerant leaks and methane escapes from landfills.
- **Scope 2:** Indirect emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling. Scope 2 emissions physically occur at the facility where electricity is generated (i.e. power plant). The City's Scope 2 emissions are often the utility company's Scope 1 emissions.
- **Scope 3:** Any indirect emissions not included in Scope 2. For the purpose of this report the main Scope 3 emissions examined will consist of emissions from employee commute, employee air and ground travel, and emissions resulting from solid waste disposal at a facility not operated or owned by the City.



Source: Bahtia and Ranganathan, 2004

<sup>7</sup> The Climate Registry, and ICLEI-Local Governments for Sustainability. *Local Government Operations Protocol*.

## Buildings & Facilities

This sector contains Scope 1 emissions due to combustion of natural gas, propane, and other fuels on site, as well as Scope 2 emissions due to electricity purchased from the utility provider Xcel Energy.

Methods: The data for natural gas and electricity were mainly acquired from Xcel Energy. For each building, the volume of natural gas (therms) and kilowatt hours of electricity used were calculated for the year. The numbers were entered into ClearPath™.

Table 3: Buildings & Facilities Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Fire Station	310
Parks and Cemeteries	514
Fairfax Pool	202
Hobbs Ice Arena	1,942
Police Facilities	21
Public Works Facilities	942
City Hall	697
L.E. Phillips Memorial Library	539
Transit Center	37
Backup Generators	2
Miscellaneous	87
<b>Total</b>	<b>5,293</b>

References: Jill Bell, Parks Department; Rodney Bonesteel, Community Service Worker Supervisor at Public Works; Jessica Solberg, Customer Service at Lakes Gas Co; Linda Schiles, Customer Service at Ferrellgas; Kelly Thomspson, Project & Acquisition Analyst in Finance; Scott Deustcher, Fiscal Associate II in Finance; Dave Graves, Senior Member Services Associate at Eau Claire Energy Cooperative; Patrick Newkirk, Hobbs Ice Center Facility & Program Supervisor.

## Streetlights & Traffic Lights

This sector consisted of Scope 2 emissions due to electricity purchased from Xcel Energy and Eau Claire Energy Cooperative.

Methods: The data for metered and unmetered traffic and street lights were obtained from billing information provided by Xcel Energy and Eau Claire Energy Cooperative. Usage data was previously estimated based on equations provided by Xcel.

Table 4: Street Light & Traffic Light Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Traffic Lights	216
Street Lights	3,826
<b>Total</b>	<b>4,042</b>

References: Andrew Quirk, Associate Product Developer at Xcel Energy; Leah Ness, Transportation Engineer at Public Work; and Justin Kennedy, Lead Accountant in Finance; James Hanke, Xcel Energy; Scott Deutscher Fiscal Associate II in Finance.

## Water Delivery Facilities

This sector contained emissions associated with Scope 1 natural gas combustion and Scope 2 electricity purchased from Xcel Energy.

Methods: The data for Water Delivery Facilities were acquired directly from Xcel bills.

Table 5: Water Delivery Facilities Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Water Reservoirs	40
Booster Stations	404
Water Wells and Treatment Plant	4,059
<b>Total</b>	<b>4,503</b>



References: Jeff Pippenger, Utilities Manager at Public Works; Tim Greene, Water Plant Supervisor, City of Eau Claire; Scott Deutscher, Fiscal Associate II in Finance; Kelly Thompson, Project & Acquisition Analyst in Finance.

## Wastewater Facilities

This sector contains Scope 1 emissions from the combustion of purchased natural gas, and the combustion of digester gas on site for electricity generation. Also included are Scope 1 emissions associated with effluent discharge and Scope 2 emissions from purchased electricity.

Methods: The emissions from purchases electricity and natural gas were acquired from Xcel billing. Site specific calculations for process emissions, including the daily N load, gas production and composition of digester gas, and nitrification process data were entered directly into the Clearpath software. Some formulas in ClearPath also use the population served by the wastewater treatment plant (estimated at 76,000) as the proxy.

Table 6: Wastewater Facilities Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Stormwater Pumps	8
Lift Stations	968
Wastewater Treatment Plant	5,312
<b>Total</b>	<b>6,288</b>

References: Jeff Pippenger, Utilities Manager at Public Works; Steve Hayden, Utilities Engineer II at Public Works; Rodney Bonesteel, Community Service Worker Supervisor at Public Works; Kathy White, Utilities Chemist; Sheri Jackson-Wahlin, Administrative Associate at Public Works; Scott Deutscher, Fiscal Associate II in Finance.

## Solid Waste Facilities

The emissions in this sector consisted of Scope 2 emissions due to purchased electricity to operate the water purification system at the Blue Valley Landfill site.

Methods: The Scope 2 electricity usage was acquired from Eau Claire Energy Cooperative and entered directly into ClearPath™ software. Wisconsin DNR studies indicate that landfill gas production and release still occur at the Blue Valley and Sky Park landfill sites. Because the City did not practice keeping track of the types and quantities of substances received (see Appendix

III) and because the landfills have been closed for over 40 years, it is difficult to estimate the fugitive emissions due to methane escapes.

Because of the lack of direct data and methodologies available to us, a good estimate cannot be ascertained, and fugitive emissions will be excluded from the analysis. The emissions from the landfill would be insignificant because the emissions of the material from the landfill are much smaller now compared to when the material was originally deposited.

Table 7: Solid Waste Facilities Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Blue Valley Landfill	171

References: Dave Graves, Sr. Member Services Associate of Eau Claire Energy Cooperative.

## Vehicle Fleet

The emissions in this sector consisted of Scope 1 mobile emissions due to mobile combustion of fossil fuels (unleaded gasoline and diesel). The fleet consists of a multitude of government-owned fuel combusting equipment such as heavy duty vehicles, trucks, cars, off-road vehicles, fire trucks, and lawn mowing equipment.

Methods: The activity data were acquired from Equipment Maintenance Supervisor, Larry Roth and consisted of total miles driven as well as volume (gallons) and type of fuel used by each type of vehicle. The data was then processed in the ClearPath™ software using emissions factor sets created from EPA emissions reports.

Table 8: Vehicle Fleet Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Heavy Duty Vehicles	670
Off-Road Equipment	355
Light Trucks	786
Passenger Cars	158
<b>Total</b>	<b>1,969</b>

References: Larry Roth, Equipment Maintenance Supervisor at Public Works and Vicki Franson, Accountant in Finance.

## Employee Commute

The emissions in this sector consisted of Scope 3 emissions resulting from mobile combustion of fossil and biogenic fuels due to employees' commute between their residence and workplace. It also includes the Scope 3 emissions from reimbursed mileage for work-related travel, including air travel.

Methods: The activity data for the daily commute was estimated using the 2011 survey that was sent out to all employees via email. The response rate was around 35% and the results were extrapolated for the whole employee population (Full time equivalent – 566). The number of employee-driven miles reimbursed by the City of Eau Claire was acquired from the Accounting Division. Emissions factors were found from an EPA report and used to create emissions factor sets for the different types of vehicles employees commute and travel in. Data was then entered into the ClearPath software. For air travel, the percentage of short (<300 miles) Medium (300-2,300 miles), and Long haul (>2,300 miles) flights were also acquired from the Accounting Division and entered into ClearPath.

Table 9: Employee Commute Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Single Occupancy Vehicles	1,012
Carpool Commute	8
Moped and Motorcycle Commute	1
Reimbursed Employee Travel	82
Air Travel	9
<b>Total</b>	<b>1,112</b>

References: Employee Commuter Survey Results; Vicki Franson, Accountant in Finance; Kim Spande, Payroll Specialist in Finance.

## Transit Fleet

The emissions in this sector consisted of Scope 1 emissions resulting from mobile combustion of diesel in the transit fleet buses. Pictured is one of the City's hybrid buses.

Methods: Activity data was acquired from the Transit Division and consisted of distance travelled (miles) and volume of diesel consumed (gallons). The data were entered into ClearPath, which used a factor set containing emissions factors from the EPA to calculate total emissions.

Table 10: Transit Fleet Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
Transit Diesel Combustion	1,306

References: Larry Roth, Equipment Maintenance Supervisor at Public Works and Vicki Franson, Accountant in Finance.



## Process and Fugitive Emissions

This sector contains Scope 1 fugitive emissions of refrigerants due to leaks in air conditioning and chiller systems, as well as mobile refrigerant leaks from the transit fleet. Refrigerants are often very potent greenhouse gases.

Methods: Transit fugitive emissions data were acquired from Badger Truck Company lbs. of R-134A purchased for the transit fleet. Data on the Refrigerant Leak in LE Phillips Public Library were provided by public works in units of purchased R410a that replaced the leaked gas. The volumes of gases leaked, as well as the GWP determined by the EPA were entered into ClearPath to be converted into CO<sub>2</sub> equivalents.

Table 11: Process and Fugitive Emissions

<b>Emissions Source</b>	<b>Emissions (metric tons CO<sub>2</sub>e)</b>
LE Phillips Library R410a Leak	85
Transit Fugitive Emissions	22
<b>Total</b>	<b>107</b>

References: Ed Dunham, Badger Truck Reference; Larry Roth, Equipment Maintenance Supervisor at Public Works; Rodney Bonesteel, Community Service Worker Supervisor at Public Works.