City of Eau Claire
Municipal Operations
Carbon Footprint Report

Year 2013

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Executive Summary

Findings

The carbon footprint for the City of Eau Claire's municipal operations for year 2013 was estimated at **25,184 metric tons of carbon dioxide equivalents** (CO_2e). This resulted in an 11.7% or 3330 metric tons of CO_2e decrease compared to the baseline year, 2011. The following table details the changes by sector.

Table I: CO_2e Comparison

Sector	CO_2e produced, metric tons (2013)	CO_2e produced, metric tons (2011)
Buildings & Facilities	5,414	5,800
Streetlights & Traffic Lights	3,419	5,075
Water Delivery Facilities	5,300	5,252
Wastewater Facilities	7,315	6,832
Solid Waste Facilities	198	200
Vehicle Fleet	2,689	2,564
Employee Commute	1,092	1,125
Transit Fleet	871	1,383
Air Travel	13	13
Totals	**25,184**	**28,514**

While this change was occurring, due to the City's municipal operations, the global climate continued to warm, which the Intergovernmental Panel on Climate Change describes as *virtually certain* (probability is between 99 and 100%)[1]. The panel also describes that concentration of greenhouse gases has substantially increased. Concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels that exceed recorded concentrations in ice cores for the past 800,000 years. Scientific measurement has now identified that CO_2 levels have surpassed 350 ppm (parts per million)[2].

What this report aims to do is:

- ✓ Report improvements and areas of concern regarding CO_2 emissions and equivalents due to the City's operations
- ✓ Promote the continued efforts of the City to reduce its carbon footprint
- ✓ Report findings to the City's new Advisory Commission on Sustainability
- ✓ Become prepared for any new Federal Legislation regarding climate change

[1] IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 5, [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
[2] IPCC, 2013: Summary for Policymakers, 12.

Environmental Protection Agency's proposed rule, which is subject to public comment and will be finalized a year from now, would cut carbon dioxide emissions from existing coal plants by up to 30 percent by 2030 from 2005 levels. By targeting the nation's single biggest source of carbon output, the proposal plays a central part in President Obama's vow to address climate change before leaving office.[3]

The EPA estimates that for every $1 invested in complying with the rule, Americans would reap $7 in health benefits, in large part because of accompanying reductions in soot, sulfur dioxide and nitrogren oxides, which are linked to heart and lung illnesses.[4]

Year in Review

In the fifth assessment report by the Intergovernmental Panel on Climate Change (IPCC), the authors stated that "human interference with the climate system is occurring"[5]. This biannual report establishes a commitment to monitor the City's contribution to these climate changes. In the 2011 carbon footprint report there was a list of next steps which detailed recommendations to the City if they were to pursue carbon dioxide mitigation efforts.

The City acknowledges that one of the effects of climate change is the adverse effect to the health and well-being of its citizens. In October of 2013, the Eau Claire Health Chapter Comprehensive Plan was adopted, and with it outlined the need for a climate action plan to be undertaken in the year 2015. The creation of this policy was a substantial accomplishment, since the 2011 footprint report, in detailing recommendations to mitigate the City's effects in changing the climate of our planet. The creation and pursuit of a possible climate action plan naturally fits within the duties charged to the Advisory Commission on Sustainability that was created in December 2013.

Based on the findings of this report, it is still advised that the City continue to adopt measures that reduce or encourage the reduction of greenhouse gas emissions due to the City's operations and moreover as a population. The goal of this report is to detail city emissions and help in assisting city policy-makers in continuing the efforts outlined in the *Sustainability Chapter* and *Health Chapter* of the *City of Eau Claire's Comprehensive Plan*.

A vast improvement was the City's process fugitive and mobile refrigerant leaks. In 2013, no such leaks existed. These leaks have a high global warming potential, and their absence is positive. This is compared to the 2011 report, where two such leaks occurred.

[3] Eilperin, J., Mufson, S., 2013, June 2nd : EPA's proposed rules on carbon emissions create complications for coal-state Democrats: *The Washington Post.* Retrieved from: http://wapo.st/1n4ZQTg
[4] Eilperin, J., Mufson, S., 2013, June 2nd : EPA's proposed rules on carbon emissions create complications for coal-state Democrats: *The Washington Post.* Retrieved from: http://wapo.st/1n4ZQTg
[5] IPCC 2013: Summary for Policymakers, 15.

City Sector Overview

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 the next carbon footprint. The City of Eau Claire's municipal operation in 2013 resulted in **25,184 metric tons of CO_2e**, excluding sequestration. There were specifically **25,062 metric tons of carbon dioxide (CO_2)**, **358 kilograms of nitrous oxide (N_2O)**, and **527 kilograms of methane (CH_4)**. The following figure and table note the emission breakdown per City sector.

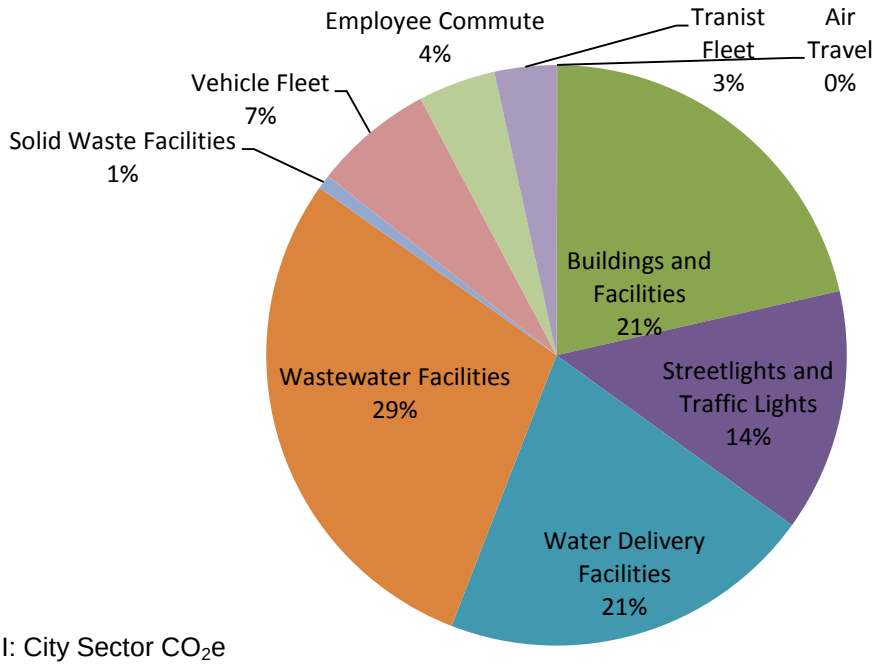

Figure I: City Sector CO_2e

Table II: City Sector CO_2e

Sector	CO_2e produced, metric tons	Energy consumed, MMBtus
Buildings & Facilities	5,414	46,069
Streetlights & Traffic Lights	3,419	15,710
Water Delivery Facilities	5,300	26,898
Wastewater Facilities	7,315	24,160
Solid Waste Facilities	198	908
Vehicle Fleet	2,689	37,014
Employee Commute	1,092	15,668
Transit Fleet	871	11,767
Air Travel	13	124
Totals	**25,184**	**178,623**
Public Trees (partial inventory)	-3,037	0

City Sector Breakdowns

Data quality has steadily improved from the last report to current. There are still problems with reporting due to specific data sources. For example, residential lighting is still estimated, but efforts have been made by the City to continue installing meters at various locations to retrieve better energy and costs data of the City's lighting infrastructure.

Buildings & Facilities

This sector's emissions mainly consisted of Scope 1 emissions due to combustion of natural gas, propane and other fuels on site, and Scope 2 electricity purchased from utility providers such as Xcel Energy and Eau Claire Energy Cooperative.

Methods: The data for natural gas and electricity was acquired from Xcel Energy. For each building, the volume of natural gas (therms) and kilowatt hours used were calculated for the entire year of 2011. The numbers were then plugged into the CACP 2009 software, which converted the activity data into GHG emissions.

Data: the operations of the buildings and facilities consumed an equivalent of 46,069 MMBtus of energy, which resulted in the emissions of 5,387 metric tons of CO_2, 73 kilograms N_2O, and 210 kilograms CH_4, totaling in 5,414 metric tons CO_2e.

References: Business Solutions Center at Xcel Energy; Dave Graves, Sr. Member Services Associate of Eau Claire Energy Cooperative; Vicki Franson, Accountant and Rod Bonesteel, Buildings Supervisor, City of Eau Claire.

Table I: Buildings & Facilities Emissions

Emissions Source	Emissions (metric tons CO_2e)
Fire Station	274
Propane Use	51
Ballfields (Parks)	437
Cemeteries (Parks)	33
Community Parks	300
Neighborhood Parks	53
Fairfax Pool	309
Hobbs Ice Arena	1,811
Police Facilities	23
Public Works Facilities	605
City Hall	843
L.E. Phillips Memorial Library	645
Transit Center	30
Total:	**5,414**

Streetlights & Traffic Lights

This sector consisted mainly of Scope 2 emissions due to electricity purchased from Xcel Energy

Methods: the data for metered lights and traffic lights was acquired directly from Xcel bills. For unmetered lights, the quantities and power rating of the bulbs used (wattage) were know. The lights were assumed to be operating 4,083 hours a year (approximately 11 hours a day). The number of kilowatt-hours used by unmetered lights in 2013 was calculated using the following formula provided by Xcel energy:

Power rating of bulbs used (watts)* # of bulbs * 4,083 (hours)/1,000

Sample calculation: 100 watts*328 bulbs*4,083 hours/1,000 = 133,922.4 kWh

Data: Street light and traffic light operation paid for by the City of Eau Claire consumed an equivalent of 15,710 MMBtus, emitting 3,399 metric tons of CO_2, 61 kilograms of N_2O, and 58 kilograms of CH_4, totaling in 3,419 metric tons of CO_2e.

References: Xcel Energy and Jodi Nuenke, Engineering Tech. with City of Eau Claire.

Table IIV: Street Light & Traffic Light Emissions

Emissions Source	Emissions (metric tons CO_2e)
Metered Lights	769
Unmetered Whiteway Lights	1,595
Unmetered Xcel Owned Lights	999
Unmetered Traffic Lights	55
Total:	**3,419**

Water Delivery Facilities

This sector contained emissions associated with Scope 1 natural gas combustion and Scope 2 electricity.

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

Data: Operating Water Delivery Facilities consumed an equivalent of 26,898 MMBtus, resulting in emissions of 5,270 metric tons of CO_2, 91 kilograms of N_2O, and 91 kilograms of CH_4, totaling in 5,300 metric tons of CO_2e.

References: Jeff Pippenger, Utilities Administrator and Tim Greene, Water Plant Supervisor, City of Eau Claire.

Table III: Water Delivery Facilities Emissions

Emissions Source	Emissions (metric tons CO_2e)
Water Reservoirs and Towers	24
Booster Stations	691
Water Wells and Treatment Plant Electricity	4,499
Water Wells and Treatment Plant Gas	86
Total:	**5,300**

Wastewater Facilities

This sector contains Scope 1 emissions from combustion of purchased natural gas, combustion of biogas produced on site and used in electricity generation; as well as process and fugitive emissions of CH_4 due to incomplete combustion of digester gas. Also included are Scope 1 N_2O emissions associated with effluent discharge and Scope 2 emissions associated with purchased electricity.

Methods: Emissions resulting from purchased electricity and natural gas were calculated using CACP 2009 and activity data acquired directly from Xcel billing. Fugitive and process emissions were calculated using the formulas presented in LGOP 2010. Some formulas use the population served by the wastewater treatment plant (estimated at 74,122) as the proxy. Other use effluent nitrogen discharge per day (estimated at 735 kg/day). See Appendix I for complete formulas and emission factors.

Data: The operation of the wastewater facilities consumed an equivalent of 24,160 MMBtus and resulted in the emissions of 94 metric tons of methane, 81 metric tons of nitrous oxide, and 7,288 metric tons of carbon dioxide, which summed up to 7,315 metric tons of CO_2e.

References: Jeff Pippenger, Utilities Administrator, Steve Hayden, Sewage Plant Supervisor, Craig Capper, Chemist, City of Eau Claire.

Table IVI: Wastewater Facilities Emissions

Emissions Source	Emissions (metric tons CO_2e)
Stormwater Pumps	8
Lift Stations	709
Wastewater Treatment Plant	6,598
Total:	**7,315**

Solid Waste Facilities

The emissions in this sector consisted of Scope 1 fugitive emissions from the City's closed Blue Valley Landfill (also known as Town of Union Landfill) and the Sky Park Landfill, as well as Scope 2 emissions due to purchased electricity to operate the water purification system at the Blue Valley Landfill site.

Methods: The Scope 2 emissions were calculated using CACP 2009 and activity data acquired from Eau Claire Energy Cooperative (ECEC). 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 this lack of direct data and methodologies available to us, a good estimate cannot be ascertained. Thus, fugitive emissions will be excluded from the analysis. The emissions from the landfill would be inconsequential because the emissions of the material from the landfill are much smaller now compared to when the material was first deposited.

Data: The emissions due to purchased electricity resulted in 196 metric tons of CO_2, 3 kilograms of N_2O and 3 kilograms of CH_4, which sums to 198 metric tons of CO_2e.

References: Dave Graves, Sr. Member Services Associate of Eau Claire Energy Cooperative; Colleen Schian, Risk Manager and Kathy White, Chemist, City of Eau Claire.

Table V: Solid Waste Facilities Emissions

Emissions Source	Emissions (metric tons CO_2e)
Blue Valley Landfill	198

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 fuel combusting equipment such as heavy duty vehicles, trucks, cars, off-road vehicles, fire trucks, lawn mower equipment, etc.

Methods: The activity data were acquired from Fleet Manager, Bob Boecher 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 CACP 2009 using default settings to find greenhouse gas emissions.

Data: The operations of the vehicle fleet emitted 2,673 metric tons CO_2, 47 kilograms N_2O, and 54 kilograms CH_4, totaling 2,689 metric tons CO_2e.

References: Bob Boecher, Buildings, Grounds, & Fleet Manager, Kelly Kuba, Accountant Analyst, and Vicki Franson, Accountant, City of Eau Claire.

Table VI: Vehicle Fleet Emissions

Emissions Source	Emissions (metric tons CO_2e)
Heavy Duty Vehicles	1,301
Lawn and Small Equipment	125
Light Trucks	505
Passenger Cars	759
Total	**2,689**

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, as wells as in-town ground travel and out-of-town ground travel.

Methods: The activity data for the daily commute was estimated using a survey (see Appendix VI in the 2011 report for the full survey). The survey was sent out to all employees via email. The response rate was around 35%. The responses were extrapolated for the whole employee population (Full time equivalent – 566). The activity data for the employee in and out-of-town travel was acquired from the Accounting Division. The data provided were the number of miles reimbursed by the City of Eau Claire. The total mileage was divided by the 22 miles/gallon fuel

economy (estimate the City of Eau Claire used then for reimbursements) to calculate the volume of fuel consumed. The activity data were converted into emissions using CACP 2009.

Data: The employee commute and work related travel resulted in emissions of 1,062 metric tons CO_2, 93 kilograms of N_2O, and 81 kilograms of CH_4, totaling 1,092 metric tons CO_2e.

References: Employee Commuter Survey Results, Vicki Franson and Julie Lau with Accounting, City of Eau Claire.

Table VIIX: Employee Commute Emissions

Emissions Source	Emissions (metric tons CO_2e)
Commuting	8
Single Occupancy Vehicles	1,026
In-Town Travel	38
Out-Of-Town Travel	18
Moped and Motorcycle Commuting	1
Total:	**1,092**

Air Travel

The emissions in this sector consisted of Scope 3 emissions due to work-related employee air travel.

Methods: The number of miles reimbursed by the City was acquired from the Accounting Division and then converted to greenhouse gas emissions using the formula from *Climate Leaders GHG Inventory Protocol* published by EPA (see appendix II)

Data: The number of miles reimbursed by the City in 2013 equaled 48,000 miles. This resulted in 13.14 metric tons of CO_2e.

References: Vicki Franson, Accountant, City of Eau Claire.

Table VIII: Air Travel Emissions

Emissions Source	Emissions (metric tons CO_2e)
Airplane Diesel Combustion	13

Transit Fleet

The emissions in this sector consisted of Scope 1 emissions resulting from mobile combustion of diesel in the transit fleet buses.

Methods: Activity data was acquired from the Transit Division and consisted of distance travelled (miles) and volume of diesel consumed (gallons). The data was then converted into emissions using CACP 2009.

Data: The operations of the transit buses led to emissions of 870 metric tons CO_2, 2 kilograms N_2O, and 2 kilograms CH_4, totaling 871 metric tons of CO_2e.

References: Bob Boecher, Buildings, Grounds, & Fleet Manager and Mike Branco, Transit Manager, City of Eau Claire.

Table IXI: Transit Fleet Emissions

Emissions Source	Emissions (metric tons CO_2e)
Transit Diesel Combustion	871

Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
Buildings and Facilities							
Eau Claire, Wisconsin							
Backup Generators							
Carbon Dioxide	1	0	0	1	0	0	0
Subtotal Backup Generators	1	0	0	1	0	0	0
FIRE - Fire Stations Electricity							
Electricity	151	3	3	152	0	700	0
Subtotal FIRE - Fire Stations Electricity	151	3	3	152	0	700	0
FIRE - Fire Stations Gas							
Natural Gas	99	0	9	100	0	1,875	0
Subtotal FIRE - Fire Stations Gas	99	0	9	100	0	1,875	0
PKBL - Ballfields							
Electricity	194	3	3	195	0	895	0
Natural Gas	241	0	23	242	0	4,550	0
Subtotal PKBL - Ballfields	435	4	26	437	0	5,445	0
PKCM - Cemeteries Electricity							
Electricity	33	1	1	33	0	153	0
Subtotal PKCM - Cemeteries Electricity	33	1	1	33	0	153	0
PKCP - Community Parks Electricity							
Electricity	298	5	5	300	0	1,378	0
Subtotal PKCP - Community Parks Electricity	298	5	5	300	0	1,378	0
PKFP - Fairfax Pool Electricity							
Electricity	102	2	2	103	0	472	0
Subtotal PKFP - Fairfax Pool Electricity	102	2	2	103	0	472	0

This report has been generated for Eau Claire, Wisconsin using ICLEI's Clean Air and Climate Protection 2009 Software.

Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
PKFP - Fairfax Pool Gas							
Natural Gas	206	0	19	206	0	3,878	0
Subtotal PKFP - Fairfax Pool Gas	206	0	19	206	0	3,878	0
PKHI - Hobbs Ice Arena Electricity							
Electricity	1,411	25	24	1,419	0	6,520	0
Subtotal PKHI - Hobbs Ice Arena Electricity	1,411	25	24	1,419	0	6,520	0
PKHI - Hobbs Ice Arena Gas							
Natural Gas	391	1	37	392	0	7,382	0
Subtotal PKHI - Hobbs Ice Arena Gas	391	1	37	392	0	7,382	0
PKNP - Neighborhood Parks Electricity							
Electricity	38	1	1	39	0	177	0
Subtotal PKNP - Neighborhood Parks Electricity	38	1	1	39	0	177	0
PKNP - Neighborhood Parks Gas							
Natural Gas	14	0	1	14	0	260	0
Subtotal PKNP - Neighborhood Parks Gas	14	0	1	14	0	260	0
PO - Police Electricity							
Electricity	17	0	0	18	0	81	0
Subtotal PO - Police Electricity	17	0	0	18	0	81	0
PO - Police Gas							
Natural Gas	5	0	1	5	0	103	0
Subtotal PO - Police Gas	5	0	1	5	0	103	0
Propane Use							
Propane	51	1	9	51	0	824	0
Subtotal Propane Use	51	1	9	51	0	824	0

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Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
PW - Public Works Facilities Electricity							
Electricity	437	8	8	439	0	2,019	0
Subtotal PW - Public Works Facilities Electricity	437	8	8	439	0	2,019	0
PW - Public Works Facilities Gas							
Natural Gas	165	0	16	166	0	3,116	0
Subtotal PW - Public Works Facilities Gas	165	0	16	166	0	3,116	0
PWCB - City Hall Electricity							
Electricity	666	12	11	670	0	3,078	0
Subtotal PWCB - City Hall Electricity	666	12	11	670	0	3,078	0
PWCB - City Hall Gas							
Natural Gas	173	0	16	173	0	3,262	0
Subtotal PWCB - City Hall Gas	173	0	16	173	0	3,262	0
PWCBM - Philips Library Electricity							
Electricity	513	9	9	516	0	2,370	0
Subtotal PWCBM - Philips Library Electricity	513	9	9	516	0	2,370	0
PWCBM - Philips Library Gas							
Natural Gas	129	0	12	129	0	2,429	0
Subtotal PWCBM - Philips Library Gas	129	0	12	129	0	2,429	0
TRA - Transit Center							
Electricity	29	1	1	30	0	136	0
Subtotal TRA - Transit Center	29	1	1	30	0	136	0
Subtotal Buildings and Facilities	5,365	73	210	5,392	0	45,657	0

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Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
Streetlights & Traffic Signals							
Eau Claire, Wisconsin							
Metered Lights and Traffic							
Electricity	765	14	13	769	0	3,535	0
Subtotal Metered Lights and Traffic	765	14	13	769	0	3,535	0
Unmetered - Whiteway							
Electricity	1,586	28	27	1,595	0	7,330	0
Subtotal Unmetered - Whiteway	1,586	28	27	1,595	0	7,330	0
Unmetered - XCel Owned							
Electricity	994	18	17	999	0	4,592	0
Subtotal Unmetered - XCel Owned	994	18	17	999	0	4,592	0
Unmetered Traffic Lights							
Electricity	55	1	1	55	0	253	0
Subtotal Unmetered Traffic Lights	55	1	1	55	0	253	0
Subtotal Streetlights & Traffic Signals	3,399	61	58	3,419	0	15,710	0
Water Delivery Facilities							
Eau Claire, Wisconsin							
UWRT - Water Reservoirs and Towers							
Electricity	24	0	0	24	0	112	0
Subtotal UWRT - Water Reservoirs and Towers	24	0	0	24	0	112	0
UWWB - Booster Stations							
Electricity	594	11	10	598	0	2,746	0
Natural Gas	93	0	9	93	0	1,753	0
Subtotal UWWB - Booster Stations	687	11	19	691	0	4,500	0

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Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
UWWB - Water Wells and Treatment Plant Electricity							
Electricity	4,472	80	77	4,499	0	20,671	0
Subtotal UWWB - Water Wells and Treatment Plant Electricity	4,472	80	77	4,499	0	20,671	0
UWWB - Water Wells and Treatment Plant Gas							
Natural Gas	86	0	8	86	0	1,616	0
Subtotal UWWB - Water Wells and Treatment Plant Gas	86	0	8	86	0	1,616	0
Subtotal Water Delivery Facilities	5,270	91	104	5,300	0	26,898	0
Wastewater Facilities							
Eau Claire, Wisconsin							
USTW - Stormwater							
Electricity	8	0	0	8	0	36	0
Subtotal USTW - Stormwater	8	0	0	8	0	36	0
UWWI - Lift Stations XCel Electricity							
Electricity	685	12	12	689	0	3,165	0
Subtotal UWWI - Lift Stations XCel Electricity	685	12	12	689	0	3,165	0
UWWI - Lift Stations XCel Natural Gas							
Natural Gas	20	0	2	20	0	375	0
Subtotal UWWI - Lift Stations XCel Natural Gas	20	0	2	20	0	375	0
WWTP - CH4 emissions							
Carbon Dioxide	1,465	0	0	1,465	0	0	0
Subtotal WWTP - CH4 emissions	1,465	0	0	1,465	0	0	0
WWTP - Generator CO2 emissions							
Carbon Dioxide	396	0	0	396	0	0	0
Subtotal WWTP - Generator CO2 emissions	396	0	0	396	0	0	0

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Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
WWTP - N2O emissions							
Carbon Dioxide	745	0	0	745	0	0	0
Subtotal WWTP - N2O emissions	745	0	0	745	0	0	0
WWTP - XCel Electricity							
Electricity	3,813	68	66	3,835	0	17,623	0
Subtotal WWTP - XCel Electricity	3,813	68	66	3,835	0	17,623	0
WWTP - Xcel Natural Gas							
Natural Gas	157	0	15	157	0	2,962	0
Subtotal WWTP - Xcel Natural Gas	157	0	15	157	0	2,962	0
Subtotal Wastewater Facilities	7,288	81	94	7,315	0	24,160	0
Solid Waste Facilities							
Eau Claire, Wisconsin							
EC Old Town of Union Landfill							
Electricity	196	3	3	198	0	908	0
Subtotal EC Old Town of Union Landfill	196	3	3	198	0	908	0
Subtotal Solid Waste Facilities	196	3	3	198	0	908	0
Vehicle Fleet							
Eau Claire, Wisconsin							
Heavy Duty Vehicles							
Diesel	1,284	4	4	1,285	0	17,362	0
Gasoline	15	1	1	16	0	219	0
Subtotal Heavy Duty Vehicles	1,299	5	5	1,301	0	17,581	0
Lawn and Misc. Small Equipment							
OFF ROAD Diesel	98	2	14	99	0	1,319	0

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Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
OFF ROAD Gasoline	26	1	1	26	0	372	0
Subtotal Lawn and Misc. Small Equipment	124	3	15	125	0	1,691	0
Light trucks - CO2 only							
Diesel	75	0	0	75	0	1,021	0
Gasoline	424	0	0	424	0	6,041	0
Subtotal Light trucks - CO2 only	500	0	0	500	0	7,062	0
Light trucks - NO2 and CH4 only							
Diesel	0	0	0	0	0	373	0
Gasoline	0	17	12	5	0	3,401	0
Subtotal Light trucks - NO2 and CH4 only	0	17	12	5	0	3,774	0
Passenger Cars - CO2 only							
Diesel	9	0	0	9	0	117	0
Gasoline	742	0	0	742	0	10,563	0
Subtotal Passenger Cars - CO2 only	751	0	0	751	0	10,680	0
Passenger cars - NO2 and CH4 only							
Diesel	0	0	0	0	0	27	0
Gasoline	0	23	22	8	0	4,880	0
Subtotal Passenger cars - NO2 and CH4 only	0	23	22	8	0	4,907	0
Subtotal Vehicle Fleet	2,673	47	54	2,689	0	45,695	0
Transit Fleet							
Eau Claire, Wisconsin							
Transit CO2 only							
Diesel	870	0	0	870	0	11,767	0
Subtotal Transit CO2 only	870	0	0	870	0	11,767	0

This report has been generated for Eau Claire, Wisconsin using ICLEI's Clean Air and Climate Protection 2009 Software.

Government Greenhouse Gas Emissions in 2013
Detailed Report

Scope 1 + Scope 2

	CO2 (tonnes)	N2O (kg)	CH4 (kg)	Equiv CO2 (tonnes)	Bio CO2 (tonnes)	Energy (MMBtu)	Cost ($)
Transit N2O & CH4 only							
Diesel	0	2	2	1	0	7,827	0
Subtotal Transit N2O & CH4 only	0	2	2	1	0	7,827	0
Subtotal Transit Fleet	870	2	2	871	0	19,594	0
Total	25,062	358	527	25,184	0	178,623	0

This report has been generated for Eau Claire, Wisconsin using ICLEI's Clean Air and Climate Protection 2009 Software.

Appendices:

I. Wastewater Treatment Plant Specific emissions equations

Stationary annual CH4 emissions from Incomplete Combustion of Digester Gas (metric tons CO2e) =

(P x Digester Gas x F CH4 x ϱ(CH4) x (1-DE) x 0.0283 x 365.25 x 10^{-6}) x GWP

Where:

Term	Description	Value
P	population served by the WWtp with anaerobic digesters	user input
Digester Gas	cubic feet of digester gas produced per person per day	1
F CH4	fraction of CH4 in biogas	0.65
ϱ (CH4)	density of methane [g/m^3]	662
DE	methane destruction efficiency	0.99
0.0283	conversion from ft^3 to m^3 [m^3/ft^3]	0.0283
365.25	conversion factor [day/year]	365.25
10^{-6}	conversion from g to metric ton [metric ton/g]	10^{-6}
GWP	Global Warming Potential	21
Source: EPA *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007,* Chapter 8, 8-7 (2009).		

Annual Process CH4 emissions from Wastewater Treatment Lagoons (metric tons CO2e) =

((P x Find-com) x BOD5 load x (1-FP) x Bo x MCF anaerobic x 365.25 x 10-3) x GWP

Where:

Term	Description	Value
P	population served by lagoons adjusted for industrial discharge	user input*
Find-com	factor for industrial and commercial co-discharge waste into the sewer system	1.25
Bod5 load	amount of BOD5 produced per person	0.09
FP	fraction of BOD5 removed in primary treatment	0.325
Bod5 load	maximum CH4 producing capacity for domestic wastewater [kg CH4/kg BOD5 removed]	0.6

MCF anaerobic	CH4 correction factor for anaerobic systems	0.8
365.25	conversion factor [day/year]	365.25
0.001	conversion from kg to metric ton [metric ton/kg]	0.001
GWP	Global Warming Potential	21
Source: EPA *Inventory of US Greenhouse Gas emissions and SinksL 1990-2007,* Chapter 8, 8-9 (2009)		

Annual Fugitive CH_4 emissions from Septic Systems (default BOD_5 load) =
(P x BOD5 load x Bo x MCFseptic x 365.25 x 0.001) x GWP
Where:

Term	**Description**	**Value**
P	population served by septic systems [persons]	user input
BOD 5 load	amount of BOD5 produced per person per day [kg BOD5/person/day]	0.09
Bo	maximum CH4 producing capacity for domestic wastewater [kg CH4/kg BOD5 removed]	0.6
MCF septic	CH4 correction factor for septic systems	0.5
635.25	conversion factor [day/year]	365.25
0.001	conversion from kg to metric ton [metric ton/kg]	0.001
GWP	global warming potential	21
Source: EPA *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006*, Chapter 8, 8-9 (2008)		

Annual Process N_2O Emissions from Effluent Discharge (metric tons CO2e) =
(N Load x EF effluent x 365.25 x 10^{-3} x 44/28) x GWP

Where:

Term	Description	Value
N load	measured average totral nitrgoen discharged [kg N/day]	user input**
EF effluent	emission factor [kg N2O-N/kg sewage-N produced]	0.005
365.25	conversion factor [day/year]	365.25
10^{-3}	conversion from kg to metric ton [metric ton/kg]	10^{-3}
44/28	stoichiometric ration of N2O to N2	1.57
GWP	N2O global warming potential	310
Source: EPA *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007, CH.8, 8-13 (2009)*		

Process CO_2 emissions due to CO_2 combustion (metric tons CO_2) =

P_{total} x ft^3/person/day x 0.65 * 662 g/m^3 x 0.0283 m^3/ft^3 x 365.25 x 10^{-6} x 24/20

Where:

Term	Description	Value
P_{total}	population served (persons)	user input*
0.65	fraction of CH4 in biogas	0.65
662 g/m^3	density of methane	662
0.0283 m^3/ft^3	conversion factor [ft^3 to m^3]	0.0283
365.25	conversion factor [day/year]	365.25
10^{-6}	conversion factor [g/ton]	10^{-6}
24/20	stoichiometric ratio [g CO2/g CH4]	1.2

*Population served by the Wastewater treatment plant: 74,122. This includes the whole populations of Eau Claire, Altoona and a fraction of the population of town of Washington.

**Effluent discharge is estimated at 735 kg N/day

II. Air Travel Emission Factors and equation

Table 4: Emission Factors for Airline Business Travel (passenger-mile)

Airline Travel Distance	CO_2 Emission Factor (kg CO_2/passenger-mile)	CH_4 Emission Factor (g CH_4/passenger-mile)	N_2O Emission Factor (g N_2O/passenger-mile)
Long Haul (≥ 700 miles)	0.185	0.0104	0.0085
Medium Haul (≥ 300 and < 700 miles)	0.229	0.0104	0.0085
Short Haul (< 300 miles)	0.277	0.0104	0.0085
Distance Not Known	0.271	0.0104	0.0085

Equation 4: Airline Business Travel Emissions (passenger-mile)

$$E = PMT * (EF_{CO2} + EF_{CH4} * 0.021 + EF_{N2O} * 0.310)$$

where:

E = Total CO_2-equivalent Emissions

PMT = Passenger Miles Traveled

EF_{CO2} = CO_2 Emission Factor

EF_{CH4} = CH_4 Emission Factor

EF_{N2O} = N_2O Emission Factor

0.021 = Conversion Factor

0.310 = Conversion Factor

III. Blue Valley Landfill Information

From city of Eau Claire

Ms. Diane Tesinsky
Environmental Claim Technician
November 9, 1988
Page 2.

Letters dated August 21 and August 28, 1987 referenced improving the Bauer well. The decision to improve the well came as a result of a preliminary evaluation of the well contamination conducted by Ayres Associates, Inc. (See attached letter dated July 13, 1987)

There are six residences within 2,000 feet of the Bauer home. Two are approximately 500 feet away and the other four are located at approximately 1,000 feet, 1,800 feet, 1,900 feet, and 2,000 feet respectively.

No other residences have been offered bottled water, new wells, or well reconstruction.

It was not a practice of the City to record the type of substances, the quantity, or the dates on which each was delivered or deposited at the Blue Valley landfill.

Waste was transported to the landfill by licensed and private haulers, industries, contractors, and by residents of the City of Eau Claire and the Town of Union. Waste materials were separated at the site and deposited in certain areas of the landfill. Generally, waste materials were not transported to the landfill in specific containers as standards for same had not been mandated. Liquid industrial forging compound from National Presto Industries was transported to the site in a tanker and released into a lagoon. This practice was used for approximately one year in 1970. Waste Research and Reclamation Company, Inc. transported approximately 8,980 55-gallon steel barrels of toxic and hazardous waste to the landfill between March and December, 1974. The barrels were placed into excavated trenches and covered with soil. Other wastes were placed into large natural ravines or excavated trenches and covered with soil. On a portion of the site, wastes were placed over the filled trenches and covered with soil and papermill sludge. This practice was known as the "area fill" method.

The City of Eau Claire purchased the landfill site and operated it from when it opened on September 7, 1965 to its closing date of December 2, 1978. The site was properly abandoned on November 2, 1982, and was approved by the Wisconsin Department of Natural Resources. The site is presently owned by the City of Eau Claire.

The City did not keep a perpetual record of all the transporters of waste materials to this site, nor the materials and dates any of these substances were delivered to, or deposited at, the site.

FROM:KONICA FAX TO:CITY OF EAU CLAIRE JUN 4. 1991 1:51PM P.05