2019 Environmental Impact Assessment

clearwater
CREDIT UNION

clearwatercreditunion.org/environment

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Clearwater is Greenhouse Gas Neutral in 2020!

We are pleased to announce that we met our goal of carbon neutrality in 2020. Working with the Missoula Housing Authority, MMW Architects, and Climate Smart Missoula, Clearwater funded energy efficiency improvements at the Cornerstone affordable housing project that resulted in a greenhouse gas savings of 877 metric tons (t) of greenhouse gasses (CO_2e). These savings will offset roughly one to two years of our greenhouse gas emissions (depending on the inclusion of scope 3 emissions).

Cornerstone is a 12-unit affordable rental project built, owned, and operated by the Missoula Housing Authority. The apartments are meant for people making less than 30% of the area median income, and priority will be given to frequent users of Missoula's emergency services. Clearwater's investment will help fund the installation of more efficient heat pumps instead of less efficient electric resistance heaters. Over the project's life this will save 877 t CO_2e and $107,000 in avoided electricity purchases.

This project was a close collaboration between all involved. It was intended to serve as a pilot project for Climate Smart Missoula's Footprint Fund, a local carbon offset fund. For more information on the Footprint Fund and the details of this project please visit Climate Smart Missoula's webpage, **missoulaclimate.org**.

We are pleased to have achieved our goal of carbon neutrality through purchased offsets. However, we consider offsets to be a stop-gap measure while we continue to drive down our direct emissions. We are currently working to increase our on-site solar electricity generation, lower our building energy use, and reduce our overall greenhouse gas emissions, while continuing to act as responsible stewards of our members' money by only pursuing economically viable projects. For more information on our sustainability initiatives, please visit **clearwatercreditunion.org/sustainability**.

Introduction

This report details Clearwater Credit Union's environmental impact for 2019. It contains our management approach to environmental sustainability, a summary of our impact, and a detailed description of data and methods.

Clearwater Credit Union is driven by four core values:

Together We Own

We practice responsible banking, grounded in cooperative ownership.

Together We Empower

We solve problems and create opportunities for a better tomorrow.

Together We Include

We choose to be inclusive, not exclusive.

Together We Matter

We are committed to making a difference in the world.

One expression of these values is promoting environmental sustainability for our community, our members, and our coworkers. We are committed to reducing our environmental impact and demonstrating leadership in sustainability for the financial industry. To meet these goals, we conduct annual environmental impact assessments. This is our third assessment.

Our environmental impact reporting follows standard disclosures from the Global Reporting Initiative's Sustainability Reporting Guidelines ([1]; denoted GRI XXX in the text). Our greenhouse gas assessment follows the World Resources Institute's Greenhouse Gas Protocol Corporate Accounting and Reporting Standard, Revised Edition [2]. Details of our assessment methodology and complete disclosures can be found in the technical appendix.

Areas of Impact

In selecting which areas of environmental impact to measure, we were guided by three principles:

- **Sustainability Context:** We seek to measure our impact in areas relevant to local and global environmental sustainability.
- **Materiality:** We will measure our activities that have a significant impact on those areas.
- **Completeness:** Our measurement will be sufficient to reflect our significant environmental impacts.

With these principles in mind, we chose to measure: greenhouse gas emissions, water use, paper use, and solid waste generation.

Greenhouse Gas Emissions (GRI 103[1])

Greenhouse gas emissions are one of our most significant environmental impacts. Rapid and sustained reductions of GHG emissions are urgently needed to avoid the worst impacts of global climate change. We prepared our GHG emissions estimates according to the World Resources Institute's GHG Protocol Corporate Accounting and Reporting Standard, Revised Edition [2]. A complete description of the inventory can be found in the technical appendix. Reporting guidelines are that an organization is responsible for their scope 1 and 2 emissions. We choose to measure and report our scope 3 emissions as well in order to get a complete picture of our impact and to explore areas where management decisions could lower it.

Overall, our scope 1-3 GHG emissions increased by 17.6 metric tons (t) of CO_2e, or 2%, from 2018 to 2019), which amounts to a 5% total increase since 2017. In 2019, a sharp decrease in Scope 3 emissions from air travel, business vehicle use, and water use helped offset increasing building natural gas and fleet vehicle emissions (Figure 1). The changes in our building energy use may be attributable to higher heating load in the winter (increased gas use) and lower cooling load in the summer (we mostly cool with electric-driven ground-source heat pumps). It should be noted, there was no employee commuter survey conducted in 2019, so the 2018 numbers were used.

Year Over Year Change 2018-2019

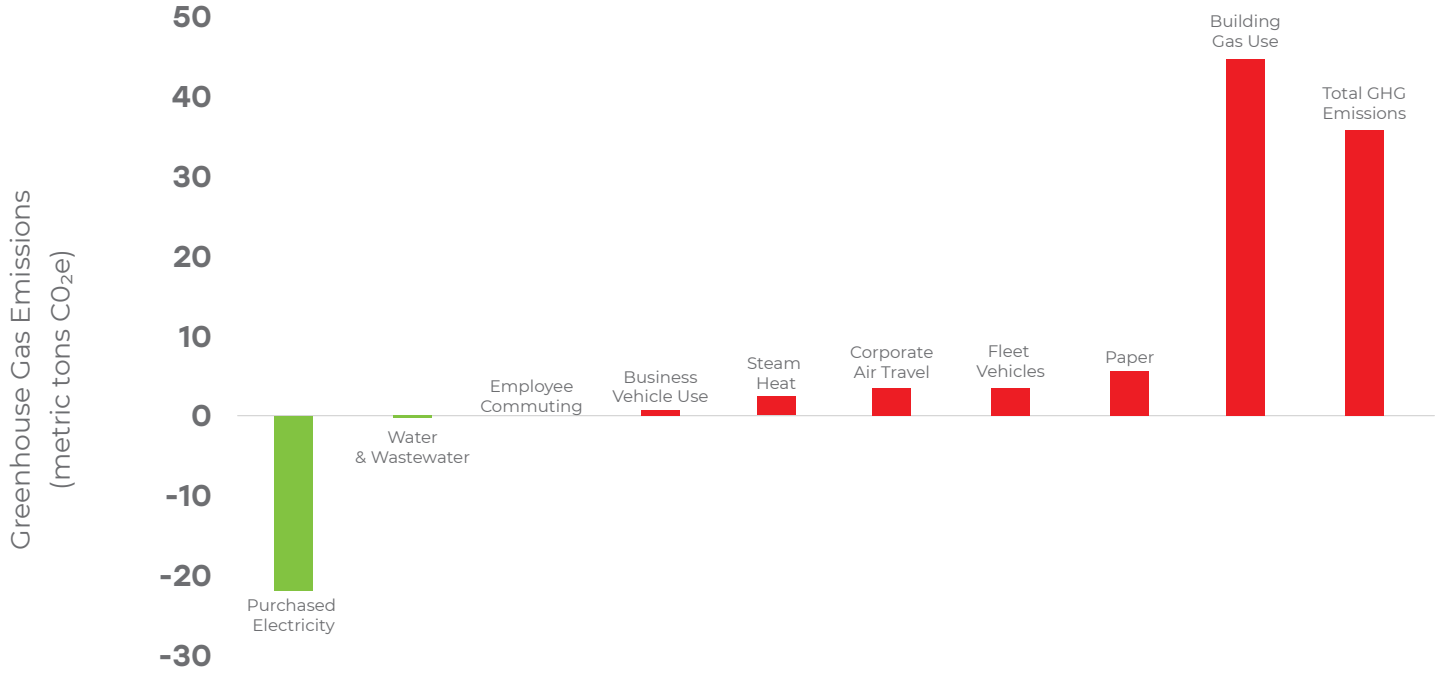

Figure 1: Change in Emissions 2018-2019

GHG Emissions (GRI 305-1, 305-2, 305-3, 305-4)

Scope 1

Direct Emissions

This covers emissions from owned assets, including one-site combustion for building heating, and operation of fleet vehicles. This includes heating of leased space [3].

Scope 2

Electricity Indirect Emissions

Emissions from the generation of purchased electricity, heat and steam.

Scope 3

Other Indirect Emissions

This includes emissions from purchased materials, water use, corporate air travel, business use of personal vehicles, and employee commuting.

Greenhouse gas emissions are given as CO_2 equivalents on a 100-year time scale (CO_2e).

Summary of Emissions By Scope

		2017	2018	2019	YOY Change
Scope 1	(mt CO_2e)	190	202	236	47
Scope 2	(mt CO_2e)	238	214	220	-19
Scope 3	(mt CO_2e)	273	306	284	11
Total GHG Emissions	(mt CO_2e)	701	722	740	39
Emissions per Employee (FTE)	(kg CO_2e)	4,900	4,608	4,747	-153
Emissions per Member	(kg CO_2e)	14.29	14.42	14	0.19

Table 1. Summary of GHG emissions by scope.

Greenhouse Gas Emissions By Scope

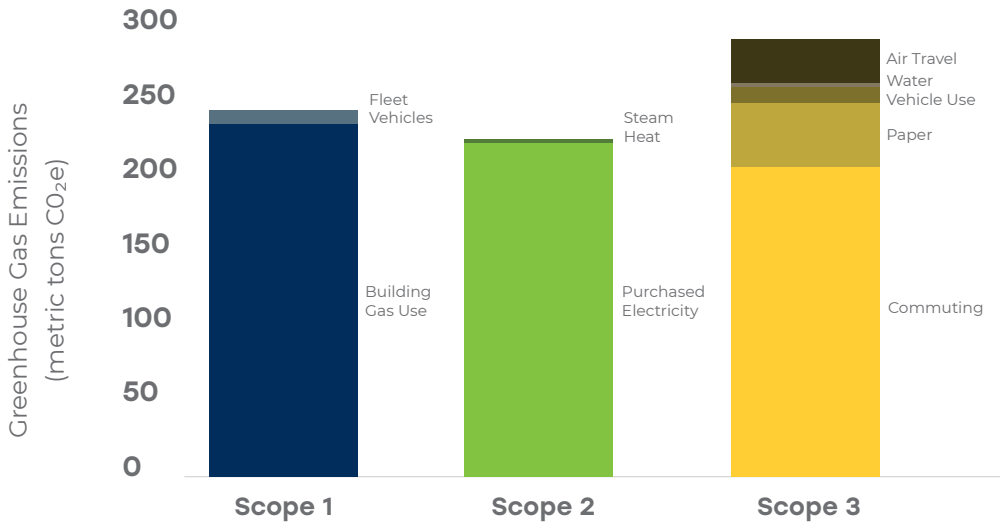

Figure 2: Emissions by Source and Scope, 2019

Water (GRI 103)

We continue to monitor our water use. Irrigation water at two Clearwater buildings was supplied from unmetered wells, so that volume was estimated. Meters have since been added to the wells; going forth, we will be able to more accurately record the irrigation usage from the wells.

Despite a 41% increase in domestic water usage from 2018 to 2019, total water use in 2019 decreased approximately 50%. The increase in domestic water usage can be largely attributable to a water leak. Total irrigation use decreased approximately 60% in 2019. This decrease is the result of several different factors; estimated irrigation at one branch was zero due to ongoing construction, the irrigation meter at another branch malfunctioned midway through summer, so the irrigation amount was estimated based on trends from previous years, and there was an overall decrease in irrigation demand at other branches.

Domestic Use		**2017**	**2018**	**2019**	**YOY Change**
Measured	(gal)	517,206	370,282	623,224	252,942
Estimated	(gal)	0	0	0	0
Irrigation					
Measured	(gal)	956,232	1,305,162	506,721	-798,441
Estimated	(gal)	2,231,208	2,205,813	844,534	-1,361,279
Total Use	(gal)	3,704,647	3,881,256	1,954,891	-1,926,365
Total Use Per Employee (FTE)	(gal)	25,907	24,761	19,992	-4,769

Table 2. Total water use., 2017-2019

Water Withdrawal by Source (GRI 303-1)

Clearwater facilities have three sources of water: City of Missoula municipal supply, Town of Stevensville municipal supply, and on-site wells. The on-site wells and Missoula municipal supply are drawn from the Missoula aquifer; the Stevensville municipal supply is drawn from a Bitterroot Valley aquifer.

Groundwater		**2017**	**2018**	**2019**
Municipal Supply	(gal)	1,473,439	1,675,443	1,351,254
On-Site Wells	(gal)	2,231,208	2,205,813	844,534
All Other Sources				
	(gal)	0	0	0

*Table 3. Water withdrawal by source. *Estimated, on-site wells are not currently metered.*

Paper (GRI 103)

Paper Use (GRI 301-1, 301-2)

Paper use is reported here as total recycled and non-recycled content. Recycled content includes both pre-and post-consumer material.

Paper use increased significantly between 2018 and 2019. This was driven by a few factors; the most impactful was the corporate name change from Missoula Federal Credit Union to Clearwater Credit Union in September 2019. Due to the name change, we had to order a significant amount of branded office materials (envelopes, deposit slips, check stock, etc.) Despite efforts to move to electronic distribution of member statements, we saw an increase in paper statement production. This is likely due to an increase in the length of printed statements.

Total Paper Use

		2017	2018	2019	YOY Change
Recycled Content	(lbs)	5,053	5,700	7,921	2,220
Non-Recycled Content	(lbs)	22,320	17,192	25,522	8,330
% Recycled Content	%	18%	25%	24%	1%
Total Paper Use	(lbs)	27,373	22,892	33,443	10,551
Total Paper Use Per Employee (FTE)	(lbs)	191	146	215	69
Total Paper Use Per Member	(lbs)	0.558	0.457	0.657	0.200

Table 4. Total paper use, 2019.

Solid Waste (GRI 103)

Clearwater currently has services for landfill waste, commingled recycling (Republic Services), and composting (Missoula Compost Collection). We support the City of Missoula's **ZERO by FIFTY** initiative to reduce solid waste generation 90% by 2050. Our measured total solid waste production increased by 50% from 2018 to 2019, with compost and recycling increasing by 109% and 108%, respectively. However, this may be an artifact of our relatively imprecise measurement method. We are working to improve our tracking methodology and increase our diversions away from the landfill.

Solid Waste Generated (GRI 306-2)

		2017	2018*	2019
Landfill Waste	(lbs)	46,265	46,265	60,190
Recycling	(lbs)	10.150	10,150	21,131
Compost	(lbs)	5,386	5,386	11,261
Total Solid Waste	(lbs)	61,800	61,800	92,582
Percent Waste Diverted From Landfill	%	25.1%	25.1%	34.99%
Total Solid Waste per Employee (FTE)	(lbs)	432	432	596
Landfill Waste per Employee (FTE)	(lbs)	324	324	388

Table 5. Solid waste generation, 2019.

**The 2017 waste audit was actually conducted in early 2018 and those results were used for both 2017 and 2018.*

Next Steps

In late 2018 Clearwater's Board of Directors approved an environmental management plan[1] committing to, by the end of 2020:

- Pursue maximizing our solar capacity to regulatory and operational constraints.
- Look into energy-efficient measures at our branches.
- Improve solid waste tracking.
- Improve employee engagement in alternative commuting and improve the methodology of commuter tracking.
- Achieve greenhouse gas neutrality through the purchase of carbon offsets.

In 2020 we will aggressively pursue management actions to meet these goals, and we will continue to monitor and report on our progress towards them.

[1]Available at **clearwatercreditunion.org/transparency/#sustainability**

Technical Appendix & Greenhouse Gas Handbook

This appendix provides the technical details of our environmental assessment. It is intended to offer greater depth to the interested reader; to assist other financial institutions with their own environmental assessments; and to comply with reporting requirements for our greenhouse gas inventory, which we conducted in accordance with the World Resources Institute's Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition [1].

Description of the Company

Clearwater Credit Union is a member-owned, not-for-profit financial cooperative headquartered in Missoula, Montana. Founded in 1956 as a policemen's cooperative credit union, Clearwater has grown to serve over 52,000 members and over $600M in assets. We currently serve anyone who lives, works, worships, studies, or participates in an association headquartered in seven counties in western Montana. In 2019 Clearwater had 155 full-time equivalent positions, operated 5 retail branches, owned and occupied 6 buildings, and occupied one leased location.

Reporting Period

The period covered by this report is 1/1/2019 through 12/31/2019.

Organizational Boundary

Clearwater owns and fully occupies all of our facilities with the exception of one leased branch and has no subsidiaries or equity shares in other organizations. Therefore, we selected the operational control approach, to set organizational and operational boundaries for this assessment. Under this approach we will report all greenhouse gas emissions for organizations and operations that we have direct, operational control over.

To account for emissions from leased space, we followed GHG Protocol Appendix F [3] and included emissions from on-site natural gas combustion in scope 1 emissions and purchased electricity in scope 2 emissions.

No sources, facilities, or operations were excluded.

Scope 1 (Direct Emissions)

As a financial institution, Clearwater has few sources of direct emissions. These sources are: (1) on-site combustion of natural gas for space and water heating; (2) operation of a small vehicle fleet.

Scope 2 (Energy Indirect)

Energy indirect emissions resulting from the production of electricity purchased by Clearwater and steam heat at generated at Clearwater's University Center branch.

Scope 3 (Other Indirect)

Scope 3 emissions are those that result from business operations but are not covered under scopes 1 & 2. Clearwater is reporting scope 3 emissions from activities that have a significant impact on total GHG emissions and are potentially responsive to management activities. The scope 3 emissions sources reported here are: corporate air travel, business travel in non-fleet vehicles, water use, paper use, and employee commuting.

GHG Sources Reported

Scope 1

- Natural Gas Combustion
- Fleet Vehicle Use

Scope 2

- Steam Heat
- Purchased Electricity

Scope 3

- Corporate Air Travel
- Business Travel is Non-Owned Vehicles
- Paper Use
- Water Use
- Employee Commuting

Methodology

Due to the nature of Clearwater Credit Union's operations, most emissions cannot be measured directly. Instead, emissions were estimated for each source using the following model:

emissions=activity level x emissions factor

The units and sources of the activity levels and emission factors are described in the following pages.

Natural Gas Combustion

ACTIVITY LEVEL

Natural gas use is metered at all Clearwater facilities. In the case of the single leased space, Clearwater's share of the total building consumption was calculated on the basis of relative floor space.

PROCEDURE

1. Natural gas use will be measured in units of energy (e.g. joules/therms/mmBtu).
2. Where metered data are not available, gas use shall be estimated, and the estimating method reported.

EMISSION FACTORS

Emission factors used were US EPA Emission Factors for Greenhouse Gas Inventories [4].

PROCEDURE

1. The natural gas emission factors shall be in units of mass per energy (e.g. kg/mmBtu).
2. The emission factors shall be obtained from the most recent US EPA Emission Factors for Greenhouse Gas Estimates.
3. The emission factors shall be reviewed each reporting period. If different emission factors are selected, the need for a base year recalculation shall be assessed.

Fleet Vehicle Use

ACTIVITY LEVEL

Fleet vehicle use for the reporting period was measured directly in miles. In some cases interpolation between recorded services was required to match vehicle mileage to the reporting period.

PROCEDURE

1. Fleet vehicle use shall be measured in vehicle-miles.
2. The class of vehicle (e.g. light truck, passenger car, hybrid, electric) shall be recorded.
3. Ideally, mileage shall be obtained by odometer readings.
4. If odometer readings are not available, linear extrapolation between recorded mile at servicing shall be used.

EMISSION FACTORS

Emissions were calculated for vehicle-miles for each class of vehicle (light truck and passenger car). Emission factors used were US EPA Emission factors for Greenhouse Gas Inventories (2018). Note that the US EPA class “passenger car” includes “passenger cars, minivans, SUVs, and small pickup trucks (vehicles with wheelbase less than 121 inches).” The US EPA class “light truck” includes “full-size pickup trucks, full-size vans, and extended-length SUVs (vehicles with wheelbase greater than 121 inches).”

PROCEDURE

1. Emission factors shall be in units of mass per vehicle-mile (e.g. kg/vehicle-mile).
2. The emissions factor shall be obtained from the most recent US EPA Emission Factors for Greenhouse Gas Estimates.
3. The emission factors shall be reviewed each reporting period. If different emission factors are selected, the need for a base year recalculation shall be assessed.

Building Electricity Use

ACTIVITY LEVEL

Electricity use is metered at all Clearwater facilities, including leased space.

PROCEDURE

1. Building electricity use shall be measured in kilowatt-hours (kWh).
2. Where metered data are not available, electricity use shall be estimated and the estimating method reported.

EMISSION FACTORS

Emissions were calculated per kWh using US EPA eGRID total production emission factors for the Northwest Power Pool (NWPP) subgrid. Emission factors used were US EPA Emission factors for Greenhouse Gas Inventories (2018).

PROCEDURE

1. Emission factors shall be in units of mass per energy (e.g. kg/kWh).
2. The emission factors used shall be the US EPA eGRID total output emission rate for the NWPP subgrid.
3. The emission factors may be obtained from the most recent US EPA Emission Factors for Greenhouse Gas Estimates.
4. The emission factor shall be reviewed each reporting period. If a different emission factor is selected, the need for a base year recalculation shall be assessed.

Steam Heat

ACTIVITY LEVEL

Steam heat is used only at Clearwater's leased University branch. In this case, Clearwater's share of the total building consumption was calculated on the basis of relative floor space.

PROCEDURE

1. Steam heat will be measured in units of energy (e.g. pounds or BTU).
2. Where metered data are not available, gas use shall be estimated, and the estimating method reported.

EMISSION FACTORS

Emission factors used were US EPA Emission factors for Greenhouse Gas Inventories (4).

PROCEDURE

1. The natural gas emission factors shall be in units of mass per energy (e.g. kg/mmBtu).
2. The emission factor shall be obtained from the most recent US EPA Emission Factors for Greenhouse Gas Estimates.
3. The emission factor shall be reviewed each reporting period. If a different emission factor is selected, the need for a base year recalculation shall be assessed.

Corporate Air Travel

ACTIVITY LEVEL

Origins, intermediate stops, and destinations for all corporate air travel were collected. Distances between airports were calculated along great circle routes and an additional 9% was added to account for route deviations and airport traffic control patterns. Flight segments were then classified as short-, medium-, and long-haul following US EPA emissions factor categories (<300 miles, ≥300 and <2300 miles, and ≥2300 miles, respectively).patterns. Flight segments were then classified as short-, medium-, and long-haul following US EPA emission factors categories (<300 miles, ≥300 and <2300 miles, and ≥2300 miles, respectively).

PROCEDURE

1. Corporate air travel will be measured in passenger-miles.
2. Starting airport, intermediate stops, and ending airport will be obtained for all corporate air travel.
3. Such data may be obtained from expense reports and employee reimbursement forms.
4. For each flight segment the distance between airports shall be calculated using the great circle method.
5. Each segment length total shall be multiplied by 1.09 to account for route deviations and air traffic control patterns.
6. Flight segments shall be classified according to length to match the appropriate emission factors.

EMISSION FACTORS

Emissions were calculated per passenger-mile for each of the three length categories (short-, medium-, and long-haul) using US EPA Emission factors for Greenhouse Gas Inventories (2018). Recognizing that emissions from aviation have an enhanced radiative forcing effect on the atmosphere, emissions from aviation were multiplied by a radiative forcing coefficient of 2 [5 ,6].

PROCEDURE

1. Emission factors shall be in units of mass per passenger-mile (e.g. kg/passenger-mile).
2. The appropriate emission factors for the flight segment length shall be used.
3. The emission factors shall be obtained from the most recent US EPA Emission Factors for Greenhouse Gas Estimates.
4. Emissions shall be multiplied by a radiative forcing factor.
5. A radiative forcing factor of 2 shall be used.
6. The emission factor and radiative forcing factor shall be reviewed each reporting period. If a different factor is selected, the need for a base year recalculation shall be assessed.

Business Travel in Non-Owned Vehicles

ACTIVITY LEVEL

Business travel in non-owned vehicles took place almost entirely in employees' personal vehicles. Total miles traveled were collected from reimbursement forms and expense reports. Vehicle class is not recorded, so vehicle-miles are assumed to be 75% in passenger cars and 25% in light trucks (see note in emission factors about vehicle classes).

PROCEDURE

1. Business travel in non-owned vehicles shall be measured in vehicle-miles.
2. Such travel data may be obtained from reimbursed mileage on expense reports and employee reimbursement forms.

EMISSION FACTORS

Emissions were calculated using US EPA Emission factors for Greenhouse Gas Inventories (2018). Note that the US EPA class "passenger car" includes "passenger cars, minivans, SUVs, and small pickup trucks (vehicles with wheelbase less than 121 inches)." The US EPA class "light truck" includes "full-size pickup trucks, full-size vans, and extended-length SUVs (vehicles with wheelbase greater than 121 inches)."

PROCEDURE

1. Emission factors shall be in units of mass per vehicle-mile (e.g. kg co2e/vehicle-mile).
2. Total vehicle-miles shall be assumed to be 75% in passenger cars and 25% in light trucks.
3. The emission factors shall be obtained from the most recent US EPA Emission Factors for Greenhouse Gas Estimates.
4. The emission factor shall be reviewed each reporting period. If different emission factor are selected, the need for a base year recalculation shall be assessed.


City Center

Paper Use

ACTIVITY LEVEL

Clearwater uses a wide variety of paper from several sources and total paper use is necessarily an estimate with significant t uncertainty. Efforts to quantify paper use focused on the major categories of use and most common products. It is recognized that given the quantity and variety of paper products used, not all paper use will be captured. Paper use shall be measured for: facilities use (janitorial); general office use; promotional and branded materials, and communication to members using third-party vendors. A simplifying assumption used here is that paper used during the reporting period can be estimated as paper ordered during the reporting period.

Generally speaking, paper use is recorded as quantity of products, which must then be converted to weight. This can be accomplished in four ways, listed here in decreasing order of preference: (1) Shipping weights determined from product specifications. (2) unit weights determined from product dimensions and paper specification weights. (Note that the system for describing paper weights--e.g. 20# bond, 10 0# cover--is non-intuitive and must be understood prior to this calculation[2]). (4) paper products may be subsampled and directly weighed. (4) estimated using fixed conversion factors.

As described in emission factors (below), paper is separated into total weight of recycled (pre- and post-consumer content) and non-recycled content by multiplying the total weight of each particular paper product by it recycled content percentage:

$$\text{recycled content} = \text{total weight} \times \% \text{ recycled content}$$

Where the recycled percentage is not known, it was assumed to be zero.

[2]See, for example, **neenahpaper.com/resources/paper-101/basis-weights**

PROCEDURE

1. Paper use shall be measured in units of mass (e.g. kg).
2. Paper ordered during the reporting period shall be used to estimate paper used during the reporting period.
3. Total use shall be measured for recycled and non-recycled content.
4. Where recycled content percentage is unavailable it shall be assumed to be zero.
5. Quantities of paper products can be obtained from annual order summaries. These may be taken from supplier-provided summaries or from internal accounting.
6. Quantities of paper products shall be converted to weights using the following methods, in order of preference:
    - **a.** Product shipping weights;
    - **b.** Paper specification weight and product dimensions;
    - **c.** Direct weighting of a subsample of the product;
    - **d.** Estimation using generic conversion weights.

EMISSION FACTORS

Environmental impact estimates were made using the Environmental Paper Network Paper Calculator Version 3.2.1. For more information, visit **papercalculator.org**. It was determined that GHG emissions were a perfect linear function of recycled percentage. As a result, paper can be aggregated into total recycled content (100% recycled) and total non-recycled content (0% recycled) using the formula in activity level, above. The emission factors used were for uncoated groundwood for uncoated freesheet. Note that the emission factors provided by the Environmental Paper Network are lifecycle emissions; that is, they include emissions from disposal.

PROCEDURE

1. Emission factors shall be in units of mass per mass (e.g. kg/lbs).
2. Emissions shall be calculated separately for recycled and non-recycled content.
3. Emission factors may be taken from the Environmental Paper Network.
4. The emission factors shall be reviewed each reporting period. If different emission factors are selected, the need for a base year recalculation shall be assessed.

Water Use

ACTIVITY LEVEL

Water use at Clearwater falls into two categories: domestic (i.e. facilities use) and irrigation. Water use can also be separated by source. Water used by Clearwater comes from two sources: (1) municipal water supply; (2) groundwater wells.

Most Clearwater facilities use metered municipal water supplies. In the case of our leased locations, Clearwater's water use was calculated from the building total based on the percentage of total floor space the leased office occupied in the building. Most facilities also had separate meters for irrigation supply. In the case that a building had a single meter for domestic and irrigation use, the domestic use was estimated by averaging the use over the winter months when no irrigation was taking place; this value was then subtracted from the summer months to separate domestic and irrigation use. Clearwater's largest campus had been irrigated with unmetered groundwater wells. An estimate of water use per irrigation zone was calculated from buildings with metered irrigation supplies and was then applied to the total number of irrigation zones on the unmetered wells. Water meters were installed before the irrigation season of 2020.

PROCEDURE

1. Water use shall be measured in units of volume (e.g. gallons).
2. Water use for domestic use and irrigation shall be measured separately.
3. All domestic water use shall be assumed to be returned to the wastewater treatment system.
4. Unmetered use shall be estimated, and the estimation method shall be reported.

EMISSION FACTORS

Water supply and wastewater treatment cause greenhouse gas emissions in multiple ways, including the energy used to treat and transport water and, in the case of wastewater, direct emissions of biogenic gasses. Given the wide variety of upstream and downstream treatment methods and energy intensity of transport, generalized emission factors are difficult to come by. For this assessment, emission factors for municipal supply and wastewater treatment were taken from the City of Missoula's GHG inventory [8]. Those values, in turn, were the result of detailed calculations following ICLEI US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions [9].

PROCEDURE

1. Emission factors shall be in units of mass per volume (e.g. kg/gal).
2. Emissions from both supply and waste treatment shall be calculated.
3. All domestic water used shall be counted as treated in the wastewater system.
4. Emission factors shall be based on the City of Missoula's Greenhouse Gas Inventory unless other, city-specific values are available.
5. The emission factors shall be reviewed each reporting period. If different emission factors are selected, the need for a base year recalculation shall be assessed.

Employee Commuting

ACTIVITY LEVEL

Emissions from employee commuting are included in this report because (a) they are a large component of overall GHG emissions; and (b) Clearwater has the ability to influence commuting emissions through programs to incentivize sustainable commuting modes. Employee commuting emissions were calculated using a survey of annual commuting behavior. This survey collects data on the total miles traveled to work, the mode used (single-occupancy vehicle, carpool, walk/bike, bus, and telecommute), and vehicle type (light truck, passenger car, electric, hybrid).

PROCEDURE

1. Employee commuting data shall be collected in both total miles commuted and passenger-miles commuted.
2. Employee commuting shall be estimated at least once per reporting period by survey.
3. Commuting modes measured shall include: single occupancy vehicle, carpool, walk/bike, bus, and telecommute.
4. Where a vehicle is shared, the vehicle-miles shall be divided by the number of people in the car to calculate passenger-miles.
5. Survey results shall be scaled to total commuting for the reporting period by adjusting for the response rate and by assuming 48 work weeks per employee to account or holidays and annual leave.

EMISSION FACTORS

Emission factors for employee commuting are based on the passenger-miles for each mode.

PROCEDURE

1. Emission factors shall be in units of mass per passenger-mile (e.g. kg/passenger-mile).
2. Emissions shall be calculated separately for single-occupancy vehicle, carpool, and bus, and shall be calculated separately for light trucks, passenger cars, hybrid vehicles, and electric vehicles.
3. Hybrid vehicles shall be assumed to produce ½ the emissions of passenger cars unless more specific emissions are available.
4. The emission factors shall be obtained from the most recent US EPA Emission Factors for Greenhouse Gas Estimates.
5. The emission factors shall be reviewed each reporting period. If different emission factors are selected, the need for a base year recalculation shall be assessed.

Solid Waste

Solid waste is not included in our greenhouse gas inventory, but the activity level estimation method is presented here for reference.

ACTIVITY LEVEL

Very little data is available for solid waste generation. Each facility is contracted for regular pickup of a fixed size container, but there are not data on weight or % full of each container. To estimate annual weight, the average fullness of the containers was estimated, and a density coefficient was applied to convert volume to weight. There is considerable uncertainty in this method and in the resulting estimates of total weight of solid waste.

All conversion factors from US EPA Volume-to-Weight conversion factors (2016).

PROCEDURE

1. Solid waste generation shall be reported in units of weight (e.g. lbs).
2. Solid waste generation shall be reported for landfill waste, recycling, and compost.
3. Annual volume shall be estimated using expert judgment for average filled percentage at pick-up.
4. Volume estimates shall be converted to weight using US EPA Volume-to-Weight Conversion Factors [9], specifically those conversion factors listed in this report.

Base Year

The GHG Protocol requires an organization define a base year as a point of comparison for reporting
The GHG Protocol requires an organization to define a base year as a point of comparison for reporting reductions, progress towards targets, and compliance with applicable reporting requirements. Clearwater has defined calendar year 2017 as its base year. 2017 was the first year a greenhouse gas inventory was completed. Recalculation of base year emissions shall follow the guidance and procedures in the GHG Protocol [2]. Per GHG Protocol, base year emissions shall be recalculated in the case of:

- Acquisitions or divestments;
- Outsourcing or insourcing of emitting activities;
- Changes in calculation methodology that result in a significant impact on the base year emissions data;
- Discovery of significant errors, or a number of cumulative errors that are collectively significant.

What constitutes a significant impact on base year emissions data is left to the organization; Clearwater Credit Union has set this threshold at 10% of total GHG emissions in CO_2e.

Base year recalculation is not required for:

- Organic growth or decline;
- Acquisition or insourcing of facilities that did not exist in the base year;
- Outsourcing or insourcing of scope 2 and scope 3 emissions.

2019 Emissions

GHG Emissions By Scope & Source

	CO_2		CH_4		N_2O		HFCs		PFCs		SF_6		Total GHG
Scope 1	t	CO_2e	t	t CO_2e	t	t CO_2e	t	t CO_2e	t	t CO_2e	mt	t CO_2e	t CO_2e
Building Gas Use	227	227	0.00428	0.1198	0.000428	0.1134	a	a	a	a	a	a	227
Fleet Vehicles	8.87	8.87	0.000491	0.0138	0.000184361	0.0754	a	a	a	a	a	a	8.96
												Total	236
Scope 2													
Steam Heat	3	3	0.00006	0.0017	0.000006	0.00161	a	a	a	a	a	a	3
Purchased Electricity	216	216	0.0202	0.5653	0.00298	0.789	a	a	a	a	a	a	217
												Total	220
Scope 3													
Corporate Air Travel	36.9	36.9	0.000170	0.00476	0.00117	0.31	a	a	a	a	a	a	37.2
Business Vehicle Use	8.48	8.48	0.000429	0.0120	0.000288055	0.153	a	a	a	a	a	a	8.64
Water & Wastewater	a	1.34	a	a	a	a	a	a	a	a	a	a	1.34
Paper	a	38.8	a	a	a	a	a	a	a	a	a	a	38.8
Employee Commuting	195	195	0.0102	0.285	0.00649	1.721	a	a	a	a	a	a	197
												Total	283
Direct Biogenic Emissions	0	0											
												Total GHG Emissions	**739**

t = metric ton = 1 megagram

Emission Factors & Global Warming Potentials

Emissions Factors

Activity	Gas	Units	Value	Source
Paper - 0% Recycled	Total GHG	(kg CO_2e/lbs paper)	1.271	Evironmental Paper Network
Paper - 100% Recycled	Total GHG	(kg CO_2e/lbs paper)	0.801	Evironmental Paper Network
Water Supply	Total GHG	(g CO_2e/gal)	0.675	Missoula Greenhouse Gas Emissions Inventory & Analysis, 2003-2008
Wastewater	Total GHG	(g CO_2e/gal)	1.425	Missoula Greenhouse Gas Emissions Inventory & Analysis, 2003-2008
Air Travel - Short Haul (<300 miles)	CO_2	(kg/passenger-mile)	0.225	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Short Haul (<300 miles)	CH_4	(g/passenger-mile)	0.0039	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Short Haul (<300 miles)	N_20	(g/passenger-mile)	0.0072	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Medium Haul (>=300 miles, <2300 miles)	CO_2	(kg/passenger-mile)	0.136	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Medium Haul (>=300 miles, <2300 miles)	CH_4	(g/passenger-mile)	0.0006	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Medium Haul (>=300 miles, <2300 miles)	N_20	(g/passenger-mile)	0.0043	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Long Haul (>=2300 miles)	CO_2	(kg/passenger-mile)	0.166	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Long Haul (>=2300 miles)	CH_4	(g/passenger-mile)	0.0006	EPA Emission Factors for Greenhouse Inventories (2018)
Air Travel - Long Haul (>=2300 miles)	N_20	(g/passenger-mile)	0.0053	EPA Emission Factors for Greenhouse Inventories (2018)
Natural Gas Fired Steam Heat	CO_2	(kg/mmBtu)	66.33	EPA Emission Factors for Greenhouse Inventories (2018)
Natural Gas Fired Steam Heat	CH_4	(kg/mmBtu)	1.25	EPA Emission Factors for Greenhouse Inventories (2018)
Natural Gas Fired Steam Heat	N_20	(kg/mmBtu)	0.125	EPA Emission Factors for Greenhouse Inventories (2018)
Building Gas Use (Natural Gas Stationary Combustion	CO_2	(kg/mmBtu)	53.06	EPA Emission Factors for Greenhouse Inventories (2018)
Building Gas Use (Natural Gas Stationary Combustion	CH_4	(g/mmBtu)	1	EPA Emission Factors for Greenhouse Inventories (2018)
Building Gas Use (Natural Gas Stationary Combustion	N_20	(g/mmBtu)	0.1	EPA Emission Factors for Greenhouse Inventories (2018)
Building Electricity Use (NWP Total Output)	CO_2	(lbs/MWh)	651.2	EPA Emission Factors for Greenhouse Inventories (2018)
Building Electricity Use (NWP Total Output)	CH_4	(lbs/MWh)	0.061	EPA Emission Factors for Greenhouse Inventories (2018)
Building Electricity Use (NWP Total Output)	N_20	(lbs/MWh)	0.009	EPA Emission Factors for Greenhouse Inventories (2018)
Passenger Car	CO_2	(kg/vehicle-mile)	0.343	EPA Emission Factors for Greenhouse Inventories (2018)
Passenger Car	CH_4	(g/vehicle-mile)	0.019	EPA Emission Factors for Greenhouse Inventories (2018)
Passenger Car	N_20	(g/vehicle-mile)	0.011	EPA Emission Factors for Greenhouse Inventories (2018)
Light-Duty Truck	CO_2	(kg/vehicle-mile)	0.472	EPA Emission Factors for Greenhouse Inventories (2018)
Light-Duty Truck	CH_4	(g/vehicle-mile)	0.019	EPA Emission Factors for Greenhouse Inventories (2018)
Light-Duty Truck	N_20	(g/vehicle-mile)	0.018	EPA Emission Factors for Greenhouse Inventories (2018)
Bus	CO_2	(kg/vehicle-mile)	0.056	EPA Emission Factors for Greenhouse Inventories (2018)
Bus	CH_4	(g/vehicle-mile)	0.0013	EPA Emission Factors for Greenhouse Inventories (2018)
Bus	N_20	(g/vehicle-mile)	0.0009	EPA Emission Factors for Greenhouse Inventories (2018)
Hybrid	CO_2	(kg/vehicle-mile)	0.1715	Custom 1/2 EPA Passenger Car Value
Hybrid	CH_4	(g/vehicle-mile)	0.0095	Custom 1/2 EPA Passenger Car Value
Hybrid	N_20	(g/vehicle-mile)	0.0055	Custom 1/2 EPA Passenger Car Value

Emission Factors & Global Warming Potentials Cont'd

Global Warming Potentials

Global Warming Potential	CO_2	Mass CO_2	1	IPCC AR5, 100-Year GWP Without Climate-Carbon Feedback [11]
Global Warming Potential	CH_4	Mass CO_2	28	IPCC AR5, 100-Year GWP Without Climate-Carbon Feedback [11]
Global Warming Potential	N_2O	Mass CO_2	265	IPCC AR5, 100-Year GWP Without Climate-Carbon Feedback [11]

Solid Waste Density Factors

Type	Density (lbs/yard³)	Source
Trash	138	Commercial, all waste, uncompacted.
Recycling	101.5	Containers (plastic bottles, aluminum cans, steel cans, glass bottles) corrugated containers, and paper.
Compost	396	Food waste - restaurants.

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