

Environmental Impact Assessment

2017 - 2018

Photo by Ron Hoff
Pablo, MT



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BELONG

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Photo by Robert Pal
Wise River, MT

Introduction

This report details Missoula Federal Credit Union's first environmental impact assessment. It contains our management approach to environmental sustainability, a summary of our impact, and a detailed description of data and methods.

Missoula Federal Credit Union (MFCU) is driven by four core values:

TOGETHER WE OWN



What we do is rooted in cooperative ownership.

TOGETHER WE INCLUDE



What we do is rooted in being inclusive, not exclusive.

TOGETHER WE EMPOWER



What we do is rooted in ensuring that everyone touched by our work is better equipped for tomorrow than they were yesterday.

TOGETHER WE MATTER



What we do is all about 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 to demonstrating leadership in sustainability for the financial industry. We recycle, compost, buy green, and have solar panels on three of our buildings, but we've never taken a comprehensive look at our environmental impact before now. This report is our first-ever environmental impact assessment.

Measurement alone is not enough. We are committed to taking real action to reduce our impact. This report will serve as a starting point. We will use it to set targets and to measure our progress. Our commitment to our members includes wise management of their financial resources, and the information collected for this report will help us choose environmental improvements that make good business sense. By regularly measuring and publishing our environmental impact we will make ourselves accountable to our members and our community.

Our environmental impact reporting follows standard disclosures from the Global Reporting Initiative's Sustainability Reporting Guidelines [1]. 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.

Environmental Management

Missoula Federal Credit Union is committed to reducing our environmental impact. To put this commitment into action, first we will:

1

Establish a Baseline

We will conduct an initial assessment of our environmental impact.

2

Set Targets

We will establish clear, quantifiable targets for reducing our environmental impact.

3

Prioritize Improvements

Based on their impact, cost-effectiveness, and sound stewardship of our members' resources.

4

Implement Improvements

5

Measure Results

Provide an annual update on our environmental impact.

This report is our first environmental impact assessment. We will use it as a baseline for measuring our progress, to set targets for reduction, and to prioritize improvements.



Photo by Melissa Kinyon
Glacier National Park, MT

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 103¹)

Photo by Chelsea Culp
Seeley, MT

This is our first greenhouse gas (GHG) emissions inventory. We will use it as a baseline for comparison with future inventories, to set targets, and to identify opportunities for reduction. 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.

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

○ Scope 1

Direct Emissions

Emissions from owned assets, including on-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.

○ Scope 3

Other Indirect Emissions

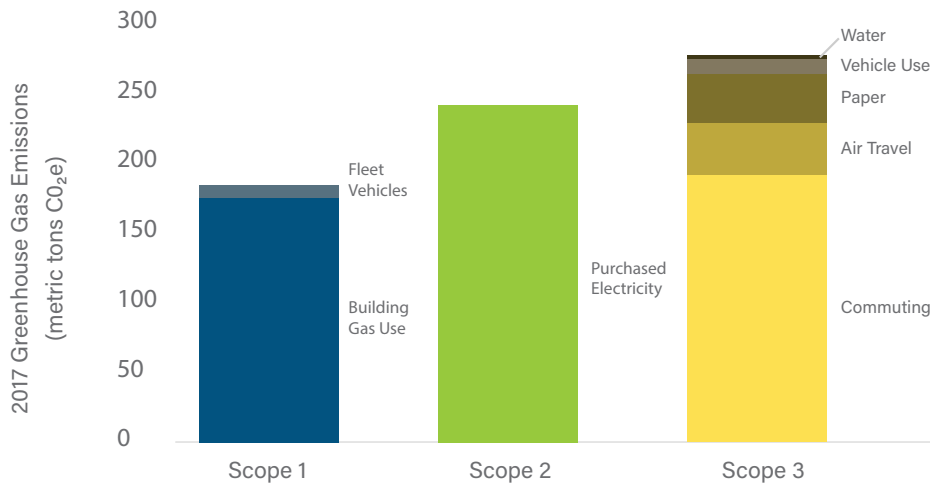
Emissions from purchased materials, water use, corporate air travel, business use of personal vehicles, and employee commuting.

¹GRI = Global Reporting Initiative [1]



Greenhouse gas emissions are given as CO₂ equivalents on a 100-year time scale (CO₂e).

Greenhouse Gas Emissions By Scope



Summary of Emissions By Scope

| | | 2017 |
|---------------------|------------------------|----------------------------|
| Scope 1 | (mt CO ₂ e) | 190 |
| Scope 2 | (mt CO ₂ e) | 238 |
| Scope 3 | (mt CO ₂ e) | 273 |
| Total GHG Emissions | | (mt CO ₂ e) 701 |

| | | |
|------------------------------|------------------------|-------|
| Emissions per Employee (FTE) | (kg CO ₂ e) | 4,900 |
| Emissions per Member | (kg CO ₂ e) | 14.29 |

mt = metric ton = 1 megagram
FTE = Full Time Equivalent

Greenhouse Gas Emissions By Source

| Scope 1 | | 2017 |
|------------------|------------------------|----------------------------|
| Building Gas Use | (mt CO ₂ e) | 184 |
| Fleet Vehicles | (mt CO ₂ e) | 5 |
| Total | | (mt CO ₂ e) 190 |

| Scope 2 | | 2017 |
|-----------------------|------------------------|----------------------------|
| Purchased Electricity | (mt CO ₂ e) | 238 |
| Total | | (mt CO ₂ e) 238 |

| Scope 3 | | 2017 |
|----------------------|------------------------|----------------------------|
| Employee Commuting | (mt CO ₂ e) | 196.8 |
| Corporate Air Travel | (mt CO ₂ e) | 33.5 |
| Paper | (mt CO ₂ e) | 32 |
| Business Vehicle Use | (mt CO ₂ e) | 8 |
| Water & Wastewater | (mt CO ₂ e) | 2 |
| Total | | (mt CO ₂ e) 273 |

| | | |
|---------------------|--|----------------------------|
| Total GHG Emissions | | (mt CO ₂ e) 701 |
|---------------------|--|----------------------------|

mt = metric ton = 1 megagram



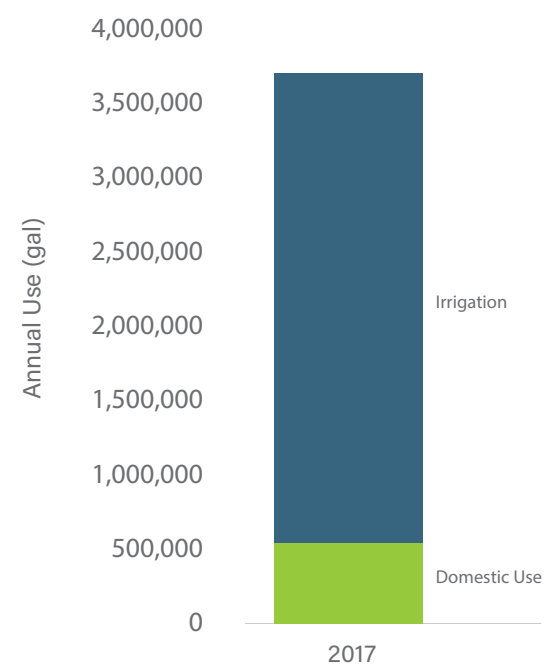
Photo by Chris Clarke
Blackfoot River, MT

Water (GRI 103)

This is our first water use assessment. We will use it as a baseline for comparison with future inventories, to set targets, and to identify opportunities for reduction. Domestic use refers to use in buildings. Irrigation water at two MFCU buildings was supplied from unmetered wells, so that volume was estimated.

| Domestic Use | | | 2017 |
|------------------------------|-------|--|-----------------|
| Measured | (gal) | | 517,206 |
| Estimated | (gal) | | 0 |
| Irrigation | | | |
| Measured | (gal) | | 893,922 |
| Estimated | (gal) | | 2,293,518 |
| Total Use | | | (gal) 3,704,647 |
| Total Use Per Employee (FTE) | | | (gal) 25,907 |

FTE = Full Time Equivalent



Water Withdrawal by Source (GRI 303-1)

Missoula Federal Credit Union 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.

Water Withdrawals by Source

| Groundwater | | | 2017 |
|---------------------------|-------|--|-----------|
| Municipal Supply | (gal) | | 1,473,439 |
| On-Site Well ^a | (gal) | | 2,231,208 |
| All Other Sources | | | |
| | (gal) | | 0 |

^aEstimated, on-site wells are not currently metered.

Paper (GRI 103)

As a financial institution, paper is our primary material input and output. We currently make efforts to reduce paper use and source paper from sustainable suppliers, but this is our first assessment of total paper use. We will use this assessment to better understand our paper use, to establish targets for reduction, and to identify opportunities for reduction or conversion to more sustainable sources.

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.

Total Paper Use

| | | | 2017 |
|------------------------------------|-------|--|--------|
| Recycled Content | (lbs) | | 5,053 |
| Non-Recycled Content | (lbs) | | 22,320 |
| Total Paper Use | (lbs) | | 27,373 |
| % Recycled Content | % | | 18.5% |
| Total Paper Use Per Employee (FTE) | | | (lbs) |
| | | | 191 |
| Total Paper Use Per Member | | | (lbs) |
| | | | 0.570 |

Paper Use by Destination, per Capita

| | | | 2017 |
|-----------------------------------|--------------------|------|-------|
| Member Statements | per member | (oz) | 3.44 |
| Office Use & Other Communications | per member | (oz) | 5.04 |
| Facilities | per employee (FTE) | (oz) | 0.639 |

FTE = Full Time Equivalent



Solid Waste (GRI 103)

Missoula Federal Credit Union currently has service 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. This is our first measurement of our total waste generation. We will use it as a baseline for comparison with future assessments, to set targets for reduction, and to identify opportunities for reduction.

Solid Waste Generated (GRI 306-2)

| | | 2017 |
|-------------------|-------|--------|
| Landfill Waste | (lbs) | 43,194 |
| Recycling | (lbs) | 10,150 |
| Compost | (lbs) | 2,693 |
| Total Solid Waste | (lbs) | 56,037 |

| | | |
|--------------------------------------|-------|------|
| Percent Waste Diverted From Landfill | % | 22.9 |
| Total Solid Waste per Employee (FTE) | (lbs) | 392 |
| Landfill Waste per Employee (FTE) | (lbs) | 302 |

FTE = Full Time Equivalent





Next Steps

Working to reduce our environmental impact isn't new to Missoula Federal Credit Union, but this is the first time that we've taken a comprehensive look at that impact is. Measurement is just the start though, making real reductions in our environmental impact means taking action. With the information collected in this report we will set concrete, measurable targets for reduction; we will prioritize improvements by impact and cost-effectiveness; and we will regularly assess our progress. We will conduct regular environmental impact assessments and report the results to our members. We are committed to responsible stewardship of our members' financial resources, and of our shared environment, and we will demonstrate that commitment with transparent reporting on our financial and environmental performance.

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 [2].

Description of the Company

Missoula Federal Credit Union (MFCU) is a member-owned, not-for-profit financial cooperative headquartered in Missoula, Montana. Founded in 1956 as a policemen's cooperative credit union, MFCU has grown to serve over 49,000 members and holds over \$520M in assets. We currently serve anyone who lives, works, worships, studies, or participates in an association headquartered in three counties around Missoula. In 2017 Missoula Federal Credit Union had 147 employees (143 FTE), operated 5 retail branches, owned and occupied 6 buildings, and occupied one leased location.

In 2016 MFCU's board adopted a strategic plan built around four core values: cooperative ownership, inclusion, empowerment, and impact. This includes a commitment to environmental sustainability. MFCU has long worked to reduce our environmental impact, but this is our first comprehensive greenhouse gas inventory.

Reporting Period

The period covered by this report is 1/1/2017 through 12/31/2017.

Organizational Boundary

MFCU owns and fully occupies all of our facilities, with the exception of one leased branch location, 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, MFCU has few sources of direct emissions. These sources are: (1) on-site combustion of natural gas for heating; (2) operation of a small vehicle fleet.

Scope 2 (Energy Indirect)

Energy indirect emissions result from the production of electricity purchased by MFCU.

Scope 3 (Other Indirect)

Scope 3 emissions are those that result from business operations but are not covered under scopes 1 & 2. MFCU 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.



Methodology

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

$$\text{emissions} = \text{activity level} \times \text{emissions factor}$$

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 MFCU facilities. In the case of the single leased space, MFCU'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 from 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.

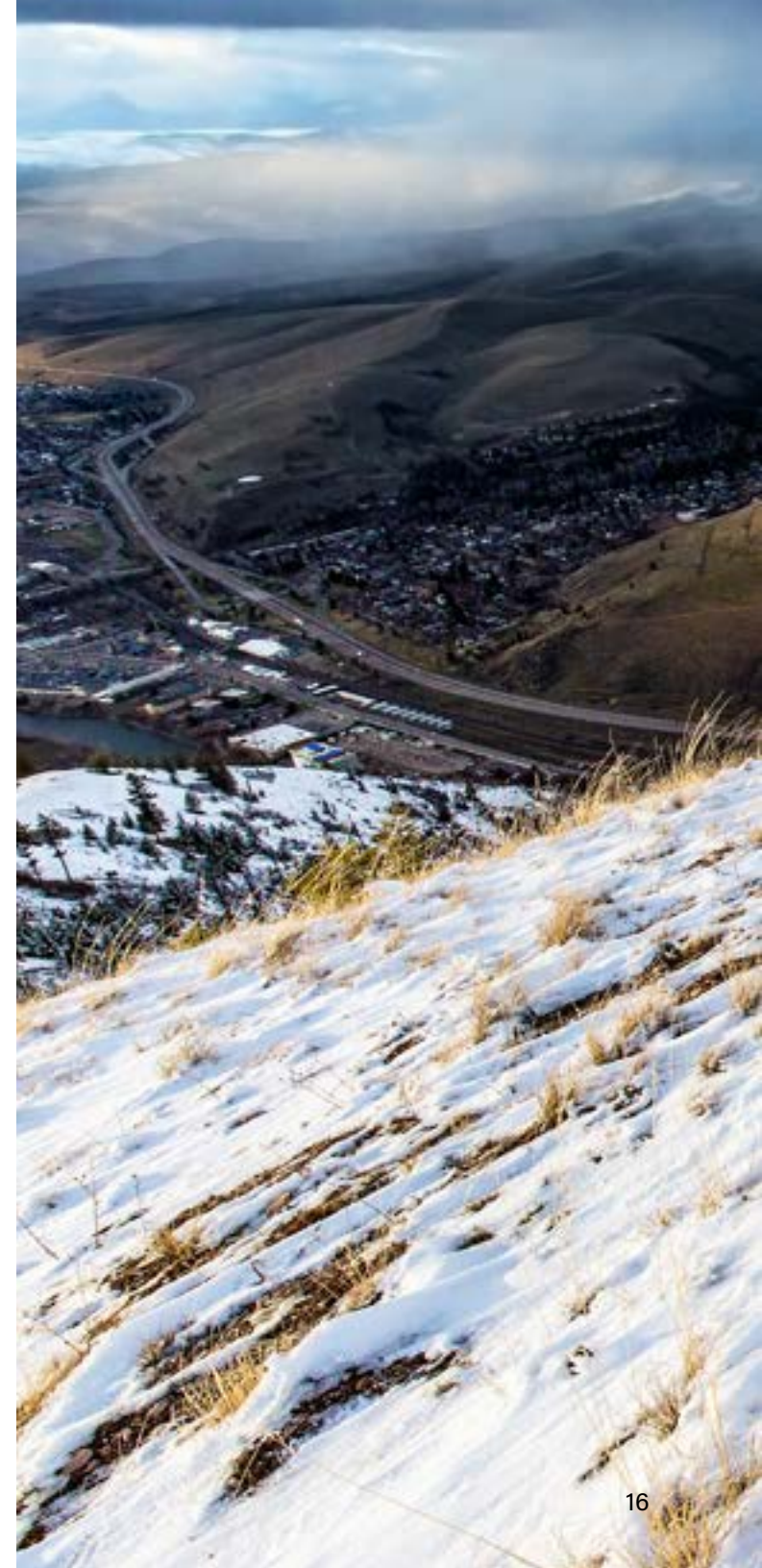




Photo By Brian Christianson
Mount Jumbo
Missoula, MT



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. Follow definitions in the relevant emission factors source(s).
- 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

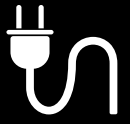
Emissions were calculated for vehicle-miles for each class of vehicle (light truck and passenger car). Emission factors used were US EPA Emission Factors for Greenhouse Gas Inventories [4]. Note that the US EPA class “passenger car” includes “passenger cars, minivans, SUVs, and small pickup trucks (vehicles 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 MFCU facilities, including leased space.

PROCEDURE

- 1 Building electricity use shall be measured in units of energy (e.g. 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 from US EPA Emission factors for Greenhouse Gas Inventories [4].

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 factors shall be reviewed each reporting period. If different emission factors are 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 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 [4]. 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 was 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 [4]. 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 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.







Paper Use

ACTIVITY LEVEL

Missoula Federal Credit Union uses a wide variety of paper from several sources and total paper use is necessarily an estimate with significant 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, 100# cover—is non-intuitive and must be understood prior to this calculation²). (3) 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 its 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.

²See, for example, <https://www.neenahpaper.com/resources/aboutpaper/basisweights>.

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

Most MFCU facilities use metered municipal water supplies. In the case of our leased locations, MFCU'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. MFCU's largest campus is irrigated with unmetered groundwater wells. In this case, 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.

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.

Photo by Brian Christianson
Swift Current Sunset
Many Glacier, MT



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 [7]. Those values, in turn, were the result of detailed calculations following ICLEI US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions [8].

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) MFCU 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, 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 for 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 $\frac{1}{2}$ 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 filled percentage of each container. To estimate annual weight, the average fullness of the containers was estimated and a density coefficient 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 [9].

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 the table below.



Base Year

The GHG Protocol requires an organization define a base year as a point of comparison for reporting reductions, progress towards targets, and compliance with applicable reporting requirements. Missoula Federal Credit Union has defined calendar year 2017 as its base year. 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; Missoula Federal Credit Union has set this threshold at 10% of total GHG emissions in CO₂e.

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.

2017 Emissions

GHG Emissions By Scope & Source

| | CO ₂ | | CH ₄ | | N ₂ O | | HFCs | | PFCs | | SF ₆ | | Total GHG |
|---------------------------|-----------------|----------------------|-----------------|----------------------|------------------|----------------------|------|----------------------|------|----------------------|-----------------|----------------------|----------------------|
| | mt | mt CO ₂ e | mt | mt CO ₂ e | mt | mt CO ₂ e | mt | mt CO ₂ e | mt | mt CO ₂ e | mt | mt CO ₂ e | mt CO ₂ e |
| Scope 1 | | | | | | | | | | | | | |
| Building Gas Use | 184 | 184 | 0.00347 | 0.0972 | 0.000347 | 0.0920 | a | a | a | a | a | a | 184 |
| Fleet Vehicles | 5.23 | 5.23 | 0.000290 | 0.0081 | 0.000168 | 0.0445 | a | a | a | a | a | a | 5.29 |
| | | | | | | | | | | | | Total | 190 |
| Scope 2 | | | | | | | | | | | | | |
| Purchased Electricity | 237 | 237 | 0.0222 | 0.6214 | 0.00327 | 0.868 | a | a | a | a | a | a | 238 |
| | | | | | | | | | | | | Total | 238 |
| Scope 3 | | | | | | | | | | | | | |
| Corporate Air Travel | 33.2 | 33.2 | 0.000145 | 0.00405 | 0.00105 | 0.28 | a | a | a | a | a | a | 33.5 |
| Business Vehicle Use | 8.25 | 8.25 | 0.000426 | 0.0119 | 0.000313 | 0.166 | a | a | a | a | a | a | 8.42 |
| Water & Wastewater | a | 1.73 | a | a | a | a | a | a | a | a | a | a | 1.73 |
| Paper | a | 32.4 | a | a | a | a | a | a | a | a | a | a | 32.4 |
| Employee Commuting | 195 | 195 | 0.0102 | 0.285 | 0.00649 | 1.721 | a | a | a | a | a | a | 197 |
| | | | | | | | | | | | | Total | 273 |
| Direct Biogenic Emissions | 0 | 0 | | | | | | | | | | | |
| | | | | | | | | | | | | | Total GHG Emissions |
| | | | | | | | | | | | | | 701 |

mt = metric ton = 1 megagram

Emission Factors & Global Warming Potentials

Emissions Factors

| Activity | Gas | Units | Value | Source |
|--|------------------|----------------------------------|--------|---|
| Paper - 0% Recycled | Total GHG | (kg CO ₂ e/lbs paper) | 1.271 | Environmental Paper Network |
| Paper - 100% Recycled | Total GHG | (kg CO ₂ e/lbs paper) | 0.801 | Environmental Paper Network |
| Water Supply | Total GHG | (g CO ₂ e/gal) | 0.675 | Missoula Greenhouse Gas Emissions Inventory & Analysis, 2003-2008 |
| Wastewater | Total GHG | (g CO ₂ e/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 ₂ O | (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 ₂ O | (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 ₂ O | (g/passenger-mile) | 0.0053 | 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 ₂ O | (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 ₂ O | (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 ₂ O | (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 ₂ O | (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 ₂ O | (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 ₂ O | (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 [10] |
| Global Warming Potential | CH ₄ | Mass CO ₂ | 28 | IPCC AR5, 100-Year GWP Without Climate-Carbon Feedback [10] |
| Global Warming Potential | N ₂ O | Mass CO ₂ | 265 | IPCC AR5, 100-Year GWP Without Climate-Carbon Feedback [10] |

Solid Waste Density Factors

| Type | Density (lbs/yard ³) | Source |
|-----------|----------------------------------|--|
| Trash | 138 | Commercial, all waste, uncompacted. [9] |
| Recycling | 101.5 | Containers (plastic bottles, aluminum cans, steel cans, glass bottles) corrugated containers, and paper. [9] |
| Compost | 396 | Food waste - restaurants. [9] |

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