



City of Red Lodge

Energy Conservation Plan

ACKNOWLEDGEMENTS

This document was unanimously adopted by resolution by the Red Lodge City Council on October 23, 2018 and revised on November 14, 2023.

Last Updated On: October 24, 2023

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CONTENTS

Section 1: Introduction

What is the City’s Baseline Energy Footprint?	07-09
Energy Conservation Plan.....	10-19

Section 2: Energy Conservation Strategies

Fleet, Buildings, and Streetlights.....	20-29
Internal Policies and Practices.....	30-41
Solid Waste, Recycling and Compost.....	42-55
Wastewater and Water.....	56-65
Codes and Land Use.....	66-78

Section 3: Implementation

Guiding Principle and Goals.....	79-80
Who will Implement the Plan?	81
Which Strategy do we Implement?	82
Monitoring and Reporting.....	82-83

Appendices

Appendix A: Adopted Resolutions.....A-1.....	84-85
Appendix B: City of Red Lodge Baseline Inventory.....B-1.....	86-87

2023 Updates, Current status and Progress Towards Goals

Executive Summary:

A central goal of the Energy Conservation Plan is to reduce the City's municipal greenhouse gas emissions, in metric ton CO₂ equivalent (mtCO₂e). The goal of the original 2016 document was a 50% reduction in GHG emissions by the year 2040. In the time since the publication of the original document, it has become abundantly clear that human-caused CO₂ emissions are causing a rapid warming of our planet, due to its heat-trapping effects. The effects of a warming planet are coming on stronger and faster than was previously understood. Recent examples of this include devastating floods and wildfires in and around Red Lodge, poor summertime air quality due to regional wildfire smoke, increasing frequency and severity of hurricanes, erratic polar ice coverage, and less stable ocean currents. Once-in-a-thousand year events are happening on a regular basis.

Red Lodge has reduced its own greenhouse gas emissions at a much faster pace than originally expected:

- In the 5 years since the first document was published (2016 - 2021), the City has seen a nearly 20% reduction in its mtCO₂e. This compares with an originally proposed goal of a 50% reduction over 24 years (2016-2040). This unexpectedly rapid progress has also resulted in significant financial savings for the City, resulting in a win-win situation.

Accordingly, one of the major changes to this year's update is an acceleration of our GHG reduction goals, as well as accelerating and adding more interim goals.

OLD GOAL: A 50% reduction in the City's mtCO₂e emissions, by 2040.

NEW GOAL: A 50% reduction in the City's GHG emissions, by 2035.

OLD INTERIM GOAL:

- 10% reduction by 2021.

NEW INTERIM GOALS:

- 10% reduction by 2021 (already achieved)
- 20% reduction by 2025 (nearly achieved as of 2021)
- 30% reduction by 2029
- 40% reduction by 2032.

Additional highlights of the current update to the Energy Conservation Plan include:

- Completion of a solar panel installation at the City Pool
- Ongoing efficiency projects such as LED streetlights
- Updates on mtCO₂e emissions from all city departments
- Growing recycling and solid waste programs
- Reusable grocery bags distributed throughout the City.

Summary of mtCO₂e emissions:

- 2016 baseline year CO₂ emissions =1,004 mtCO₂e

- 2021 (the most recent year for which full data is available) = 806 mtCO₂e.

This shows that, over the 5 year period 2016-2021, we have reduced our emissions by 19.7% (806/1,004). This is well ahead of schedule (goal of 20% reduction by 2025) and shows that further rapid reductions are feasible.

Bottom line, even only going on the 2021 data, we are nearly at our second goal of 20% reduction! That's 4 years ahead of even the proposed new schedule!!

The reductions were fairly widespread across all of the various sources of emissions within Red Lodge. However there were a few notable specific examples:

- Carnegie Library's 50% reduction from 2016 to 2022. This was due almost entirely to the installation of 19 rooftop solar panels in late 2019, as well as insulation and LED efficiency improvements. This demonstrates the potential for solar power in rapidly reducing carbon footprint.
- All Street Lights achieved a 63% reduction, from 2018 (the first year for which full data was available) to 2021. This was largely due to the NEW project to switch to energy-efficient LED bulbs, which is now nearly complete.

The Water and Wastewater Treatment sector is responsible for generating more emissions than all other sources combined: approximately 60% of total emissions, which is actually quite typical for municipalities such as ours.

This is due to the immense electrical consumption required to pump essential clean water for drinking and domestic use, as well as equally essential need to treat wastewater. It is unlikely that either of these needs will go away in the near future. Further, as other sources of City emissions are reduced, the emissions caused by Water and Wastewater Treatment will become a larger and larger percentage of the City's mtCO₂e emissions.

Water and Wastewater Projects:

- Installation of several Variable Frequency Drives at the WasteWater Treatment Plant and Grant Well Pump House. These increase efficiency by activating the electrical pumps with only as much power as is needed to meet demand.
- Future actions to increase efficiency have been evaluated, such as Solar Bee Lagoon Mixers, which could replace some of the requirements of the oxygen mixer. This approach has been evaluated and was found to not be economically feasible at this time.
- The Stormwater project will reduce the amount of water flowing into the WasteWater Treatment Plant to be treated, significantly decreasing municipal energy consumption.

In order to make the largest dent in this sector's massive mtCO₂e emissions, we will need to generate more electricity on-site using a renewable resource. There is already a solar array at the WasteWater Treatment Plant, however it is nearly 15 years old and is being outstripped by the growing energy needs of our City.

In 2016, our emissions were approximately 1,000 mtCO₂e, As of 2021, our emissions were reduced to approximately 800 mtCO₂e. Possible projects to achieve reductions before next goal include:

- Offsetting some of the massive consumption of the Water and WasteWater Department with solar panels. We would need to replace 425,000 kWh of annual electricity consumption with renewables. Based on our recent experiences with solar installations at the City Pool and the Carnegie Library, we would expect this to be possible with 1,000 solar panels.
- A more likely scenario to getting to our GHG reduction goals will be ongoing efficiency improvements combined with solar panel installations where feasible. Low interest green loans could play a part in the more daunting solar installations.
- The City's vehicle fleet consists entirely of internal combustion vehicles, representing a large area for potential reductions. Our cold climate and limited selection of electric pickup trucks are obstacles, but battery advances and new vehicle offerings in the coming years will make the transition to EVs more feasible before the 2035 goal.

DRAFT

Section 1: Introduction

WHAT IS AN ENERGY CONSERVATION PLAN?

An Energy Conservation Plan (ECP) focused on city operations creates a roadmap for a municipality to transition to a clean energy economy, while reducing their energy costs and energy usage. A comprehensive plan also builds local resilience to future changes in our climate and establishes a municipality as a leader in sustainability.

Across the United States, more than 1,500 local governments have taken steps to create their own version of an ECP, including Montana communities of Bozeman, Missoula, and Whitefish.¹

The City of Red Lodge ECP is Red Lodge's next step toward a more sustainable and secure future.

UPDATES AND REVISIONS

In 2021, the Sustainability Board and City Staff began the updating process for the ECP. Included in these updates:

- Reports on Energy Conservation Strategies (ie. what was completed).
- Corrected 2016 baseline data.
- Report on 5-year emissions reduction goal.
- Updated strategies and goals.

HOW WILL THIS HELP US?

The concept of sustainability for communities consists of addressing the needs of current generations without compromising the needs of future generations, while ensuring a balance between economic growth, environmental care and social well-being.

As Red Lodge residents are aware, our local government has long struggled to sufficiently fund the programs and services that residents want. One way of addressing this funding shortfall is by reducing our City operations' bottom-line and making it more affordable to run our town. This would involve reducing the cost of heating and cooling our City buildings, lighting our streets, and operating our water and wastewater treatment facilities. This plan was written with cost savings and energy reduction in mind, and each strategy spells out ways we can reduce our energy costs, and ultimately, our bottom-line.

This plan represents a commitment on behalf of the City government to operate as efficiently as possible through innovative energy efficiency and alternative energy solutions, as opposed to spending funds on operating costs that could be allocated to other priorities.

Additionally, this plan reflects our community's longstanding commitment to environmental protection. The City and its residents are cognizant of the fact that access to the natural environment is the defining character of our town. This plan will help Red Lodge to protect what makes us special and mitigate the effects of a

changing climate. Projections predict that in the coming years our summers will become drier and more prone to wildfires, and precipitation from snowfall will become less predictable and dependable.² When implemented, this plan will produce a healthier, more livable community for all, while safeguarding us from the negative effects of an unstable climate.

WHAT ABOUT THE MONEY?

The feasibility of a strategy being implemented is to be determined by the potential partners identified for each strategy.

The partners for each strategy are to determine the following:

1. Detailed scope of each strategy
2. Engineering or design needs
3. Capital costs
4. Ongoing operating and maintenance costs
5. Administrative requirements
6. Potential funding sources
7. Payback period, if applicable

Potential funding sources include grants, rebates, and City funds that could be budgeted for a feasible strategy. In 2017, grants in excess of \$10,000 were obtained to fund all costs for the electric vehicle charging stations located at the Red Lodge public restrooms. Rebates were used to partially fund the LED lighting retrofits at City Hall, the Police Station, and the Public Works shop, and the Variable Frequency Drives throughout town.

Strategies for which a baseline cost analysis can be determined (i.e. LED lighting, solar arrays, streetlights, paper and printing policies) will require a determination of payback time, in years, to determine the feasibility for investment of funds. For strategies in which a payback or benefit-cost cannot be developed (i.e. codes and land use such as tree planting, impermeable surfaces, recycling strategies), qualitative metrics can be identified for outcomes such as environmental, economic, or health benefits.

HOW DID WE GET HERE?

In August of 2008, the City of Red Lodge joined The U.S. Mayors Climate Protection Agreement and added climate protection goals to the Red Lodge Growth Policy. Since then, the City has become a member of Local Governments for Sustainability, signed onto the Mayors for Solar Energy Agreement, and undertaken a number of energy efficiency and renewable energy projects. Additionally, the City employed an EnergyCorps member to spearhead their sustainability efforts from October of 2015-2019.

In October of 2017 a baseline assessment of the City's energy footprint was performed,



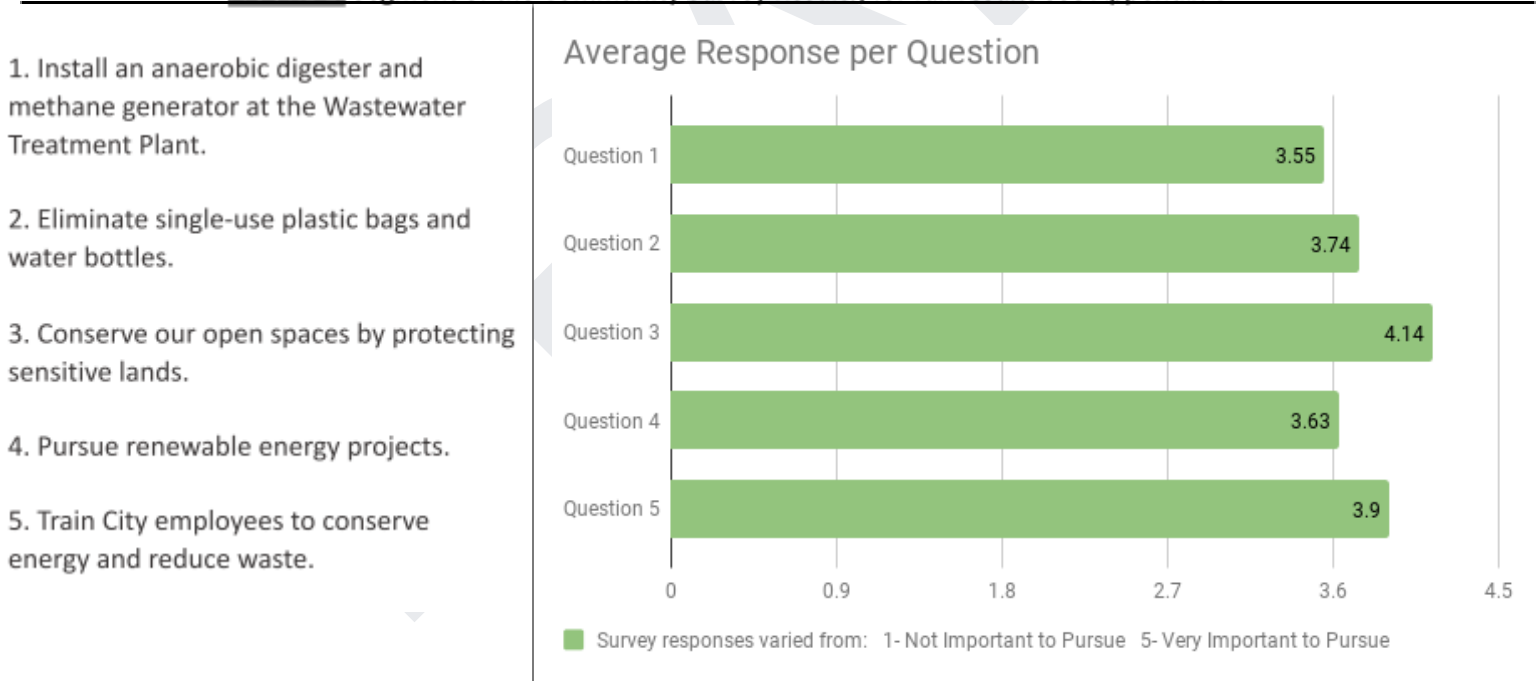
Members of the Planning Committee

and the decision was made to convene a group of local citizens to assist in the writing of an Energy Conservation Plan. In February of 2018, under the guidance of Mayor Bill Larson, a committee of Red Lodge residents with a wide range of expertise was formed, including renewable energy and planning, urban forestry and land conservation, education and electricity, geology and government, and energy policy.

Martha Brown served as the facilitator, and Public Works Director Jim Bushnell, Community Development Director James Caniglia, City Clerk Loni Hanson, and Deputy Clerk DeNaye Kern assisted, attending meetings periodically and serving as advisors to the committee.

EnergyCorps members Katelynn Essig and Kathryn Eklund provided additional research and analysis. In addition to the work done by the planning committee, public input was gathered throughout the planning process. A community survey was published, which received 188 responses and indicated strong support for the strategies listed in the plan. An employee survey was conducted as well, which measured the sustainability perceptions held by City employees (See Appendix C). Extensive public outreach was also conducted, including 5 meetings with City officials and 4 community presentations to date (See Appendix C).

FIGURE 1. Segment of the Community Survey Results, for full results see Appendix C



What is the City's Baseline Energy Footprint?

The first step in developing an energy conservation plan is to pinpoint the baseline energy usage, costs, and emissions. Once this is known, areas for improvements can be identified, completed, and data is available to measure future reductions against.

In October of 2017, The City of Red Lodge Baseline Assessment was completed and has since served as the foundation for the City of Red Lodge Energy Conservation Plan. The assessment accounts for all greenhouse gas emissions produced by City operations during calendar year 2016, and associated energy usage and costs.

The City's baseline assessment does not include emissions from the community as a whole, but rather, emissions from facilities and vehicles that are directly financially controlled by the City government.

This section summarizes the results of the City of Red Lodge Baseline Assessment, but the complete report can be found in Appendix B.

2021 UPDATE

In early 2021, City Staff recognized previous errors in calculating emissions for natural gas usage. When converting from therms, the standard measurement of natural gas reported, to metric ton carbon dioxide equivalent (mtCO₂e) the user did not change the unit from million British Thermal Units (MMBtu) to therms. As a result, all natural gas emissions reported were 10x higher than actual use. Data and assumptions based on that data have now been corrected in this document.

METHODS

In 2015 the City of Red Lodge hired an EnergyCorps member to run sustainability programming for the City, and to complete a baseline assessment of the City's energy footprint. The City then became a member of ICLEI, or Local Governments for Sustainability, and gained access to their ClearPath Software. This software is the leading online platform for completing baseline assessments.³ It tracks emissions from greenhouse gasses and applies standardized emission factors to local government records of energy use in order to calculate the energy and greenhouse gas footprint of a community or government. Emissions are then converted to metric tons of carbon dioxide equivalents (mtCO₂e) and reported in this way. Red Lodge's EnergyCorps members used the protocols, tools, and default assumptions provided by ClearPath to calculate the City government's energy footprint. The calendar year of 2016 was chosen as the baseline year, against which all future reduction measures will be compared. 2016 was chosen because it was the most recent year for which data was available. Data on the City's energy use in City buildings, facilities, water treatment, wastewater treatment, and lighting were gathered using utility expense

What is a mtCO₂e?

A mtCO₂e, or metric ton of carbon dioxide equivalents, is a more concise way of thinking about warming potential. There are six main greenhouse gases that contribute to climate change, and each of them has a different level of impact. For example, methane emissions have 21 times the warming potential of carbon dioxide. In order to present the impact of different gases in a uniform way, all emissions are converted into carbon dioxide equivalents and presented in this way.

records. Information on the City’s transportation fleet was obtained by analyzing credit card receipts and logged mileage from City vehicles. The electric vehicle charging stations and employee commute were not included in baseline calculations due to insufficient data. Emissions and costs from heavy duty vehicles were also excluded.

RESULTS

2016

In 2016, The City of Red Lodge’s operations were responsible for emitting 1,004 metric tons of carbon dioxide equivalents (mtCO₂e). These emissions, which are the result of energy consumption, cost the City \$201,226.82 in energy bills.

The Water and Wastewater sector, which encompasses fresh water treatment, wastewater treatment, and pumps and pumping stations, was the largest emissions producer and cost to the City. This accounted for 588 mtCO₂e, or 59% of emissions.

When analyzed by cost, the Water and Wastewater sector accounts for 53.5% of total annual energy costs, followed by Streetlights at 22.8%, Buildings and Facilities at 11.1%, and the Transportation Fleet at 12.6%.

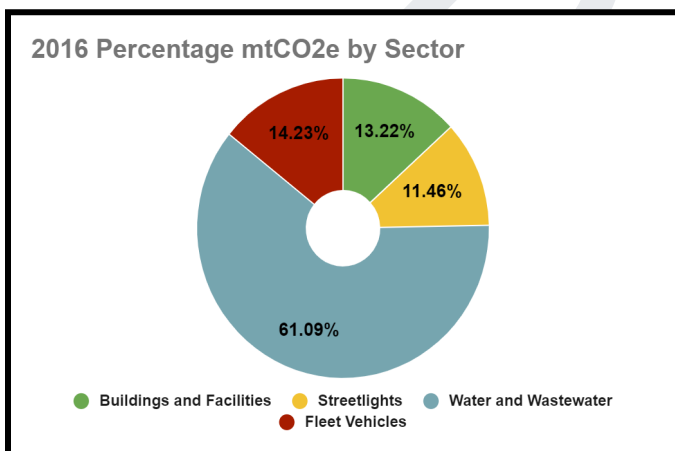
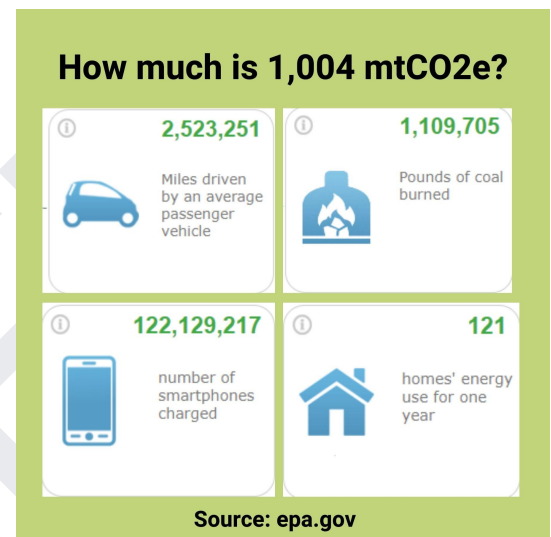


FIGURE 2. 2016 City of Red Lodge Emissions by Sector

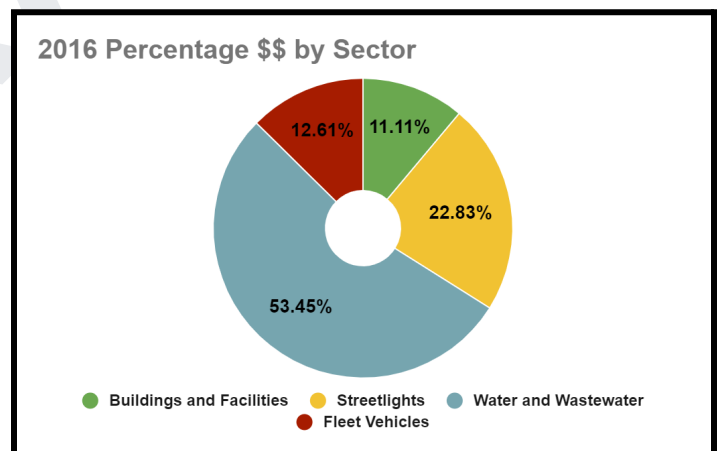


FIGURE 3. 2016 City of Red Lodge Costs by Sector

SECTOR	2016 COST (\$)	GREENHOUSE GASES (mtCO2e)
Buildings and Facilities	\$21,508	127
Water and Wastewater Treatment	\$103,464	588
Streetlights	\$43,081	110
Fleet Vehicles	\$24,410	137

RESULTS

2021

In 2021 the City of Red Lodge’s operations were

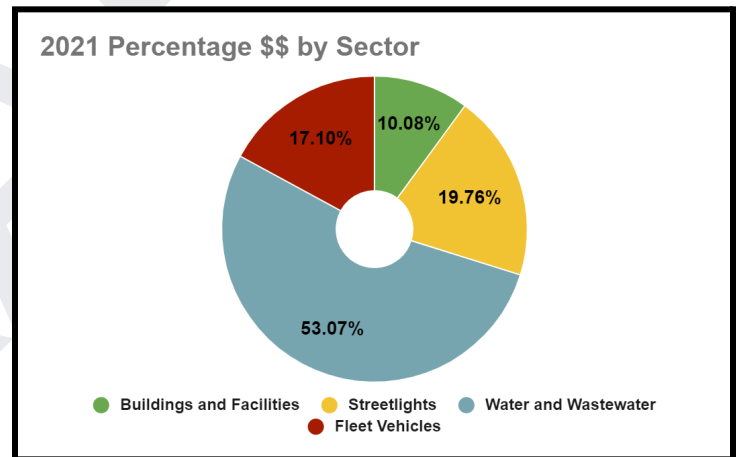
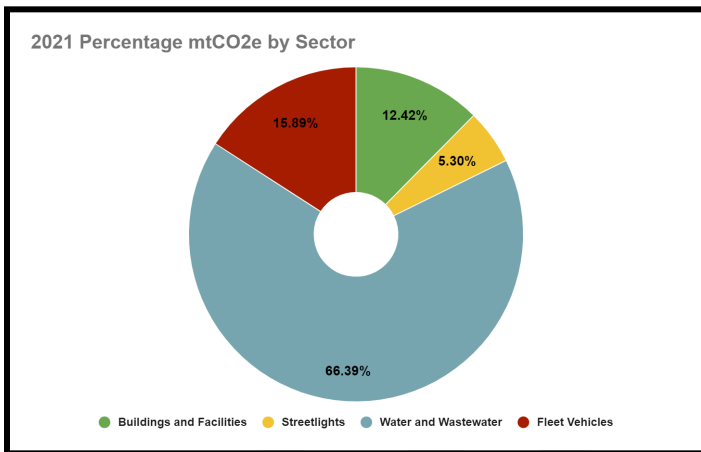


FIGURE 5 2021 City of Red Lodge Emissions by Sector

FIGURE 6 2021 City of Red Lodge Costs by Sector

responsible for emitting 806 metric tons of mtCO2e, which was approximately 61 mtCO2e below the 5-year goal. Notable changes from the 2016 estimate was the loss of the Red Lodge swimming pool, which was rebuilt and in full operation by Spring 2023.

SECTOR	2021 COST (\$)	GREENHOUSE GASES (mtCO ₂ e)
Buildings and Facilities	\$17,697	100
Water and Wastewater Treatment	\$93,202	535
Streetlights	\$34,694	43
Fleet Vehicles	\$30,024	128

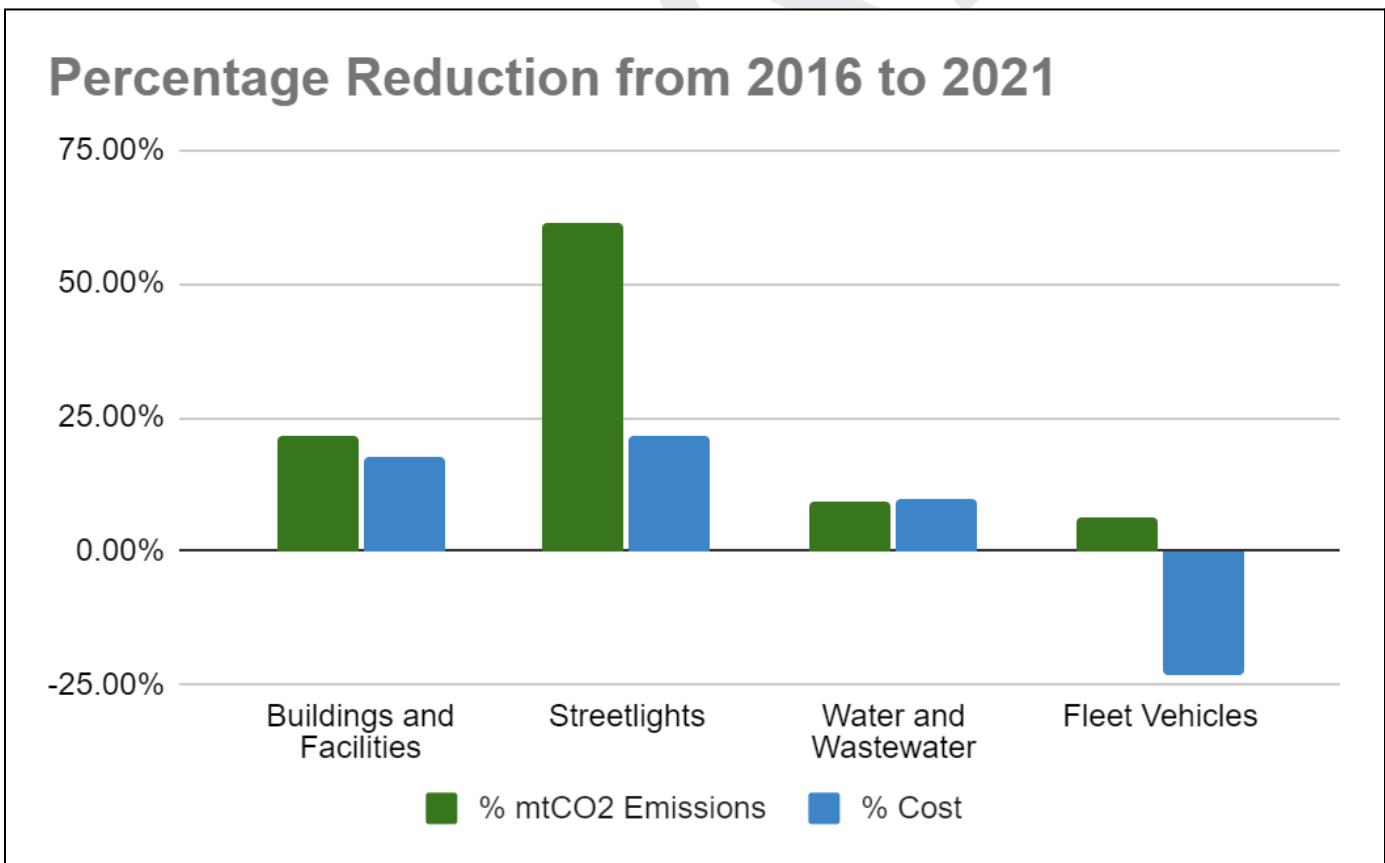
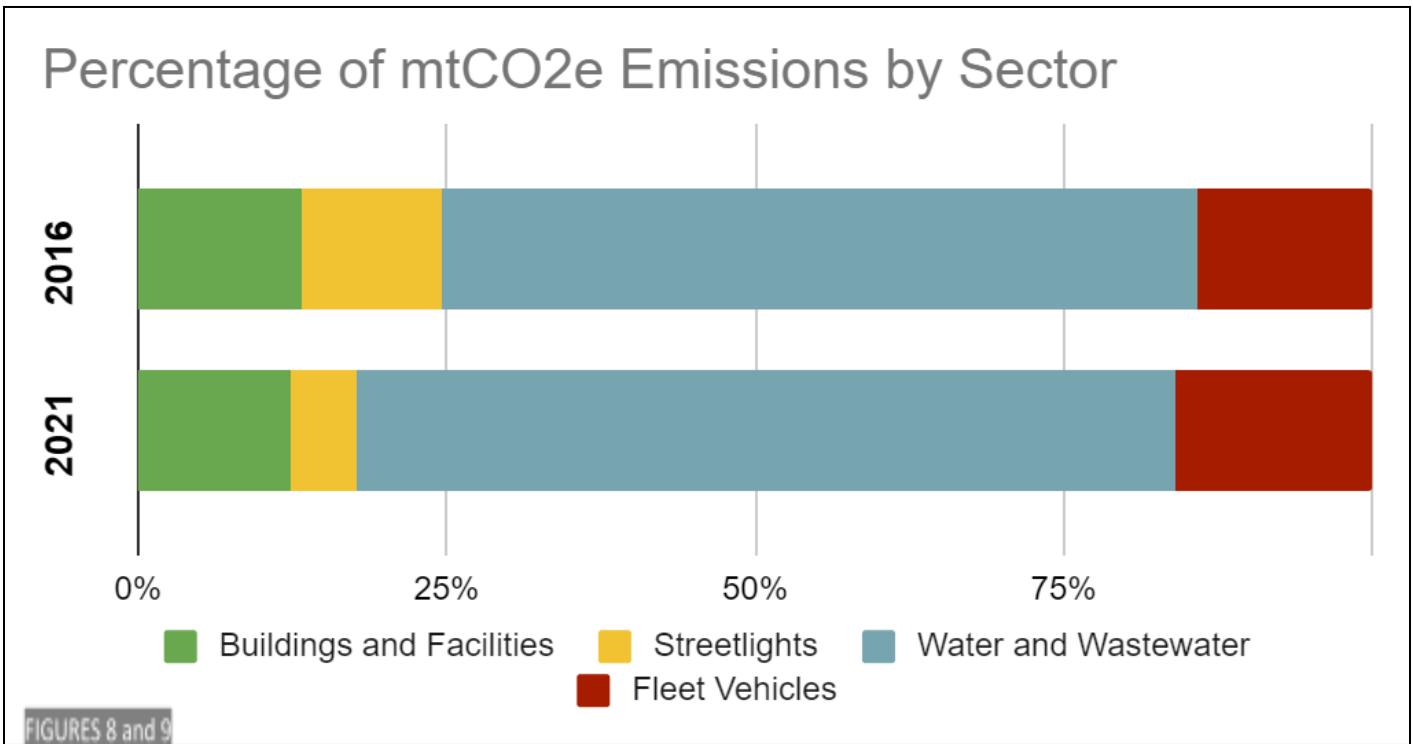
FIGURE 7 2021 City of Red Lodge Cost and Emissions Values by Sector

2016 & 2021 COMPARISONS

Overall, CO₂ emissions decreased in all four major categories from 2016 to 2021. Cost savings were generally less than CO₂ emissions reductions, because of increasing cost of electricity and gas due to inflation over this time period. Costs of fueling fleet vehicles actually increased over this time period, despite a decrease in consumption, due to a 31% increase in the cost of gasoline in Montana over this time period (www.eia.gov).

Coefficients for calculating mtCO₂e emissions are adjusted on a regular basis by EPA's Emissions and Generation Resource Integrated Database, or eGRID.

In 2016, the City Pool and Recycling Center were under municipal operation. At the time of the 5-year analysis, the pool was under construction and the Recycling Center was operated under a non-profit. As of 2023, both facilities are now operational under the City management.



Energy Conservation Plan

SCOPE

This Energy Conservation Plan focuses on municipal operations and citywide impacts. The strategies included within identify ways to reduce the electricity and natural gas used by City government facilities and vehicles.

In the Community Survey, some community members raised interest in expanding this Plan out into the community and increasing its scope so as to address the greenhouse gas emissions and associated energy costs produced by the town of Red Lodge as a whole. This is something that could be done in the future, but that is not within the scope of this plan.

OBJECTIVE & GUIDING PRINCIPLE

In order to guide the planning process, the following objective was identified by City government officials and Taskforce members:

“To create an energy roadmap for the City of Red Lodge that identifies reduction targets and strategies, and ultimately results in reductions of energy use, energy costs, and greenhouse gas emissions.”

As you can see from the plan objective, reducing energy costs, energy use, and greenhouse gas emissions were all held to the same level of importance. Luckily, a reduction in any one of these areas will result in a reduction in all areas.

The Taskforce also identified the importance of basing strategy implementation decisions off of sound economic reasoning. The group decided that the following concepts should be viewed as the guiding principle for plan implementation:

- A cost-benefit analysis should be conducted, if applicable, before each strategy is put into action.
- Consider implementing the strategies with the shortest payback period first.
- Strategies with a 10-year payback period or less should be implemented and included in the annual budgeting process. If possible, a 6 or 7 year payback should be achieved.
- Account for technology roll-over to ensure that the City does not invest in technologies that will become obsolete before their return on investment has been achieved.

In 2021-2022, McKinstry was contracted to complete an Investment Grade Audit (IGA) that performed a baseline analysis of Red Lodge’s current energy-related conditions to determine the scope and feasibility of an Energy Performance Contract (EPC). A report was generated that identified specific target areas to implement cost saving measures. *See Appendix B.*

Utilizing these principles will allow the City to achieve the greatest amount of return on its investment, and will allow funds that are saved from earlier projects to be put toward more costly projects such as solar arrays or other renewable energy projects.

WORKING GROUPS & PLAN DEVELOPMENT

To achieve plan objectives and identify reduction goals, the Taskforce identified five focus areas that needed to be addressed:

- 1- Fleet, Buildings, and Streetlights
- 2- Internal Policies and Practices
- 3- Solid Waste, Recycling, and Compost
- 4- Wastewater and Water
- 5- Codes and Land Use

Each focus area became a subcommittee and Taskforce members assigned themselves to the area they felt most knowledgeable and experienced in. From there, strategies were created at the subcommittee level and expert knowledge was brought in where necessary. City staff provided guidance to the group during each segment of plan development and helped identify strategies that are included in this plan.

The Taskforce also consulted with local government officials in Bozeman, Missoula, Whitefish, and Park City, Utah. These towns have their own version of an Energy Conservation Plan, and were used as examples on which Red Lodge's Plan was built. The Taskforce convened monthly over the course of six months to vet the strategies put forth by individual subcommittees and served as the guiding body during plan development.

Suggested Goals and Objectives:

1. **Conduct a Community Greenhouse Gas Emissions (some municipal operations represent only 1% of emissions)**
2. **Conduct an emissions assessment every 5 years**
3. **30% Reduction by 2029**

EMISSIONS REDUCTION TARGETS

These goals were set after measuring the projected impact of our reduction strategies. The group also consulted with communities across Montana who have set reduction goals and took their advice and decision making process into consideration. Our reduction goals will allow us to track our greenhouse gas and energy use reductions, and will help our progress and efforts to be quantified. The final chapter of this document is an implementation plan that defines what actions should be taken in order to reach our next interim goal of an

Be 50% below 2016 emissions by the year 2035, with interim goals of incremental 10% reductions as follows:

- 2016 - baseline
- 2021 - 10% reduction from baseline (already achieved)
- 2025 - 20% reduction
- 2029 - 30% reduction
- 2032 - 40% reduction
- 2035 - 50% reduction

This allows for a gradual escalation of progress; the time allotted for each 10% incremental decrease is initially 5 years for the first goal (which has been achieved), then 4 years to get to the next two reduction goals, and eventually down to only 3 years as the 2035 goal gets closer, and more conservation and infrastructure are in place.

additional 10% reduction, set for 2025. Specific actions will be identified for reaching our overall target once our 2021 goal has been met.

The following section lays out specific reduction strategies that will help us to reach our 50% reduction by 2035 goal.

Progress Towards GHG Emissions Reduction Goals

We have chosen 2016 as the baseline year to compare our CO₂ emissions against. In that year, our CO₂ equivalent emissions were 1,004 mtCO₂e. In 2021 (the most recent year for which full data is available), our emissions were 806 mtCO₂e. This shows that, over the 5 year period 2016-2021, we have reduced our emissions by 19.7% (806/1,004). This is well ahead of schedule (original goal of 20% reduction by 2025) and shows that further rapid reductions are feasible.

The reductions were fairly widespread across all of the various sources of emissions within Red Lodge. However there were a few notable specific examples:

1. Carnegie Library's 50% reduction from 27 mtCO₂e in 2016, to 13 mtCO₂e in 2022. This was due almost entirely to the installation of 19 rooftop solar panels in late 2019, as well as insulation and LED bulb efficiency improvements. This demonstrates the potential for solar power in rapidly reducing carbon footprint. The panels were paid for in large part by a generous NorthWestern Energy grant.
2. Street lights achieved a 63% reduction, from 100 mtCO₂e in 2018 (the first year for which full data was available), to 37 mtCO₂e in 2021. This was largely due to the switch to energy-efficient LED bulbs, which is now nearly complete. While this is a great success story, it unfortunately shows a limitation going forward: once the new bulbs are installed, there is little room for additional improvement.

The large elephant in the room for Red Lodge's CO₂ emissions is the Water and Water Treatment facilities. Together, this single sector is responsible for generating more emissions than all other sources combined: approximately 60% of total emissions. This is actually quite typical for municipalities such as ours. This is due to the immense electrical consumption required to pump essential clean water for drinking and domestic use, as well as equally essential need to treat wastewater. It is unlikely that either of these needs will go away in the near future. Further, as other sources of City emissions are reduced, the emissions caused by Water and Wastewater Treatment will become a larger and larger percentage of the City's remaining mtCO₂e emissions.

Some successful steps have been taken in the Water and Water Treatment sector, to include the installation of several Variable Frequency Drives at the WasteWater Treatment Plant and Grant Well Pump House. These increase efficiency by activating the electrical pumps with only as much power as is needed to meet demand. Older pumps basically pump at full power no matter how much pressure is needed by the system, resulting in large amounts of wasted energy. Future actions to increase efficiency have been evaluated, such as Solar Bee Lagoon Mixers, which could replace some of the requirements of the energy-intensive oxygen mixer. This approach has been evaluated and was found to not be economically feasible at that time.

In order to make the largest dent in this sector's massive mtCO₂e emissions, we will need to generate more electricity on-site using a renewable resource. There is already a solar array at the WasteWater Treatment Plant, however it is nearly 15 years old and is being outstripped by the growing energy needs of our City.

In 2016, our emissions were approximately 1,000 mtCO₂e, As of 2021, our emissions were reduced to approximately 800 mtCO₂e. As a thought experiment, we could achieve the remaining 300 mtCO₂e per year reduction required to achieve our 50% reduction goal by offsetting some of the massive consumption of the Water and WasteWater Department with solar panels. Using the conversion factor of 0.000707 mtCO₂e per kWh, we would need to replace 425,000 kWh of annual electricity consumption with renewables. Based on our recent experiences with solar installations at the City Pool and the Carnegie Library, we would expect this to be possible with 1,000 solar panels. This would cost \$1.1 million, and would save \$52,000 per year in annual electricity cost. Alternatively, depending on the rate and scale of implementation of grid scale renewable energy sources by NorthWestern Energy, Red Lodge could in part reduce its mtCO₂e emissions simply by waiting until NorthWestern Energy incorporates more renewable energy generation into its mix.

A more likely scenario to getting to our GHG reduction goals will be ongoing efficiency improvements combined with solar panel installations where feasible. Low interest green loans could play a part in the more daunting solar installations, by monetizing the future energy cost savings to pay for such projects. The City's vehicle fleet consists entirely of internal combustion vehicles, representing a large untapped area for potential reductions. Our cold climate and the currently limited selection of electric pickup trucks are obstacles, but battery advances and new vehicle offerings in the coming years will make the transition to EVs more feasible before the 2035 goal.

Energy Conservation Strategies

FLEET, BUILDINGS, AND STREETLIGHTS

LED Lighting for all City Facilities

Energy Conservation Improvements for Existing City Facilities

High Performance Building Standards on Future Construction

Fuel Efficiency Standards for Fleet Vehicles

Renewable Energy

INTERNAL POLICIES AND PRACTICES

Single-Stream Recycling Program

Paper and Printing Policy

Energy Use of Electronics

Energy and Sustainability Training for City Employees

Sustainability in the Employee Handbook

Flexible Work Scheduling

CODES AND LAND USE

Land and Water Conservation

Urban Forestry Tree Planting and Maintenance

Impermeable Urban Surface Reduction and Future Surface Design

Landscaping and Water Management Systems

Vacated, Unused, or Open Municipal Lots

Tree Nursery

WASTEWATER AND WATER

Wastewater Treatment Plant Solid Waste

Dissolved Oxygen and Mixing in the Sewage Ponds

Water Pipe and Wastewater Treatment Plant Upgrades Water Delivery System

Stormwater Inputs

Water Delivery System

Water Conservation

SOLID WASTE, RECYCLING, AND COMPOST

Single-Use Water Bottles

Single-Use Plastic Bags

Composting and E-Waste Recycling Initiatives

Recyclables in our Waste Stream

Public Education on Proper Recycling

Recycling Program Best Practices

Recycling Center Funding

Republic Services Contract

Carbon Footprint of our Solid Waste System

Other Waste Reduction Strategies

End Notes

¹ Whitlock C, Cross W, Maxwell B, Silverman N, Wade AA. 2017. Executive Summary. In: Whitlock C, Cross W, Maxwell B, Silverman N, Wade AA. 2017. 2017 Montana Climate Assessment. Bozeman and Missoula MT: Montana State University and University of Montana, Montana Institute on Ecosystems. 318 p. doi:10.15788/m2ww8w.

² "Who We Are." ICLEI USA, icleiusa.org/about-us/who-we-are/.

³ "Who We Are." ICLEI USA, icleiusa.org/about-us/who-we-are/.



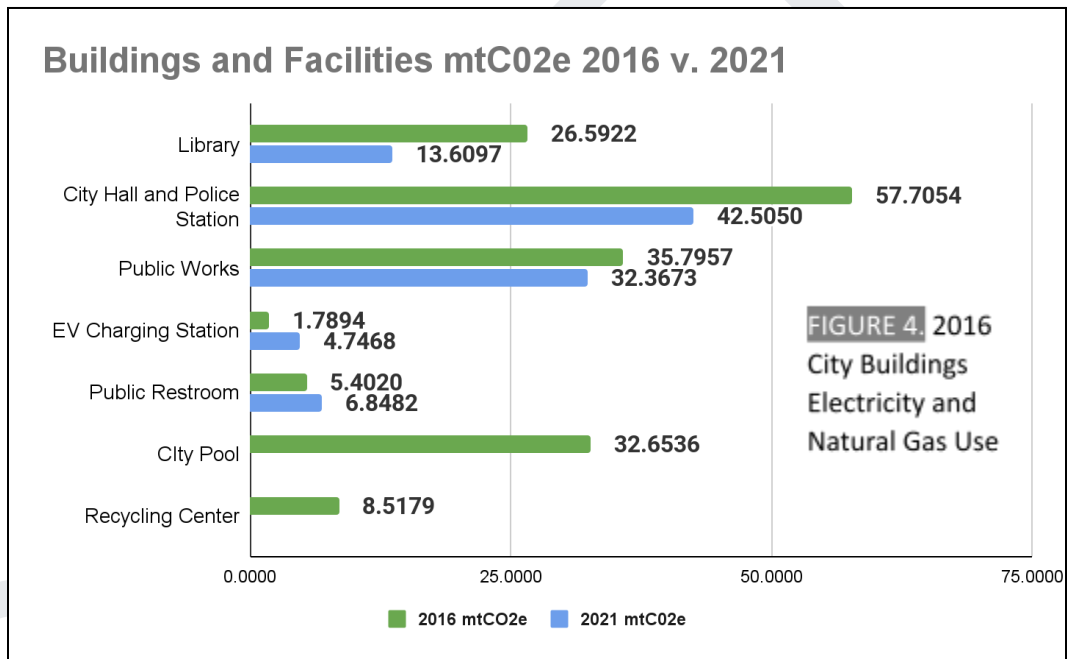
FLEET, BUILDINGS, AND STREETLIGHTS

FLEET, BUILDINGS, AND STREETLIGHTS

OVERVIEW

In 2016 the City of Red Lodge operated seven facilities whose energy usage produced 59.9% of our total greenhouse gas emissions. Of these facilities, the main energy users were City Hall and the Police Station, the Public Works Shop, the Public Pool, and the Library. Together, these four buildings accounted for 50% of our total energy use and 45% of our total emissions. In 2016, all of our Buildings and Facilities combined cost the City \$30,271.69 to operate.

For this same time period, the City's Fleet produced 7.2% of our total emissions and cost \$24,410 to fuel. In 2016, the City fleet consisted of 17 vehicles; eight trucks, six SUVs, and two small cars. Seven of these vehicles were police cars and the remaining nine used by the Public Works Department and Planning Department.



In Red Lodge, there are 264 streetlights, 250 of which are owned and operated by Northwestern Energy. In 2016, the City paid \$43,081.48 to NorthWestern for streetlight operation, maintenance, and lighting costs. The streetlights produced only 3.3% of total greenhouse gas emissions and 1.9% of total energy use but made up 21% of total energy costs.

It is worth noting that the Water Treatment Plant and Wastewater Treatment Plant are not included in the emissions inventory for Buildings and Facilities. This is because a large portion of the energy use at these facilities has to do with water and wastewater treatment processes, and not the physical buildings themselves. Their emissions and costs are addressed in the Wastewater and Water chapter. Additionally, large vehicles such as snowplows and tractors are not included within Fleet calculations.

PROGRESS TO DATE

Table 1 lists actions already taken by the City to improve their Fleet, Buildings, and Streetlights. It is important to recognize these actions, learn from their outcomes, and track their impact.

Table 1—Actions	Year Implemented
Installed Programmable Thermostats and Occupancy Sensors at Library	2009
Solar Panels Installed at the Wastewater Treatment Plan	2010
Installed LED Lighting at Library	2010
Installed LED Lighting on Street Lights between 3rd and 8th Street	2016
Installed Electric Vehicle Charging Station at Public Restrooms	2016
Installed LED Lighting at City Hall, Police Station, Public Works Shop	2017
Increased Attic Insulation at City Hall	2018
Installed 29 solar panels at Library, an estimated annual 14,000 kWh	2019
NWE City Wide LED updates to all street lights	2019 & 2020
Red Lodge Pool Committee and City installed 18 solar panels at City Pool, an estimated annual 7,000 kWh	2023
Electric Vehicle Charging Station ongoing maintenance and broken charger replaced to ensure 100% functionality	2023

FLEET, BUILDINGS, AND STREETLIGHTS STRATEGIES

Table 2 summarizes the Fleet, Buildings, and Streetlights Strategies. An in-depth explanation of each strategy can be found in the following pages.

Table 2 – Strategy	Page Number
FBS-1 LED Lighting for all City Facilities	23
FBS-2 Energy Conservation Improvements for Existing City Facilities	24
FBS-3 High Performance Building Standards on Future Construction	26
FBS-4 Fuel Efficiency Standards for Fleet Vehicles	27
FBS-5 Renewable Energy	29

FBS-1 LED Lighting for all City Facilities

RECOMMENDATION

Work with NorthWestern Energy to retrofit the remaining City Facilities and streetlights to LED lighting.

BACKGROUND

In 2017, LED lighting retrofits were carried out at City Hall, the Police Station, Carnegie Library, Public Works Shop, and on a portion of the streetlights. Interior and Exterior lighting should be retrofitted to LED at the remainder of City Facilities, which include the Public Pool, Recycling Center, Public Restrooms, Water Treatment Plant, and Wastewater Treatment Plant.

2023 Status: Not all facilities have been retrofitted for LED.

The City has also worked to have all streetlights retrofitted to LED. Our streetlights are owned and operated by NorthWestern Energy. Red Lodge is one of the first communities in Montana to make the switch.

2023 Status: Completed

With this retrofit, the streetlights within Red Lodge also produce minimal light pollution. This is in accordance with the Dark Skies Initiative and the Growth Policy.

WHY DOES THIS MATTER?

In 2016 and 2017, LED lighting retrofits were carried out at the Public Works Shop, City Hall, Police Station, and on 14 of the decorative street lights on Broadway Avenue. In 2019 and 2020, all streetlights were converted to LED, reducing kilowatt-hour (kWh) production by well over 50%.

Potential Partners

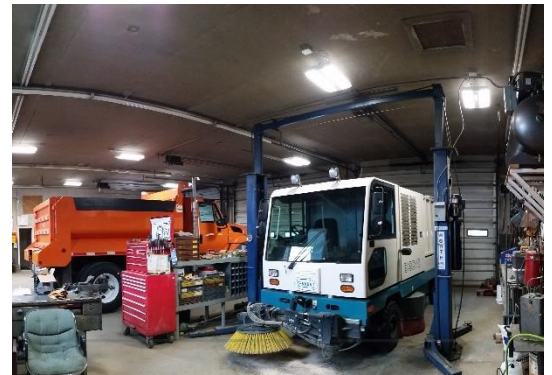
- Department Heads
- NorthWestern Energy
- Sustainability Coordinator
- Sweet Grass County High School Facility Manager

Potential Funding

- City Funds
- NorthWestern Energy Rebates

Install Goal

- Convert all City lighting to LED by 2022



FBS-2 Energy Conservation Improvements for Existing City Facilities

RECOMMENDATION

Incorporate energy conservation improvements when existing buildings and facilities require maintenance, and as the budget allows.

BACKGROUND

In order to ensure that our City buildings and facilities can economically and physically function into the future, energy conservation measures should be taken on all existing City buildings and facilities. These measures should be incorporated in the Capital Improvements Plan or undertaken routinely as existing facilities require maintenance. Standard and more affordable improvements are to install programmable thermostats, occupancy sensor lighting, high efficiency windows, and increase insulation at the Police Station, Public Works Shop, and wherever else applicable. All hot water lines should be insulated, and hot water recirculation pumps should be placed on timers. A high efficiency heater should be installed at the Public Works Shop such as a Waste Oil Heater or Infrared Heater. Energy efficient products and measures should be incorporated whenever changes are made to our existing buildings, including Smart Building Systems. In order to simplify the process of purchasing efficient equipment, we recommend that equipment be, at a minimum, Energy Star approved. Once our buildings are as energy efficient as possible, the City will be able to more cost-effectively install renewable energy technology and further decrease our energy costs.

Annually, Department Heads should work with the Sustainability Board via the McKinstry IGA report to identify energy usage reduction goals that can be budgeted and implemented.

WHY DOES THIS MATTER?

In 2016, the City spent \$30,212.65 to power their buildings and facilities and in January 2017, NorthWestern Energy increased rates on electricity and natural gas 5.83% and 3.73% respectively. Although rates have continued

Potential Partners

- City Architect
- City Council
- City Mayor
- NorthWestern Energy
- Planning and Zoning Board

Potential Funding

- City personnel time



to increase, the City spent nearly \$5,000 less on electricity and natural gas in 2021 (excluding costs for the pool and recycling center under City operation in 2016).

According to the EPA, the average commercial building in the United States wastes 30% of the energy it consumes. Therefore, if Red Lodge were to invest in energy efficiency improvements the City could expect to save up to \$9,050, or 30%, annually on our energy costs. – City of Red Lodge and NorthWestern Energy

DRAFT

FBS-3 High Performance Building Standards on Future Construction

RECOMMENDATION

All newly-constructed City Buildings and building modifications to City buildings should attempt to meet the 2019 State of Montana High-Performance Building Standards.

BACKGROUND

The State of Montana High-Performance Building Standards were developed in 2009 by the Montana Department of Administration in response to legislation requiring state-owned facilities to build to a higher energy standard. They were developed in conjunction with architects, engineers, and sustainability specialists. These standards require buildings to exceed the International Energy Conservation Code by 20%, to the extent that it is cost effective.¹ These standards should guide the design and construction process for any new buildings that the City of Red Lodge financially controls.



2023 Status: The new Red Lodge City Pool was designed with consideration to many of these standards. The roof was designed for solar panel installation.

If the building standards cannot be met, the City and construction team need to explain why not and express the efforts they made to meet the standards.

Solar design standards should also be established for any future construction projects. This would involve purposely constructing buildings so as to align with the path of the sun and hold high solar production potential or utilizing a design conducive to passive solar. Zoning codes, permitting regulations, and building inspections procedures should also be analyzed and revised to encourage the implementation of solar projects for the City and community. Landscaping design should also incorporate trees and shrubs that provide shade during summer months and solar gain in winter.

WHY DOES THIS MATTER?

The building sector has the largest potential to significantly reduce greenhouse gas emissions compared to other major emitting sectors and if undertaken globally, could save an estimated \$323 to \$480 billion in savings on energy spending. – World Green Building Council

FBS-4 Fuel Efficiency Standards for Fleet Vehicles

RECOMMENDATION

Implement a fuel efficiency policy for all newly purchased City vehicles.

BACKGROUND

The City currently has no standards for fuel efficiency when purchasing new vehicles. Setting standards can result in the purchase of more affordable vehicles that in the long term, cost the City more once the price of fuel is factored in. It is recommended that the City implement a fuel efficiency policy that requires all new vehicles to get 30 MPG or more for light duty vehicles, hybrid technology for special use vehicles, or B-15 minimum clean diesel vehicles for heavy duty vehicles. As technology for hybrid, electric and biofuel vehicle technology improves this goal should be achievable.

Additional benefits of EVs over gasoline cars include greater safety (due to lower center of gravity and greater crumple zone), less downtime for maintenance, faster acceleration, and improved air quality.

A cost analysis is recommended to determine the cost of purchasing, operating and maintaining the vehicle over the first 100,000 miles of operation. This will allow the cost of fuel to be incorporated into the purchase price and will help the City to make decisions that are cost effective in the long term.

2023 Status:

In 2020, a conscientious effort was made to acquire two new police vehicles that turn off the engine when idling. There are several obstacles to transitioning the City's vehicle fleet to electric. First, the current availability of electric pickup trucks is very limited. Pickup trucks are by far the most common component of the fleet, due to their high clearance, durability, and 4 wheel drive. More electric truck models are expected to become available in the coming years. Second, EVs lose range in extreme cold (-10 F). There are ways to mitigate this range loss, and technology is making this a moot point as EV ranges increase every year. Third, the new purchase price of an EV is typically greater than a gasoline car, due mostly to the battery components. This purchase price differential has been rapidly narrowing in the last few years, due to the declining cost of batteries.

Potential Partners

- City Mayor
- Public Works Director

Potential Funding

- No City funding required

Fleet Goal

- All light duty fleet vehicles average 30 MPG by 2030



WHY DOES THIS MATTER?

In 2016, the City spent \$24,410 on fuel for its City fleet vehicles, which averaged 19 MPG based on the average gas price for that year. In 2021 the City spent \$30,024.17.

The cost per mile of driving an electric vehicle (EV) is much cheaper than a gasoline car: typically only 25-33% the cost per mile, depending on gasoline prices. Assuming 10,000 miles driven per year, this leads to annual fuel savings of around \$1,200 per year. Additionally, electric vehicles do not require oil changes or most of the regular maintenance of a gasoline car. AAA estimates annual maintenance savings of \$330 per year. Thus, the combined fuel and maintenance savings are over \$1,500 per year.

DRAFT

FBS-5 Renewable Energy

RECOMMENDATION

Implement renewable energy technologies to ensure our buildings are as energy efficient as possible.

BACKGROUND

The Public Works building at the south end of town (“City Shop”) has significant potential for rooftop solar. In 2023, the City is applying for a grant from NorthWestern Energy to potentially cover up to 90% of the project cost. The building is relatively new with a trussed roof design, which faces south, with no significant shading. Electrical consumption on-site supports the installation of 20 solar panels, producing 8,000 kWh per year, saving \$960 per year.

2023 status: The application has been prepared and will be submitted by the November 1, 2023 application cycle due date. Based on past NWE grant experiences, we expect to hear back around May of 2024, with installation to begin shortly thereafter if the grant is awarded.

The City Hall and Police Station hold potential for a solar rooftop installation. This would result in cost savings of up to \$4,200 annually and could entirely eliminate City Hall’s electricity bill.

2023 Status: The Police Station roof is not considered structurally supportive for solar panels. City Hall may still be a candidate for some future solar panel installation.

The Red Lodge Carnegie Library produces nearly 3/4ths of its on-site electrical consumption due to its 29 rooftop solar panels. These were installed in late 2019, thanks in large part to a generous NorthWestern Energy grant. This system produces approximately 14,000 kWh of electricity per year, saving the city \$1,500 per year.

2023 status: Completed. In the future, perhaps more rooftop panels could be installed, however the NorthWestern Energy grant could likely not be used again, as NWE’s rules do not allow us to apply for more than 1 grant per physical site. The success of solar installation at the Carnegie Library is a model for future successes.

Potential Partners

- Carbon County Resource Council
- Montana Renewable Energy Association
- Sundance Solar

Potential Funding

- Alternative Energy Revolving Loan Fund
- City Funds
- US Department of Energy Loan Guarantee Program

Install Goal

- Install 5 kW’s of renewable energy each year (5 kW’s would produce enough electricity to power the Public Restrooms and Recycling Center)

The Water Treatment plant may hold great potential for a rooftop solar installation. Challenges to this project include trenching costs, and need for overhead lines, given current siting of the electrical panel and future solar installation. This would result in a cost savings of approximately \$2,610 annually. This would be mostly paid for by a Northwestern grant program.

2023 Status: In progress

In addition, the City Pool has installed and activated 18 rooftop solar panels in May 2023, producing 7,000 kWh per year, saving \$840 annually.

2023 Status: Completed

The WasteWater Treatment Plant is home to a large 160 panel, 48.75 kW solar array. This was installed in 2010 and has been saving large amounts of electrical consumption, emissions, and money for the City. This array is now nearly 15 years old. The demands of the WaterWater Treatment Plant have continued to increase, as the City's population has continued to increase and a new pump has come online, requiring more electricity from the grid.

2023 Status: Completed. This is another successful example of self-generation of renewable energy, however the solar installation is now showing its age. Solar panels naturally lose approximately 1% per year in their ability to generate electricity, as their components slowly break down. Further, newer solar panels are more efficient, due to ongoing technological advances. Lastly, the growing power requirements of the facility mean there is more room to add to the existing solar array. The City owns a large tract of land to the east of the Water Treatment Plant, which could be used for a growing solar installation.



Installing a solar array and battery system at the electric vehicle charging stations would result in cost savings for the City as well as showcase the synergy between solar power and electric vehicles. *2023 Status: Preliminary review of installation identified considerations for tree shade and aspect of panels would be prohibitive. Additionally, consumption of electricity at this location was not sufficient to justify installation at this time.*

WHY DOES THIS MATTER?

Installing renewable energy will become more cost-effective in the future as panel and installation prices continue to drop, and electricity rates from NorthWestern Energy continue to increase.²

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End Notes

¹“State of Montana High Performance Building Standards Goals.” Montana Architecture and Engineering, <http://architecture.mt.gov/Portals/14/docs/HPBS/HPBS%20Rev%202016.12.01.pdf>.

²“NorthWestern Energy electric rates in Montana: still among highest in region” MTN News Mike Dennison, <http://www.ktvq.com/story/37257358/northwestern-energy-electric-rates-in-montana-still-among-highest-in-region>.



INTERNAL POLICIES AND PRACTICES

INTERNAL POLICIES AND PRACTICES

OVERVIEW

According to the U.S. Environmental Protection Agency, 30% of the energy consumed by commercial buildings is used inefficiently or unnecessarily.¹ Therefore, training City employees to reduce their energy use and integrating green business practices into our employee culture has the potential to significantly decrease our energy usage and costs. This is especially true for the buildings and facilities most heavily used by City employees, namely, City Hall and the Police Station, the Public Works Shop, and the Library.



The following Internal Policies and Practices strategies aim to educate our City employees and create a culture of sustainability. These strategies will result in reduced energy costs and reduced waste production, and will produce healthier, happier work spaces for our employees. The majority of these strategies have low implementation costs and can be implemented rather quickly.

PROGRESS TO DATE

Table 3 lists actions already taken by the City to foster an employee culture of sustainability. It is important to recognize these actions, learn from their outcomes, and track their impact

Table 3 – Action	Year Implemented
Leased High-Efficiency Printer	2015
Single-Stream Recycling Bin at City Hall	2017
Flexible Work Scheduling for 3 City Hall Employees	2018
Single-Stream Recycling Removed	No longer available

INTERNAL POLICIES AND PRACTICES STRATEGIES

Table 4 summarizes the Internal Policies and Practices Strategies. An in-depth explanation of each strategy can be found in the following pages.

Table 4 – Strategy	Page Number
IPP-1 Recycling Program	35
IPP-2 Paper and Printing Policy	36
IPP-3 Energy Use of Electronics	37
IPP-4 Energy and Sustainability Training for City Employees	39
IPP-5 Sustainability in the Employee Handbook	40
IPP-6 Flexible Work Scheduling	41

IPP-1 Recycling Program

RECOMMENDATION

Promote and implement recycling in City buildings and parks.

BACKGROUND

In 2019, single stream recycling was lost when recycling responsibilities transferred from the City to the non-profit, Recycle Red Lodge. Small recycling bins should also be set up inside each office at City Hall and the Police Station to increase employee use.

WHY DOES THIS MATTER?

According to the EPA, as much as 45 percent of the 250 million tons of municipal waste generated in 2010 was from commercial locations such as business and government offices, retail establishments, schools and hospitals. – Keep America Beautiful

Potential Partners

- Sustainability Board

Potential Funding

- City Funds
- Grants

IPP-2 Paper and Printing Policy

RECOMMENDATION

Reduce the amount of paper used in all City operations.

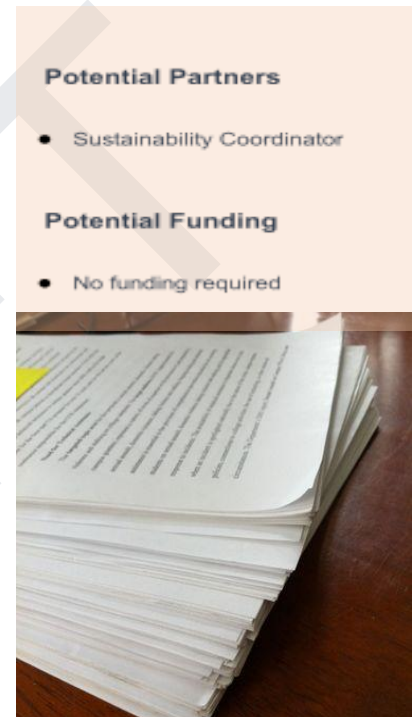
BACKGROUND

The City recently purchased a new, energy efficient printer that uses very little toner and automatically goes into sleep mode. In order to reduce the amount of paper that is used, Green Print software should be installed on all computers. This is a program that checks all print jobs to make sure no unnecessary pages are printed such as those with only a few characters on it, or those that are left blank.² All employees should be taught how to print double-sided, and should be required to do so whenever possible. City Council Packets should also no longer be printed, and instead electronic files should be sent out. Large documents such as strategic plans should also only be sent out electronically.

2023 Status: Completed and ongoing

WHY DOES THIS MATTER?

In 2011, Americans recovered only 65.6 percent of U.S. paper, which means we threw away \$2.3 billion worth of paper products. – Keep America Beautiful



IPP-3 Energy Use of Electronics

RECOMMENDATION

Reduce the use of all electronics by incorporating sleep mode, motion sensors, and energy saving power strips.

BACKGROUND

In an effort to save energy City Hall does not have an air conditioning system, but some individuals use window air conditioners. Completed improvements such as increased insulation and window replacements should reduce the need for air conditioners.

2023 Status: Attic insulation and window improvements have reduced the need to use air conditioners.

Additionally, unnecessary electronics such as extra printers, microwaves, and space heaters should be removed.

2023 Status: City Hall is inefficiently heated upstairs and downstairs.

Small items such as chargers and laptops should be unplugged when not in use. Computers should be set up to automatically enter sleep mode when not in use for more than 10 minutes. For electronics that need to be plugged in constantly, energy saving power strips that prevent phantom loads should be purchased and installed. A “hard lights out” should be implemented over weekends and holidays where all electronics, lights, and temperature control systems are shut off.

2023 Status: These items are in constant state of progress.

Occupancy sensors should be installed in City Hall. These sensors can detect motion and automatically turn the lights off if no one is present in the room.

2023 Status: City Hall upstairs has installed motion sensors in eastern offices.

The implementation of a Smart Control system should also be evaluated. A smart controls system would control, monitor, and optimize building services, such as, lighting, electrical plug-loads, and occupancy-related systems, and often results in a significant reduction of energy consumption.

2023 Status: Not yet implemented.

Potential Partners

- City Mayor
- Department Heads

Potential Funding

- City Funds
- Energy Efficient Commercial Buildings Tax Deduction



WHY DOES THIS MATTER?

30% of the energy used in commercial buildings, such as government offices like City Hall, is used inefficiently or unnecessarily. – Energy Star

DRAFT

IPP-4 Energy and Sustainability Training for City Employees

RECOMMENDATION

Create and administer an Energy & Sustainability Training for City employees and groups who use City Hall.

BACKGROUND

This training would teach them how to properly recycle and ways to reduce their energy usage while at work, such as shutting off the lights, unplugging computers, etc. It would also touch on the paper and printing policy. Training should be videotaped and administered multiple times so that all employees can attend. Biannual sustainability surveys should also be administered, with the Employee Energy Conservation Survey (see Appendix C) serving as the baseline, in order to track changes in employee culture and sustainability practices.

2023 Status: Sustainability, recycling and energy reduction strategies should be incorporated into the Employee Handbook (see IPP 5).

WHY DOES THIS MATTER?

Studies have shown that simply by providing people with information on how much energy they use, in their home or while at work, can reduce their usage by up to 12%. - Consortium for Energy Efficiency



IPP-5 Sustainability in the Employee Handbook

RECOMMENDATION

A new section built off the Energy & Sustainability Training should be drafted and added to the Handbook.

BACKGROUND

When someone new is hired by the City, part of their orientation is to read and agree to the contents of the Employee Handbook. A new section built off of the Energy & Sustainability Training should be drafted and added to the Handbook. This would explain to the new employee how the recycling program in the building works, what items should be powered down each night before leaving, and how the printing policy works. The City needs to ensure that new hires are committed to acting sustainably in the workplace and are aware of what is required of them. We also recommend that this handbook be distributed in a digital version, rather than a hard copy.



WHY DOES THIS MATTER?

More than 80% of workers are attracted to employers with a positive environmental reputation. - Kelly Global Workforce Index

IPP-6 Flexible Work Scheduling

RECOMMENDATION

Allow for flexible work scheduling to reduce the amount of time employees spend commuting to work and reduce the City's (and County's) greenhouse gas emissions.

BACKGROUND

In the past, the City has utilized Initiatives that allow for flexible work scheduling to be implemented for as many employees as possible while still maintaining service levels to the public.

2023 Status: In progress

WHY DOES THIS MATTER?

Many City employees live outside of city limits and spend, on average, 18 minutes a day commuting to and from work. If you factor in our current 9 am to 5 pm schedule, employees spend a total of 1,018 hours per year driving for work. A portion of this time and subsequent carbon emissions could be avoided if employees were offered flexible work scheduling.

Potential Partners

- City Mayor
- Department Heads

Potential Funding

- No City funding required



End Notes

¹ Buildings Energy Databook, 2006. US Department of Energy and Annual Energy Review 2007. DOE/EIA-0384 (2007). Energy Information Administration, U.S. Department of Energy. June 2008. <http://www.eia.doe.gov/aer/pdf/aer.pdf>.

² "GreenPrint Preview+." Green Print, <https://www.printgreener.com/>.

SOLID WASTE, RECYCLING, AND COMPOST



SOLID WASTE, RECYCLING AND COMPOST

OVERVIEW

In 2021, the total tonnage of solid waste for the City of Red Lodge was 2,447 tons. When this waste breaks down it will produce approximately 1,224 metric tons of carbon dioxide equivalents (mtCO2e). In 2022, the Recycling Center diverted **xxxx tons** of waste to the recycling stream. Annually, the largest quantity of recyclables by weight consists of mixed paper and Old Corrugated Containers (ie. cardboard). Our emissions from waste production are relatively small, but there is room for a drastic reduction in waste production through increased recycling and composting initiatives.

The goal of the Solid Waste, Recycling, and Compost strategies is to divert as much waste from the landfill as possible, and to extend these actions into the community. Some of the strategies included below would involve policy changes and collaboration between the City and local businesses and organizations. These collaborative efforts will help set Red Lodge apart as a sustainability minded town and will encourage our tourists and visitors to be aware of their impact while in and around Red Lodge.

PROGRESS TO DATE

Table 5 lists actions already taken by the City to decrease their waste production. It is important to recognize these actions, learn from their outcomes, and track their impact.

Table 5 – Action	Year Implemented
Established Beartooth Industries Recycling Center	1992
Electronic Recycling Event offered Annually	2012
Loss in funding, non-profit (Red Lodge Recycling) formed to take over operations	2019
Glass recycling offered	2020
E-Waste recycling offered permanently	2021
Compost no longer accepted at Recycling Center	2022
City resumes operation of Recycling Center	2023

SOLID WASTE, RECYCLING, AND COMPOST STRATEGIES

Table 6 summarizes the Solid Waste, Recycling and Compost Strategies. An in-depth explanation of each strategy can be found in the following pages.

Table 6 – Strategy	Page Number
SWRC-1 Single-Use Water Bottles	45
SWRC-2 Single-Use Plastic Bags	46
SWRC-3 Recyclables in our Waste Stream	47
SWRC-4 Composting and E-Waste Recycling Initiatives	48
SWRC-5 Public Education on Proper Recycling	49
SWRC-6 Recycling Program Best Practices	50
SWRC-7 Recycling Center Employees	51
SWRC-8 Republic Services Contract	52
SWRC-9 Carbon Footprint of our Solid Waste System	53

SWRC-1 Single-Use Water Bottles

RECOMMENDATION

Market and install water bottle filling stations across town to encourage the use of reusable water bottles.

BACKGROUND

Red Lodge is known as the Base Camp to the Beartooths and is one of the main entrances to Yellowstone National Park. Due to this, many tourists purchase bottled water to take with them into the Park and backcountry. In order to decrease the amount of plastic bottles that are purchased in Red Lodge, water filling stations should be marketed and installed across town at key locations such as Sylvan Peak, the Visitors Center, convenience stores, and City Hall. This would encourage people to utilize reusable water bottles rather than plastic, and decrease the amount of plastic that ends up in our waste stream. Energy-saving, non-refrigerated filling stations should be installed to minimize our energy use. The City should also stop the purchase of plastic water bottles for use at City Hall and at City sponsored functions.

2023 Status: Red Lodge High School Green Team received a grant and installed a water bottle refill station at 11th and Broadway. Additional stations are suggested in high-pedestrian traffic areas.

WHY DOES THIS MATTER?

As of 2015, more than 6.9 billion tons of plastic waste had been generated. Around 9 percent of that was recycled, 12 percent was incinerated, and 79 percent accumulated in landfills or the environment. – National Geographic

Potential Partners

- City of Red Lodge
- High School Green Team
- Local Businesses
- Republic Services
- Visitors Center

Potential Funding

- Elkay ezH2O Program
- Peace, Love, and Plant Go Green Grant
- Yellowstone National Park

SWRC-2 Single-Use Plastic Bags

RECOMMENDATION

Encourage businesses to convert to paper bags or consumer-brought reusable bags.

BACKGROUND

Start a conversation between the Red Lodge Business Alliance, the Chamber of Commerce, and the City, and encourage businesses to switch to paper bags. Additionally, stores and merchants could begin charging for bags. An official date to ban plastic bags should be set for the future, and steps should be taken to prepare the community for the switch.

2023 Status: The Sustainability Board has designed and placed posters around the City, encouraging customers to bring their own non-disposable bags. They purchased 100 reusable bags that have been distributed to City employees, elected officials and committee members.

Currently, Montana Code prohibits local governments from adopting local single-use plastic bag restrictions.

WHY DOES THIS MATTER?

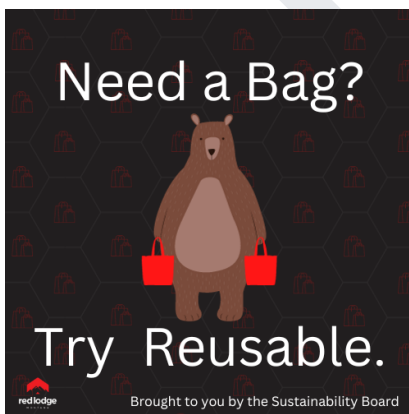
The average American family takes home almost 1,500 plastic shopping bags a year, and it takes 1,000 years for a plastic bag to break down. - Natural Resources Defense Council

Potential Partners

- City of Red Lodge
- Chamber of Commerce
- Jackson Hole WY City Council
- Local Businesses
- Red Lodge Business Alliance
- Republic Services

Potential Funding

- No City funding required



SWRC-3 Recyclables in our Waste Stream

RECOMMENDATION

Encourage higher recycling rates by highlighting the Recycling Center at key locations throughout town. Participate in initiatives that increase diversity of items from waste stream to be reused or recycled (ie. Hefty ReNew program).

BACKGROUND

In 2016, the Recycling Center in Red Lodge diverted 123 tons of recyclables from the landfill. This number could be increased by educating the community and making the recycling center more visible. The Recycler of the Month program could be used to showcase star recyclers in town, both businesses and residents, and some form of reward along with recognition could be offered. The recycling cans should be made more noticeable and obvious so that our garbage and recyclables are kept separate. Work could also be done with the High School's Green Team to form a Green Booster Program where the students acknowledge recycling efforts of the community. Businesses who recycle are given a sticker to put in their window or a rating based on recycling habits.

2023 Status: The non-profit, Recycle Red Lodge, improved recycling awareness and participation. This is demonstrated through the increase in recycled tonnage from 2016 to 2022. Recycling cans are not available in town. The Sustainability Board is currently working with the Red Lodge Business Alliance to establish recycling containers during large downtown events.

WHY DOES THIS MATTER?

69% of the things Americans toss out end up in landfills. This is compared with 1 percent in countries like Belgium and Sweden. - Center for American Progress

Potential Partners

- Beartooth Industries
- Carbon Country Resource Council
- High School Media Class
- Local Businesses
- City Recycling Board
- Recycling Electronics into New Devices (REWIND)
- Republic Services

Potential Funding

- City staff time



SWRC-4 Composting and E-Waste Recycling Initiatives

RECOMMENDATION

Follow the lead of our local grassroots organizations as they bring composting and electronic recycling to town.

BACKGROUND

Many people in Red Lodge are interested in composting and have been looking into the feasibility of bringing in a private company to run the program or creating a collaborative program through multiple entities in town. The City should step forth and spearhead these efforts, be a part of the conversation, and help push them forward where possible. In the event that a methane digester is installed at the Wastewater Treatment Plant, methane digester bio-solids and liquids should be utilized in the composting process. This would reduce the need for transport of solids to the Billings landfill and potentially produce additional compost for other uses, such as revegetation of Coal Miner's Park.

With support from REWIND and Swift Buckets, both compost and e-waste are now accepted at the Recycling Center via RRL. The Green Team filmed a short PSA about our community compost and how to use it

2023 Status: Electronic recycling is now available monthly at the Red Lodge Recycling Center. Composting is no longer available at the Recycling Center. Red Lodge would benefit from investing in a system to compost or mulch yard wastes that can be used by the City and residents.

WHY DOES THIS MATTER?

In 2016, food scraps and yard waste currently make up 20 to 30 percent of what we throw away, and could be composted instead. Reduction of these wastes could lead to a reduction of trash pick up needs. Between 2012 and 2019, REWIND provided electronic recycling and diverted 139,455 pounds of electronic waste from the landfill. – U.S. EPA and REWIND



SWRC-5 Public Education on Proper Recycling

RECOMMENDATION

Utilize social media and public events to demystify the process of recycling.

BACKGROUND

Despite the clear benefits of recycling, many people in Red Lodge are unaware of how to do it properly. Memes and movies on recycling should be shown to educate people on proper recycling. A “How to Recycle” video was created by the High School’s Media Computer class, and should be widely shared and distributed. Dumpster Dives should also be carried out at public events to display the many recyclable items that end up in the trash can rather than the recycling bin. Opportunities put forth by local businesses who offer ways to reuse non-recyclable items, such as glass and plastic bags, should be advertised to the public and supported.

2023 Status: In progress- High school “Green Team” contributes to raising awareness for proper recycling each year through videos and attending the Earth Day Block Party.

WHY DOES THIS MATTER?

The Recycling Center estimates recycling of 264,000 pounds of OCC (cardboard) and 132,000 pounds of mixed paper annually. Demand for cardboard recycling in Red Lodge justified opening a third day (currently on Thursday) for businesses only to offset the quantity received on the two other open days.

Each year in the United States, we throw away \$11.4 billion worth of recyclables. – Los Angeles Times

Potential Partners

- Beartooth Industries
- Carbon Country Resource Council
- Independent Recycling Organization
- Recycling Board
- Republic Services
- Recycling Electronic Waste into New Devices

Potential Funding

- City staff time



SWRC-6 Recycling Program Best Practices

RECOMMENDATION

Reach out to Yellowstone National Park and communities with successful recycling programs in order to learn from them and improve our program.

BACKGROUND

Yellowstone National Park has conducted a conscientious recycling program, and our proximity to the Park creates the potential for collaboration.² A dialogue should be started with them as to where they send their recycling, how they might alter their recycling program, and if they feel it has been successful thus far. Any data they have regarding the quantity of recyclables they process should also be analyzed. A visit to Jackson, WY and Gardner, MT might also provide similar data that could be useful to Red Lodge.

In addition, other Montana communities may be able to provide suggestions on practices and programs that could be implemented in Red Lodge.

WHY DOES THIS MATTER?

Thanks to Yellowstone's extensive recycling program, the Park reduced their solid waste production by 59% in 2014. – Yellowstone National Park

Potential Partners

- Beartooth Industries
- City Recycling Board
- High School Green Team
- Independent Recycling Organization
- Neighboring Communities
- Republic Services
- Yellowstone National Park Sustainability Department

Potential Funding

- No City funding required



SWRC-7 Recycling Center Funding

RECOMMENDATION

Assist Recycle Red Lodge with strategies that will sustain the Recycling Center for the future and improve resiliency to funding shortfalls.

BACKGROUND

The Beartooth Industries Recycling Center in Red Lodge provides many benefits to the community but, as demonstrated by national funding cuts in 2019, was not self-sustaining for the City. In 2021, Recycle Red Lodge charged a \$10 drop off fee, \$120 residential annual fee, and \$150 business annual fee for about 400 customers. Preliminary analysis suggests this fee structure covers the majority of operation costs. Another way to address the cost of operating the Recycling Center would be to seek grant funding for those employed there. Other means of funding the Recycling center could be explored, such as a private recycling entity. The City could rent the Recycling Center and its fenced area, for a very nominal fee, and an independent group would run the City’s recycling program.

2023 Status: City residents currently pay a \$6 monthly user fee through their tax bill. County residents continue to pay a drop-off fee or can opt into a membership.

WHY DOES THIS MATTER?

During the 2016-2017 fiscal year, the City paid Beartooth Industries to manage the facility and received less than \$2,000 for recyclables. During that year, 246,500 lbs of recyclable material was kept out of the landfill. The user fees established by Recycle Red Lodge offset some of the operational costs, pays for two part-time staff plus Beartooth Industries labor. Under this new operational system, Recycle Red Lodge increased the recycling volume by nearly three times and diversified income generation from various materials.

Potential Partners

- Beartooth Industries
- Independent Recycling Organization
- Sustainability Board

Potential Funding

- Dennis and Phyllis Washington Foundation
- Red Lodge Area Community Foundation
- Red Lodge Clubs



SWRC-8 Republic Services Contract

RECOMMENDATION

Encourage Republic Services to charge by weight rather than by the can to encourage recycling and waste stream reduction.

BACKGROUND

At present, Red Lodge residents and the City are charged by Republic Services based on the number of trash cans that they use, and not by the tonnage of waste removed. When the contract with Republic Services comes up for renewal on June 30, 2020, we should push to change how Red Lodge is billed and ask to be billed based on the tonnage of waste that is removed from town. This would incentivize the City and residents to recycle, reuse, and compost and would allow for more control over how much we are charged. This is not customary for Republic Services, but by expressing our interest in being charged by weight, Republic Services may rethink their charging policy.

In addition, at the next renewal, the City shall insert a provision in a new contract to require Republic Services to submit all documentation to justify any changes in rates to city residents. In exchange for an exclusive contract, the City shall retain the sole right to approve, reject or modify any proposed changes in rates.

2023 Status: None

WHY DOES THIS MATTER?

In Red Lodge, residents and the City are charged \$307.82 annually (as of September 2018) for one trash can with once a week pick up service. People who only produce one bag of trash per week, and those who produce 10 bags of trash are charged the same, and no financial incentive exists for those who have a smaller waste stream. – City of Red Lodge

Potential Partners

- City Recycling Board
- Republic Services

Potential Funding

- No funding required



Per capita waste rates	
2018	\$307.82
2021	\$330.00
2022	\$339.84
2023	\$349.00

SWRC-9 Carbon Footprint of our Solid Waste System

RECOMMENDATION

Measure the carbon footprint and costs of our current solid waste removal system and compare it with possible alternatives.

BACKGROUND

Measure what our carbon footprint is in our current solid waste system, where Republic Services hauls our trash to Billings for disposal. Then measure what our costs and carbon footprint would be if we switched to a transfer station system, a local landfill, or a different method of collection. Identify the financial impact of these systems as well. Use this information to guide our process as we renegotiate our contract with Republic Services and develop a new request for services.

2023 Status: The City has calculated our carbon footprint but this has not been assessed for other means of solid waste collection.

WHY DOES THIS MATTER?

During the 2016-2017 fiscal year, the City and its residents paid a total of \$388,683.78 to Republic Services for trash hauling services. A local landfill or transfer station could potentially be more cost effective, and benefit the City and its residents. - City of Red Lodge

Potential Partners

- City Council
- City Mayor
- Neighboring Communities
- City Recycling Board
- Republic Services

Potential Funding

- City staff time



SWRC-10 Other Waste Reduction Strategies

RECOMMENDATION

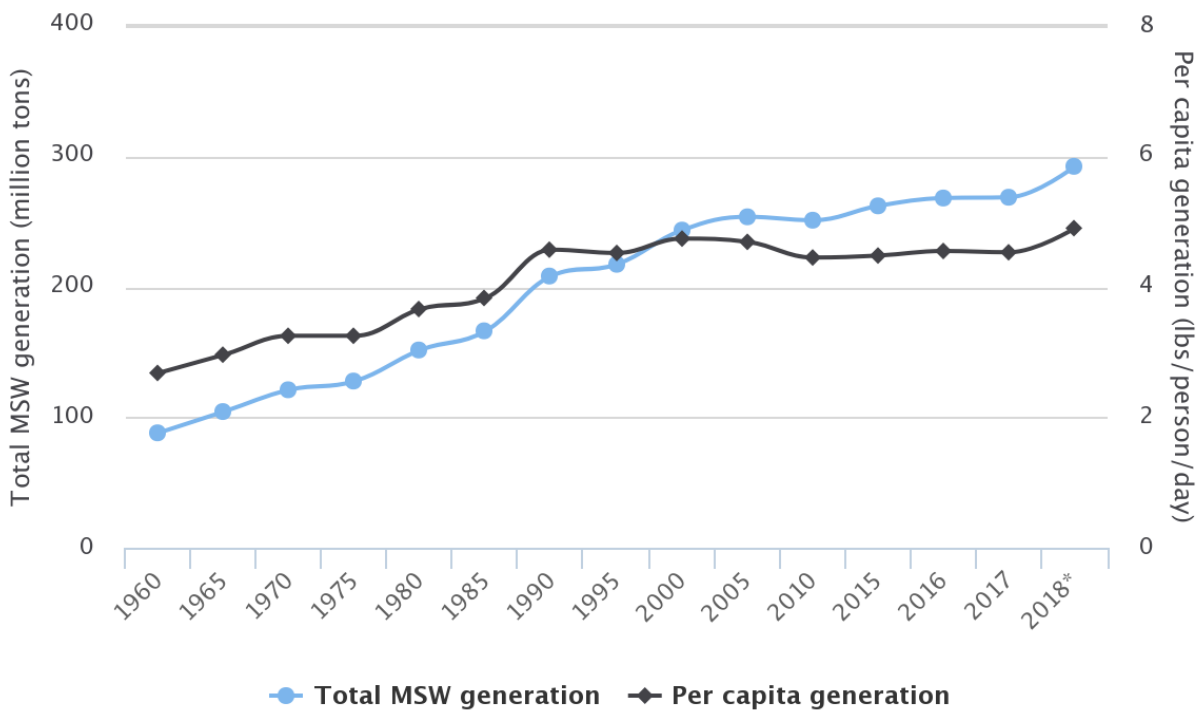
Work with local bars and restaurants to encourage them to switch to green to-go containers. This would involve transitioning away from styrofoam and plastic straws.

Work with public and/or private partners to create programs to increase composting and mulching of household and yard wastes.

BACKGROUND

Over time, recycling and composting rates have increased from just over 6 percent of municipal solid waste (MSW) generated in 1960 to about 10 percent in 1980, to 16 percent in 1990, to about 29 percent in 2000, and to about 35 percent in 2017. It decreased to 32.1 percent in 2018 (epa.gov). Despite these increases, the amount of waste generated per person has nearly doubled since 1960.

MSW Generation Rates, 1960–2018



WHY DOES THIS MATTER?

In the United States in 2018, the generation of waste per person per day was 4.9 pounds compared to 2.68 pounds in 1960.

Total MSW Landfill by Material, 2018

146.1 million tons

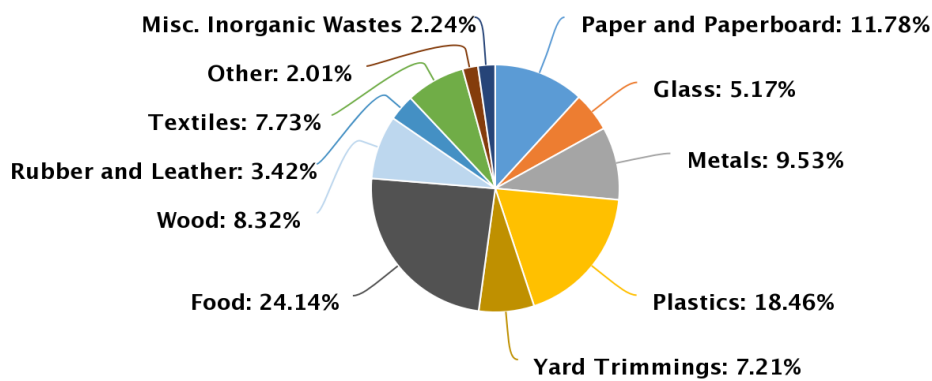


FIGURE 10. National overview of municipal solid waste (MSW) in landfills (epa.gov).

End Notes

¹“Safe, Secure, Responsible Electronics Recycling with Blue Guard.” Republic Services, <https://www.republicservices.com/electronics-recycling?tab=commercial>.

²“Our Softer Footprint: Yellowstone National Park Lodges.” Xanterra Sustainability, <https://www.yellowstonenationalparklodges.com/content/uploads/2017/05/Our-Softer-Footprint.pdf>.



WASTEWATER AND WATER

WASTEWATER AND WATER

OVERVIEW

The Wastewater Treatment Plant (WWTP), Water Treatment Plant and associated pumping stations across town are Red Lodge’s highest energy consumers. Combined, in 2016 water services produced 588 mtCO₂e and cost the City \$103,463.60 to operate annually. In 2021, the City reduced their emissions to 533 mtCO₂e and saved approximately \$10,000 compared to 2016.



According to an energy audit performed by NorthWestern energy in 2016, a large portion of this energy use and costs is attributed to water treatment and processing, 65% at the Wastewater Treatment Plant and 90% at the Water Treatment Plant. This means that reducing our energy cost and usage will largely require technology changes in processing. Additionally, water loss and excessive stormwater intake makes water and wastewater treatment more expensive than it should be. It is estimated by the Public Works Department that 45% of the water that enters our Wastewater Treatment Plant during spring runoff months comes from snow melt and rain.¹ This water does not need to be treated in the same manner as wastewater, and the City expends energy and money treating this stormwater unnecessarily. It is also estimated that 40% of the treated fresh water in Red Lodge is lost before it reaches the intended home or business.² Addressing this water loss has the potential to drastically reduce the energy use and energy costs in our Wastewater and Water Treatment operations.

PROGRESS TO DATE

Table 7 lists actions already taken by the City to improve their Wastewater and Water Treatment processing. It is important to recognize these actions, learn from their outcomes, and track their impact.

Table 7 – Action	Year Implemented
Variable Frequency Drive and Solar Panel Installation at WWTP	2010
Variable Frequency Drive Installations at WWTP	2018
Variable Frequency Drive Installed at the Grant Well Pump House	2018
Stormwater Master Plan Released	2018
Stormwater Project under construction	2023

WASTEWATER AND WATER STRATEGIES

Table 7 summarizes the Wastewater and Water Strategies. An in-depth explanation of each strategy can be found in the following pages.

Table 7 – Strategy	Page Number
WW-1 Dissolved Oxygen and Mixing in the Sewage Ponds	59
WW-2 Wastewater Treatment Plant Solid Waste	60
WW-3 Water Delivery System	61
WW-4 Stormwater Inputs	62
WW-5 Water Pipe and Wastewater Treatment Plant Upgrades	63
WW-6 Water Conservation	64

WW-1 Dissolved Oxygen and Mixing in the Sewage Lagoons

RECOMMENDATION

Investigate the feasibility of installing Solar Bee Mixers into our Wastewater Treatment processing to improve the efficiency of the Variable Frequency Drives (VFDs).

BACKGROUND

Four, fifty horsepower Variable Frequency Drives (VFDs) were recently installed at the Wastewater Treatment Plant to power the blowers that provide dissolved oxygen and mixing in the sewage lagoons. These VFDs should drastically decrease the plant's energy usage.

Control sensors in the lagoons dictate the number of VFDs required to maintain adequate dissolved oxygen levels in the lagoons. The VFDs are also used to mix the lagoon and reduce stratification in the water. Unnecessary energy usage occurs when dissolved oxygen levels are adequate in the lagoons, but energy is expended to operate the VFDs solely in order to provide mixing and reduce stratification. This extra energy use ultimately costs money, and will prevent the City from seeing the true savings that the VFDs could produce.

We recommend that the installation of Solar Bee technology lagoon mixers be investigated in order to provide mixing and further improve the efficiency of the Wastewater Treatment Plant. Solar Bee mixers are completely solar-powered and float in the lagoon at strategic locations. They have been very successful at providing the necessary amount of mixing to reduce stratification in wastewater lagoons in even the coldest environments. Energy savings are derived from not running the VFDs at times when there is no need for dissolved oxygen, but mixing is required. Once the energy reduction and cost savings of the VFDs can be pinpointed, the City should pursue discussions with Medora Corporation to evaluate a hybrid dissolved oxygen mixing system utilizing Solar Bee technology.

2023 Status: This strategy was evaluated by Energy Corps members in 2019 and determined not to be economically feasible at this time. To implement this recommendation would cost approximately \$130,000.

WHY DOES THIS MATTER?

Communities who have installed Solar Bee technology have decreased their monthly energy use by 42%, producing an annual cost savings of \$94,992, and resulting in a 3-year payback period. – Medora Corporation

Potential Partners

- City Council
- City Engineer
- Medora Corporation
- Public Works Director

Potential Funding

- Alternative Energy Loan Program
- City Funds
- Infrastructure Bill



WW-2 Wastewater Treatment Plant Solid Waste

RECOMMENDATION

Investigate the installation of an anaerobic digester to capture methane, produce electricity, and reduce electrical demand billing charges.

BACKGROUND

The City has already installed variable frequency drives (VFDs) to reduce overall kilowatt hour energy consumption. A similar strategy needs to be developed and deployed to reduce charges on demand billing at the Wastewater Treatment Plant

At present, the solid waste that is pulled from our Wastewater Treatment Plant system is bagged and taken to the landfill in Billings. The installation of an anaerobic digester would utilize solid waste from the treatment process, produce methane gas, and power an electric generator.³ The methane produced could power an on-site, low emission internal combustion engine generator. The size of the digester and methane generator is dependent on how much waste can be provided. Consequently, the methane output from anaerobic digestion could be increased by increasing the digester solids input to include food waste and ranch animal disposal.

A study should also be undertaken to identify the times of day and dates within the year that require high amounts of energy usage at our Wastewater Treatment Plant and set high electricity demand charges. In the event that a methane digester and propane-type tank are installed, they should be strategically operated during the identified peak hours to offset electric demand charges from Northwestern Energy. This will reduce the size of our monthly energy demand peak and save the City money. The product that remains after digestion should be investigated for use as a liquid or solid form as highly potent fertilizer. The City should initiate a feasibility study to validate this recommendation.

2023 Status: This strategy has been discussed and determined not a high priority or economically feasible at this time.

WHY DOES THIS MATTER?

Methane is 28 to 36 times more potent than carbon dioxide in terms of warming potential. The Wastewater Treatment Plant in Red Lodge produces 284 mtCO₂e annually. – United States EPA and City of Red Lodge Baseline Inventory

Potential Partners

- City Council
- City Engineer
- Public Works Director

Potential Funding

- Alternative Energy Loan Program
- City Funds
- Montana DNRC Renewable Resource Grant
- Montana DNRC Renewable Resource Project Planning Grant
- USDA Renewable Energy Development Assistance Grant



WW-3 Water Delivery System

RECOMMENDATION

Investigate the installation of a pressure-reducing valve (PRV) in the primary water main on the north end of Downtown to regulate pressures delivered to homes and businesses, reduce domestic water use and reduce pump energy.

Investigate the opportunity to install an in-line micro hydro facility on spring ditches on the West Bench that can be net metered to City facilities on the West Bench.

BACKGROUND

The City currently operates a gravity fed water delivery system. Ground source wells throughout the town supply water to water tanks in the hills above Red Lodge. Pump energy is utilized to fill these water tanks. Pumping is utilized in the system to maintain volume and end-use pressures. Water usage and pumping energy usage increase as the summer tourist season progresses. Excess pressures translate to increased volumes and higher maintenance on household appliances.

Because the City's system is gravity fed and the town lies on a progressive slope from south to north, water pressures vary considerably from one end of town to the other. While line pressures can be in the 60-70 psi range at the south end of town, water pressures were recently measured in excess of 120 psi on the north end of town. The City has identified the need for pressure reducing valves (PRVs) to bring delivered pressures down to levels outlined in applicable codes.

We recommend that a feasibility study be pursued by the City to reduce water pressures north of town which should reduce the volume of delivered water and produce pump energy savings.

We also recommend the City investigate the opportunity to capture energy from the high summer flows within the multiple spring ditches on the West Bench. In-line micro hydro plants can be strategically located on irrigation ditches and net-metered at City facilities on the West Bench.

WHY DOES THIS MATTER?

Because of the natural topography of Red Lodge on a progressive slope south to north, the City must deal with inherent problems in its water delivery system. Fortunately, the progressive slope also provides an opportunity to create and harness energy that can solve those problems through in-line micro hydro irrigation generation.

Potential Partners

- City Council
- City Engineer
- Montana Department of Environmental Quality
- High School Green Team
- Public Works Director

Potential Funding

- Alternative Energy Loan Program
- US Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant
- City Funds
- Montana DNRC Renewable Resource Grant
- Montana DNRC Renewable Resource Project Planning Grant
- USDA Renewable Energy Development Assistance Grant



WW-4 Stormwater Inputs

RECOMMENDATION

Implement stormwater diversion projects as specified in the Stormwater Master Plan.

BACKGROUND

The City has recently completed a Stormwater Master Plan that identifies potential capital projects to separate stormwater from the sewer system. It has been estimated that as much as 45% of the treated sewage at the Wastewater Treatment Plant during the spring runoff is derived from stormwater.⁴ Stormwater runoff does not require treatment and can bypass the wastewater treatment facility. Significant demand and energy savings will be achieved by reducing the effluent demand on the treatment plant while allowing for sufficient dilution. We recommend implementing stormwater diversion projects now that the Stormwater Master Plan is completed. The plan should also be analyzed in conjunction with the Public Works department to identify how energy efficiency can be incorporated into stormwater diversion projects.

2023 Status: Construction began in summer 2023 and is ongoing.

WHY DOES THIS MATTER?

In 2017 the City spent \$15,697.84 treating wastewater during the spring runoff months. It is estimated that 45% of this is stormwater runoff. If the stormwater was removed from our treatment system, we could expect to see 100,000 kwh's of savings (\$8,000) and 500 KW demand savings shaved from our peak energy use period (\$3,800).

Potential Partners

- Great West Engineering
- Public Works Director

Potential Funding

- City Funds
- Montana State Revolving Fund Loan
- Treasure State Endowment Program Grant
- USDA Rural Development Community Facilities Loan



WW-5 Water Pipe and Wastewater Treatment Plant Upgrades

RECOMMENDATION

Repair and replace any damaged parts of our water delivery system, and update the wastewater plant to prioritize energy-efficient technologies.

BACKGROUND

In all towns, leaks exist in the Water Main pipe system and pipe networks. By repairing and replacing damaged water mains and manholes, it will reduce the substantial loss of treated water through underground leaks before it is delivered to homes and businesses. It should be a priority to continue finding and fixing these leaks in the aging pipe network. Overall Water and Wastewater Treatment Plant operation will function more efficiently without excess clear water leaking into our wastewater stream and groundwater supply.

It is also important that we continue to evaluate new technologies and update the Wastewater Treatment plant so as to prioritize energy-efficient technologies and reduce the treatment of stormwater. We recommend that an evaluation of new wastewater technologies be made each year as a part of the Capital Improvements Plan review. This will allow our water treatment employees to have up-to-date knowledge on new technologies and will make it easy for them to recognize where further improvements in our facilities can be made.

2023 Status: City staff and Great West Engineering contractors are undergoing Lead Service Line trainings through the Department of Commerce. to identify lines that need replacement.

WHY DOES THIS MATTER?

It has been estimated that as much as 40% of treated water in Red Lodge is lost before it reaches homes and businesses. – Public Works Department

Potential Partners

- Public Works Department

Potential Funding

- City Funds



WW-6 Water Conservation

RECOMMENDATION

Set goals for water conservation in City operations and throughout Red Lodge.

BACKGROUND

Water conservation should be declared a City goal and water usage per capita should be publicized as a quarterly report. With the aid of the Public Works Department, firm goals for water usage should be set, beginning with City facilities and grounds. In our dry western climate, water quality and quantity have a huge influence on development, lifestyle, and quality of life. It is recommended that the City support water conservation programs such as low water use landscaping and incentives for high volume toilet replacement. Community initiatives to collect rainwater, develop rain gardens, and use gray water for landscaping should also be supported. A review of City zoning regulations and building codes should be undertaken to identify and remove obstacles to water conservation and reutilization.

Water conservation leads to a decreased carbon footprint through reduced need for future incoming Water and Wastewater Treatment Plant capacity, and coincident energy usage at both. Water conservation also leads to a decreased use of taxpayer funds, through reduced maintenance costs and reduced need for future incoming Water and Wastewater Treatment Plant capacity.

2023 Status: The City partnered with King's Cupboard to distribute rain barrels and education on how to convert barrels for rainwater storage.



WHY DOES THIS MATTER?

The average American family uses over 300 gallons of water per day. In Red Lodge, the average household uses 173 gallons per day but this amount could be further reduced.

End Notes

¹ “Stormwater Facility Improvements PER.” Great West Engineering.
http://cityofredlodge.net/wp-content/uploads/2014/01/Red-Lodge-Stormwater-PER-Draft_1of6.pdf

² City of Red Lodge Public Works Department. Jim Bushnell

³ “Anaerobic Digestion.” California Energy Commission: Energy Research and Development Division.
<http://www.energy.ca.gov/biomass/anaerobic.html>.

⁴ “Stormwater Facility Improvements PER.” Great West Engineering.
http://cityofredlodge.net/wp-content/uploads/2014/01/Red-Lodge-Stormwater-PER-Draft_1of6.pdf



CODES AND LAND USE

CODES AND LAND USE

OVERVIEW

Land use policies are intricately connected to how towns develop and to the transportation systems that fall into place. Cities that practice in-fill development and mixed land-use allow their residents the ability to walk or bike as they go to work and run their errands. This reduces a town’s vehicle reliance and air pollution levels.

Land use policies can also be used to encourage the development of green spaces and green infrastructure. Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier urban environments. At the city or county scale, green infrastructure is a patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water.¹ These green spaces also increase surrounding property values and make cities more welcoming and attractive.²

In Red Lodge, we have a number of parks, trails, and open spaces that provide green infrastructure, and our codes are friendly toward smart development. The goal of our Codes and Land Use strategies is to formally protect our green spaces and more consciously develop Red Lodge in an environmentally sustainable way.



Rock Creek Dental, an example of in-fill development compatible with downtown design



An example of Green Infrastructure in action

PROGRESS TO DATE

Table 9 lists actions already taken by the City to foster smart development and green infrastructure. It is important to recognize these actions, learn from their outcomes, and track their impact.

Table 9 – Action	Year Implemented
Established Parks, Trees, and Recreation Board	1992
Named Tree City USA for the last 22 years (+ 2 Growth Awards)	2000
Trails Plan Developed	2006
20 Trees Planted on Public Lands Annually on Average	2009
Tree Cost-Share Program Implemented	2013
11 Dedicated Parks in Red Lodge, 4 Dedicated within last 5 years	2013
Comprehensive Parks Plan Developed	2015
Zoning Amended to Encourage Multi-family Properties	2016
Zoning Requires Parking to be in Rear or Side and Buildings to be built Near the Street for Commercial Buildings	2016
Zoning Provides for Flexible Parking Requirements to encourage Infill	2016
Zoning Requires Commercial Buildings to have Trees and Landscaping and Tree shaded Parking Lots	2016
Zoning Requires Commercial Buildings to have Bike Racks	2016
Active Transportation Plan Developed	2016
Utilizing Detention Ponds for Stormwater Runoff to prevent Water Pollution	2018
Working to Achieve SolSmart Designation (Completed)	2018
Converting a Coal Slack Pile to a Soccer Field (Completed)	2019

CODES AND LAND USE STRATEGIES

Table 10 summarizes the Codes and Land Use Strategies. An in-depth explanation of each strategy can be found in the following pages.

Table 10 – Strategy	Page Number
CLU-1 Land and Water Conservation	69
CLU-2 Urban Forestry Tree Planting and Maintenance	71
CLU-3 Impermeable Urban Surface Reduction and Future Surface or Re-surface Design	73
CLU-4 Landscaping and Water Management Systems	75
CLU-5 Vacated, Unused, or Open Municipal Lots	76
CLU-6 Tree Nursery	77

CLU-1 Land and Water Conservation

RECOMMENDATION

Incorporate appropriate land use practices and water conservation methods in order to sequester carbon.

BACKGROUND

Making a conscious effort to conserve our land and water is a major component of fostering green infrastructure. Green infrastructure is a cost-effective, resilient approach to managing wet weather impacts. Green Infrastructure includes established green spaces such as parks and rivers, and should thread through and surround the built environment, as well as connect the urban area to its wider rural hinterland. Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier urban environments. At the city or county scale, green infrastructure is a patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water.³

The City should take steps to create and maintain our green infrastructure by identifying areas along Rock Creek that are in need of reclamation and native species planting. Steps should also be taken to preserve open space through conservation easements or through the purchase of lands from willing property owners. Green Infrastructure should also be mapped, evaluated, and incorporated into stormwater management planning and projects. This information could be used to plan for green infrastructure improvements and partnerships.

2023 Status: City staff and committee members participated in a survey to identify all City-owned properties and suggested future uses for restoration or other conservation projects.

Projects to conserve land and water should also be formulated and implemented with the help of the Custer Gallatin National Forest, State Fish, Wildlife and Parks, and Carbon County. This will allow the City’s projects to be consistent with West Fork Rock Creek municipal watershed maintenance, land use objectives within the Wildland Urban Interface and invasive aquatic and terrestrial species control measures.

Potential Partners

- Active Transportation Plan Steering Committee
- Beartooth Resource Conservation and Development Area
- Beartooth Recreational Trails Association
- Carbon County Conservation District
- City of Red Lodge
- High School Green Team
- Land Use Council Committee
- Montana Land Reliance
- Parks, Trees, and Recreation Board and affiliated MOU Groups
- Planning and Zoning Board
- Public Works Council Committee

Potential Funding

- Land and Water Conservation Fund
- Montana Land Reliance
- Open Space Levy
- Special Improvement District



WHY DOES THIS MATTER?

Land conservation, as opposed to land development, prevents greenhouse gas emissions from entering the atmosphere. By conserving key lands, existing carbon pools in forests, soils, and rangelands are left intact and the emissions that would otherwise be released through development are avoided. 0.1 metric tons of carbon can be captured in each acre of conserved land. Additionally, studies have found that proximity to parks and open spaces increases residential property value by \$4.20 for each foot you move closer to a green space. – U.S. EPA and University of Washington

DRAFT

CLU-2 Urban Forestry Tree Planting and Maintenance

RECOMMENDATION

Strategically densify and diversify the community forest by planting more native, drought resistant trees and shrubs that have CO2 sequestration and stormwater interception value.

BACKGROUND

Healthy urban forests are part of green infrastructure. They help conserve energy and water by providing shade and wind protection that naturally cools neighborhoods and increases the livability of neighborhoods and communities. Trees extract CO2 from the atmosphere and sequester carbon in their roots, branches, and trunks during their lifetime. ⁴

The City of Red Lodge adopted the revised Urban Forestry Management Plan in March 2018. The plan was first adopted by the City in 2009 intending that this plan “provides the foundation for an ongoing program that will result in a healthier and safer community forest in Red Lodge.” It identifies the economic, social, and environmental benefits of an urban forest and provides a “strategic approach to sustaining the City’s community trees on a short and long-term basis.”

Although Red Lodge’s combined forestry programs (cost-share, Arbor Day, other granted trees and their maintenance) began in 2009, year-over-year the number of trees planted annually has steadily decreased. The program started out with support for planting 30-35 trees per year and for the past 3 years was only able to manage 13 trees per year. The addition of City program trees each year is primarily funded by grant money with a low cost to the City for planting trees (bringing the cost to approximately \$80/tree as of 2018). At the same time, many other cities state-wide are competing for the limited or reduced grant awards that Red Lodge has come to depend on to sustain and support its forestry program.

Instead of reducing or slowing progress of planting City trees, Red Lodge should increase the number of trees planted annually to capitalize on the energy savings, greenhouse gas reduction benefits and reduction of stormwater runoff that an urban tree planting program produces. ⁵

Potential Partners

- Active Transportation Plan Steering Committee
- Beartooth Recreation Trails Association
- Montana Department of Natural Resources and Conservation
- Land Use Council Committee
- Parks, Trees and Recreation Board and affiliated MOU Groups
- Public Works Council Committee

Potential Funding

- Arbor Day Grant
- Montana Tree City of the Year Grant
- Urban and Community Forestry Challenge



We recommend expanding the tree planting program: more trees along our local trails, increasing the number of street trees along right-of-ways, increasing the density of trees around parking lots by addressing issues in the zoning code, and developing longer planting strips and tree islands within parking lots as projects arise.

We also recommend distributing education material to the public that identifies drought tolerant native plant species, plants with high carbon sequestration potential, and efficient watering guidelines. City Ordinance 919, Regulation of Trees on City Owned Land, and City Maintained Public Right of Way, should also be revised to establish landscaping standards for City projects. Each forestry program and landscaping standards for the City could be improved to include not only trees, but preferred shrubs, grasses and other plants and practices that improve the City forest while fortifying a green infrastructure.

2023 Status: In recent years, the Parks Board has acquired funding to increase the number of Cost Share Trees available and has decreased the cost to the property owner to \$50 per tree. Red Lodge became Montana’s first Bee City affiliate, which highlights the importance of other native habitats that contribute to carbon sequestration. Information on native plants and their care is always available at City Hall and on the City’s website.

WHY DOES THIS MATTER?

According to the Montana DNRC 2017 Community Forestry Summary, Red Lodge's street trees provide more than \$249,350 in annual benefits (\$112 per tree). These benefits include air quality improvement, energy savings, stormwater runoff reduction, atmospheric carbon dioxide reduction, and aesthetic contributions to the social and economic health of the community. Replacement of these trees with trees of similar size, species and condition, would cost \$2,786,956. While many benefits of trees are not quantifiable, these values highlight the worthwhile investment of public funds into our street tree resource" – Montana Department of Natural Resource Conservation

Potential Partners

- Beartooth Recreational Trails Association
- Carbon County Resource Council
- Local Contractors
- Northern Plains Resource Council
- Planning and Zoning Board
- Public Works Council Committee
- Public Works Department

Potential Funding

- City Funds

CLU-3 Impermeable Urban Surface Reduction and Future Surface or Re-surface Design

RECOMMENDATION

Reduce the amount of impermeable surfaces on roads and parking areas so as to reduce run-off into the Wastewater Treatment Plant and Rock Creek.

BACKGROUND

Red Lodge currently has a mixture of permeable and impermeable surfaces in town. The majority of our alleys are unpaved, while our streets are paved. In theory this would allow us to recharge our aquifers, but in practice, it produces large amounts of very silty runoff. In order to develop a green infrastructure system that meets our town's needs, creative surfacing designs should be implemented on a trial basis on sidewalks, parking lots, trails, rooftops, and alleys. One example of an impermeable surface that has proven effective in Montana is at the Northern Plains Resource Council office in Billings.⁶ Their parking lot is composed of rounded pieces of recycled glass and a honeycomb patterned mat. If a system such as this was implemented in Red Lodge it would reduce the amount of stormwater run-off, maintain water quality, reduce runoff into Rock Creek, and reduce operating and maintenance costs at the City's Wastewater Treatment Plant.

We recommend that small, trial resurfacing projects be implemented and evaluated based on their outcomes. These projects should be implemented in conjunction with Capital Improvements Plan projects and incorporated where feasible. Our City Zoning Codes should also be revised to include permeable surface requirements and reduce the minimum parking requirements for certain new developments.

Potential Partners

- Carbon County Resource Council
- Montana Bureau of Mines and Geology
- Montana Department of Environmental Quality, Water Quality Division
- Parks, Trees and Recreation Board and affiliated MOU Groups
- Public Works Council Committee

Potential Funding

- US Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant
- City Funds



2023 Status: The Planning Board and Zoning Commission included in the 2022 Zoning Regulations, an explicit restriction on paving boulevards.

WHY DOES THIS MATTER?

It is estimated that 50% of the ground surfaces in urban areas like Red Lodge are paved or otherwise impervious, whereas 10% to 20% has been identified as harmful for surrounding water systems. – Water Research, Vol. 40

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CLU-4 Landscaping and Water Management Systems

RECOMMENDATION

Promote the use of water-wise irrigation systems, natural features that recharge groundwater, and native vegetation.

BACKGROUND

In order to foster green infrastructure systems and increase local resilience, the use of drought and heat tolerant native plants, water-wise irrigation systems, and other water conservation best practices should be implemented in City Parks and facilities. These practices conserve water, particularly during the annual late summer seasonal drought period. Future late summer stream flows and water supply are predicted to be lower and water supplies to be limited with warmer predicted summer temperatures.⁷

We recommend identifying and protecting natural features that serve to recharge our aquifers, such as wetlands, drainages, and swales.

Water-wise irrigation and watering systems should also be evaluated and implemented as City park facilities require maintenance and as the budget allows.

2023 Status: The Parks, Trees and Recreation Board has been planting native and drought tolerant perennials and grasses at the roundabout on the north end of town.



WHY DOES THIS MATTER?

Thanks to water efficiency improvements and water minimization practices, Yellowstone National Park was able to decrease their water usage by 6% in 2014. – Yellowstone National Park

CLU-5 Vacated, Unused, or Open Municipal Lots

RECOMMENDATION

Until converted to other uses, vacant lands should contain adequate natural vegetation cover and local code should encourage infill development.

BACKGROUND

There are a number of vacant lots and unused municipal land within the City. Until converted to other uses, these areas should be managed to maintain adequate natural vegetation cover and combat noxious weeds. This will allow these unused areas to sequester carbon, and would serve to naturalize and beautify Red Lodge. Some of the municipal lands could be incorporated into the City’s green infrastructure and managed as open space to maintain suitable vegetation cover and provide opportunities for managing stormwater run-off and recharging aquifers. Additionally, these lands could serve as a carbon offset in the future. City Zoning Code and the Growth Policy should also be revised to encourage infill development of unused lots, reduce urban and rural sprawl, and reduce vehicle reliance for City employees and the community.

2023 Status: A project plan and budget was completed to develop an inventory and mapping of vacant lots and unused municipal land within the City.

WHY DOES THIS MATTER?

A medium growth coniferous tree, planted in an urban setting and allowed to grow for 10 years, sequesters 23.2 lbs of carbon, and the presence of trees has been shown to increase property values and improve human health. – Missoula Energy Conservation and Climate Action Plan

Potential Partners

- Beartooth Recreation Trails Association
- Carbon County Conservation District
- Land Use Council Committee
- Montana Department of Environmental Quality
- Montana Department of Natural Resource Conservation Urban Forestry Program
- Parks, Trees and Recreation Board
- Public Works Council Committee

Potential Funding

- Montana Tree City of the Year Grant
- Department of Natural Resource Conservation



CLU-6 Tree Nursery

RECOMMENDATION

Evaluate the feasibility of creating a tree nursery adjacent to the Wastewater Treatment Plant or Water Treatment Plant

2023 Status: This was completed and determined not to be feasible for public health and safety.

BACKGROUND

A number of cities across Montana operate Tree Nurseries in conjunction with their Wastewater Treatment Plants.⁸ In this system, nitrogen rich effluent-water flowing passively from the treatment plant is used to water trees adjacent to the treatment plant and these plants grow very well due to the nutrient rich water. Trees can then be sold as wood products, or used as a carbon sink or as carbon offset mitigation. There is potential for a similar nursery in Red Lodge, and the feasibility of doing so should be evaluated by the Parks Trees and Recreation Board and Public Works Department. Given our climate, the City should also consider whether treated or partially treated water could be used agricultural purposes, such as growing grass or alfalfa.



Poplar Grove adjacent to Missoula's WWTP

for

WHY DOES THIS MATTER?

The number of trees that Red Lodge has planted annually has gradually decreased from 25 per year to 10 per year over the past 9 years. The cost of trees, materials, and labor continues to grow as grant money used to fund the tree programs remains steady at best. The creation of a tree nursery would enable the City to get its number of annual tree planting's backup to at least 25, while maintaining the amount of money awarded from existing Grant processes. It would also make the City's tree program more sustainable as more cities across Montana compete for the same grants we rely on today.

End Notes

¹ “What is Green Infrastructure?” United States Environmental Protection Agency.
<https://www.epa.gov/green-infrastructure/what-green-infrastructure>.

² “Literature Review: Green Spaces and Property Values.” Natasha Catrakilis, Duke University 2015 Literature Review. <https://sites.duke.edu/urbaneconomics/?p=1441>.

³ “What is Green Infrastructure?” United States Environmental Protection Agency.
<https://www.epa.gov/green-infrastructure/what-green-infrastructure>.

⁴ “Trees: The Carbon Storage Experts.” New York State Department of Environmental Conservation.
<http://www.dec.ny.gov/lands/47481.html>.

⁵ “Energy Saving Trees.” Arbor Day Foundation. <https://energysavingtrees.arborday.org/#Home>.

⁶ “Our Building.” Northern Plains Resource Council. <https://northernplains.org/about-us/our-building/>.

⁷ Whitlock C, Cross W, Maxwell B, Silverman N, Wade AA. 2017. Executive Summary. In: Whitlock C, Cross W, Maxwell B, Silverman N, Wade AA. 2017. 2017 Montana Climate Assessment. Bozeman and Missoula MT: Montana State University and University of Montana, Montana Institute on Ecosystems. 318 p. doi:10.15788/m2ww8w.

⁸ “Hybrid Poplar Tree Project.” City of Missoula Montana.
<https://www.ci.missoula.mt.us/1971/Hybrid-Poplar-Tree-Project>



IMPLEMENTATION

This chapter identifies priority actions to be taken in order to accomplish our next 10% emissions reduction goal while abiding by our guiding principle of financially sound decision-making. If the following strategies are implemented and completed actions accounted for, the goal of an additional 10% emissions reduction by 2025 and to reach a 50% reduction goal by 2035 can be achieved.

INITIAL ACTIONS

This Plan identifies numerous strategies which will result in energy and cost savings. However, some will have a greater impact than others and should be strategically implemented to meet reduction goals and as funding allows.

In order to meet the second goal of an additional 10% reduction by 2025, the Energy Conservation Plan Taskforce has identified the following strategies to be implemented before 2025. The table above identifies energy efficiency upgrades that have been made since the Baseline Inventory was conducted, budgeted actions that are slated to take place, and additional actions that when implemented, will guide the City in reaching the second goal of reducing city emissions by an additional 10%, or 196 mtCO₂e.

The Investment Grade Audit completed in 2022 by McKinstry, provides a detailed menu of energy reduction projects that should be prioritized, budgeted for, and implemented in the near future.

Guiding Principle and Reduction Goals

This Energy Conservation Plan has identified a goal of reducing City emissions by an additional 10% by the year 2025, and a long-term goal of reducing 50% by year 2035. Implementing strategies in a financially feasible manner was also identified as a guiding principle of the Plan.

Actions to be Implemented	Estimated Reductions in mtCO ₂ e
Occupancy Sensors at City Hall, Police Station, Public Works (FBS-2)	10
Electronics Training (IPP-4)	2
LED Retrofits and Insulation at WWTP and WTP (FBS-2)	4
Install 5KW of Renewable Energy annually (FBS-5)	111
Increase Average Vehicle Fuel Efficiency (FBS-4)	61
Subtotal	188
Total Reductions	301
Reductions needed to meet 2021 Goal	196

Who will Implement the Plan?

Implementing this Energy Conservation Plan will require cooperation with the community and local organizations, on-going meetings on strategy implementation, inclusive decision-making, and commitment and leadership on behalf of the City Council, Mayor, and staff. In order to achieve this, we recommend dividing the implementation responsibilities between City staff, partner organizations, and a citizens Sustainability Board.

CITY STAFF AND COUNCIL COMMITTEES

Strategies can be implemented and reductions achieved by splitting tasks between staff who are currently employed. For example, strategies relating to changes in Code and Zoning could be handled by the Community Development Department and the Planning Board and Zoning Commission. Strategies that involve Building and Facility upgrades could be implemented by the Public Works staff and the Council Public Works Committee. As each strategy is put into action, the most qualified staff person will be asked to assist in implementation in conjunction with the Sustainability Board and applicable local partners.

It is also worth noting that the City employed an AmeriCorps EnergyCorps member for several of the past 6 years, though this program is no longer available, and a VistaCorp Resiliency Corp member in 2022/2023 to spearhead sustainability initiatives. These employees have successfully implemented cost-saving projects.

PARTNER ORGANIZATIONS

Red Lodge is fortunate to have a large breadth of local non-profits and service organizations who work on issues related to sustainability. Each in-depth strategy explanation in this Plan identifies Potential Partners within the community who could help implement strategies and share some of the workload. As each strategy is implemented, these organizations should be brought in and asked to assist. This will remove some of the burden from the City and help the values of the Energy Conservation Plan to move into the community.

SUSTAINABILITY BOARD

In order to further assist in implementation, we recommend continuing to support the Sustainability Board made up of community members and a City Council representative. This Board functions like the Parks Board and reports to the Council Public Works Committee. They would work alongside City staff to implement identified strategies and report back to the City Council and Council Public Works Committee on their progress. Having a board of this sort is critical to the success of the Energy Conservation Plan, as plans without active workgroups are often forgotten and shelved. This board undergoes a periodic review of the Energy Conservation Plan and progress of implementing these strategies.

Which Strategy do we Implement?

The Energy Conservation Plan Committee has identified 5 strategies that will get the City of Red Lodge to our second 10% target: occupancy sensors in key buildings, LED retrofits at water treatment facilities, an electronics training for City employees, increased renewable energy installations, and improved vehicle fuel efficiency. After that, an annual meeting between Plan stakeholders should be held in order to decide which strategies to tackle next. This annual strategic meeting would include Department heads, the Mayor and Council members, City staff and the Sustainability Board, and partner organizations who are involved in implementation. This group of people would evaluate the previous year's implementation progress and identify upcoming strategies that should be put into action during the coming fiscal year. This meeting should be held several months before budget discussions so that necessary funds can be allocated to strategy projects during budgeting.

Monitoring and Reporting

One key aspect of a successful Energy Conservation Plan is monitoring your progress and reporting out to the public. Monitoring allows you to see how far you have come in reducing your emissions and energy costs. It allows you to celebrate your successes and address your shortcomings, and it keeps plan implementation on the forefront of people's minds.

ANNUAL REVIEW AND PRESENTATION

To achieve these emissions goals, plan progress should be reviewed annually, followed by a report to the City Council and public that would also be posted to the City website. The annual review would involve analyzing the status of strategies that are currently in place and identifying what is working and what is not. This information would then be presented to the City Council and the public so that they are kept up to speed on plan implementation.

RE-INVENTORY

On an accelerating schedule, our greenhouse gas emissions, energy usage, and energy costs should be re-inventoried. The next target date occurs in 2025. A re-inventory is similar to the assessment that was done for the City of Red Lodge Baseline Inventory, and involves gathering data on our energy usage and costs for Buildings, Fleet, Wastewater and Water, Solid Waste, and Employee Commute.

This data is then entered into the ClearPath software, as was done in 2016 and 2021, and emissions are calculated. This updated data allows us to see if our implemented strategies are achieving the emissions and costs reductions that we estimated, and tells us if we are on track to meet our long-term goal of 50% reduction by 2035, as well as the intermediate goals of stepwise 10% reductions every few years. Re-inventory responsibilities will be handled by the Sustainability Board.

MAJOR PLAN REVIEW AND REVISIONS

As technology, policy, and finances change within the City and federal government, significant changes in emissions levels and strategies could be possible.¹ Assessment, inventory, and monitoring methods can also change. Therefore, the Energy Conservation Plan should be updated to address any affecting changes every 3–5

years, with the next goal at the year 2025. The Plan revisions should take place the year after a re-inventory, so that our most recent emissions levels and costs can be included. Major plan review and revisions will be handled by the Sustainability Board.

End Notes

¹“New Technology could slash carbon emissions from aluminum production.” The Guardian, Fiona Harvey.
<https://www.theguardian.com/environment/2018/may/10/new-technology-slash-aluminium-production-carbon-emissions>

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APPENDICES

Appendix A: Adopted Resolutions

RESOLUTION No. 3498

A RESOLUTION OF THE CITY COUNCIL OF RED LODGE, MONTANA TO ADOPT THE CITY OF RED LODGE ENERGY CONSERVATION PLAN

WHEREAS, the City of Red Lodge and the National Center for Appropriate Technology Energy Corps Americorps Program have had an agreement since 2015 for the development of City related energy conservation projects and programs utilizing a Montana Energy Corps Member/City Sustainability Coordinator; and

WHEREAS, multiple energy related projects and programs have been completed since 2015 resulting in a reduction of City related energy use and costs; and

WHEREAS, the Energy Corps member was further tasked with developing realistic energy and greenhouse gas emissions reduction goals for the City through development of a City Energy Conservation Plan based upon the Red Lodge Baseline Assessment; and

WHEREAS, the City of Red Lodge Baseline Assessment was completed in October 2017 utilizing ICLEI (Local Governments for Sustainability) software that developed an inventory measuring baseline energy usage, energy costs, and greenhouse gas emissions produced by City operations during calendar year 2016; and

WHEREAS, the Baseline Assessment has been presented to the City Council, City Departments and community groups; and

WHEREAS, a City Employee Survey and a Community Survey were conducted to gather additional local input; and

WHEREAS, the City Energy Conservation Plan was presented to the Council Public Works Committee on September 24, 2018 for discussion and formally debuted to the public at the Red Lodge Soil to Sun Eco-Fair on September 29, 2018; and

WHEREAS, the Energy Conservation Plan was brought before the full Council on October 9, 2018 for discussion; and

WHEREAS, the adoption of the City of Red Lodge Energy Conservation Plan will provide opportunities for the programs, policies, and projects to be implemented, resulting in further reductions in greenhouse gas emissions and cost savings for the City.

NOW THEREFORE BE IT RESOLVED by the Red Lodge City Council:

1. That the City Council adopts the City of Red Lodge Energy Conservation Plan, referenced as Exhibit A.
2. That implementation of the City of Red Lodge Energy Conservation Plan may be conducted by the Red Lodge City Council and a Council Sustainability Board whose composition shall be determined by the Council.

3. That the City of Red Lodge Energy Conservation Plan be considered for inclusion in the Growth Policy when the Growth Policy process is opened for update and modification.

INTRODUCED at a Regular meeting of the City Council on October 23, 2018 by Council Member Thompson.

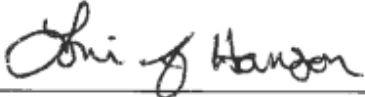
PASSED AND APPROVED BY THE RED LODGE CITY COUNCIL on this 23rd Day of October 2018.

City of Red Lodge:

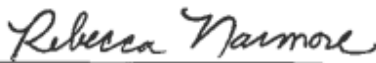


WILLIAM LARSON, Mayor

Attest:



LONI HANSON, City Clerk



REBECCA NARMORE, City Attorney



Appendix B: Investment Grade Audit Report



Table 4.2 - Facility Improvement Measure (FIM) Summary

Project: City of Red Lodge EPC
 Scenario: IGA
 Date: June 29, 2022

Facility Improvement Measures	FIM Description	Budget *	Annual Utility Savings	Annual Operational Savings **	Simple Payback (SPB)
01.01 City Hall Radiator Control Valve Replacement	Existing Condition: Control valves on steam radiators have failed. Proposed: Install new radiator control valves to control heating when needed. Provide thermostatic control at each radiator.	\$11,315	\$0	\$0	0.0
01.02 City Hall Insulation	Existing Condition: No insulation on boiler piping. Proposed: Install insulation on exposed boiler piping to reduce heat loss through piping.	\$40,412	\$124	\$0	325.7
01.03 City Hall Steam Trap Replacement	Existing Condition: Existing steam traps have failed on radiators. Proposed: Check steam traps on radiators to ensure proper function and replace where needed.	\$15,805	(\$10)	\$0	-1533.5
02.01 Chamber of Commerce Cooling	Existing Condition: There is currently no central cooling in the Chamber of Commerce. Proposed: Add a central cooling system to the building.	\$14,458	(\$219)	\$0	-66.1
03.01 Chamber of Commerce Furnace Replacement	Existing Condition: Current furnace is not energy efficient. Proposed: Replace existing furnace with more energy efficient model to reduce energy use.	\$9,115	\$93	\$0	98.3
03.01 City Hall Furnace Replacement	Existing Condition: Existing furnace is approaching end of life and is not energy efficient. Proposed: Replace furnace that serves court room with new, more efficient model to reduce energy use.	\$9,474	\$59	\$0	161.1
03.01 Police Station IT Cooling	Existing Condition: The IT closet does not have cooling for the equipment. Proposed: Install a split system cooling system in the IT closet to provide cooling for equipment.	\$11,001	(\$893)	\$0	-12.3
04.01 City Hall Programmable Thermostats	Existing Condition: City Hall has no programmable thermostats. Proposed: Replace non-programmable thermostat with programmable thermostat. Add scheduled setbacks to the thermostats to conserve energy and improve occupant comfort.	\$718	\$173	\$0	4.2
04.01 Police Station Garage Thermostat Replacement	Existing Condition: Thermostat for overhead heater is approaching end of useful life and is non-programmable. Proposed: Replace with programmable thermostat that will allow schedules and setbacks to reduce run time.	\$718	\$0	\$0	0.0
04.01 Public Works Shop Programmable Thermostat	Existing Condition: Thermostat is not programmable. Proposed: Install a programmable thermostat that allows for scheduling and set backs to reduce heating run time.	\$718	\$22	\$0	33.2
04.02 City Hall Outdoor Air Lockout	Existing Condition: No air lockout exists to prevent the boiler from running above an outside air temperature setpoint. Proposed: Install an outdoor air sensor that will prevent the boiler from running above a specified outdoor air temperature to reduce heating energy use.	\$4,760	\$17	\$0	276.4

09.01 Chamber of Commerce LED Upgrade	Existing Condition: Three existing outdoor wallpacks are not LED lights and not efficient. Indoor lights are not LED, no occupancy sensors exist. Proposed: Replace outdoor wallpacks and indoor lights with LED lights to reduce energy consumption and install occupancy sensors throughout building.	\$3,413	\$376	\$0	9.1
09.01 City Hall Occupancy Sensor	Existing Conditions: Only one occupancy light sensor currently in City Hall. Proposed: Install occupancy light sensors in office areas, bathrooms, and storage areas to reduce lighting run time.	\$629	\$74	\$0	8.5
09.01 Police Station Occupancy Sensor	Existing Condition: No occupancy light sensors in IT closet or garage. Proposed: Install occupancy light sensors in IT closet and garage to reduce lighting run time.	\$377	\$49	\$0	7.6
09.01 Treatment Building Indoor Lighting LED Upgrade	Existing Condition: Indoor lights are 4' T12s 2 tube quantity = 25. Proposed: Upgrade indoor lights to LED to reduce lighting energy.	\$4,804	\$90	\$0	53.5
09.02 City Hall Basement LED Upgrade	Existing Condition: Light bulbs in basement are not LED. Proposed: Replace approximately 6 light bulbs with LED bulbs to reduce energy use.	\$404	\$5	\$0	87.2
10.01 Water Treatment Solar Panels	Place 60 modules or 23.7kW on the first building on the right (brown roof), which will generate 30,000 kWhrs/yr or about 15% of the facility load.	\$125,725	\$2,727	\$0	46.1
12.01 City Hall Domestic Hot Water Tank Insulation	Existing Condition: Domestic hot water tank is not insulated. Proposed: Add insulation to the domestic hot water tank to reduce heat loss.	\$359	\$10	\$0	35.8
13.01 Chamber of Commerce Window Upgrade	Existing Condition: Current windows are single pane. Proposed: Replace single pane windows with double pane to reduce heat loss.	\$30,129	\$75	\$0	399.1
19.01 Sewer Influent Outside Light LED Upgrade	Existing Condition: Outdoor wallpacks are not LED. Proposed: Replace existing wallpacks with LED wallpacks to reduce lighting energy use. Quantity = 3 wallpacks.	\$898	\$40	\$0	22.5
23.02 Vehicle Charging Station Replacement Chargers	Existing Condition: Currently the vehicle charging ports are not working. Proposed: Replace non functioning charging ports with two new vehicle charging stations.	\$38,615	\$0	\$0	0.0
30.01 Public Works Shop Install Infrared Heaters	Existing Condition: Garage unit heaters are non-radiant. Proposed: Replace current unit heaters with radiant unit heaters to reduce heating energy use.	\$15,383	\$60	\$0	254.8
30.01 Police Station Infrared Heaters	Existing Condition: Heaters in garage are not infrared. Proposed: Replace existing heaters with infrared heaters to reduce heating energy.	\$11,118	\$100	\$0	111.5
30.01 Vehicle Storage Infrared Heaters	Existing Condition: Unit heaters are not infrared. Proposed: Replace existing unit heaters with overhead infrared heaters to reduce heating energy.	\$13,830	\$92	\$0	150.6
30.02 Vehicle Storage Exhaust Fan Installation	Existing Condition: There are no exhaust fans in the vehicle storage garage. Proposed: Install exhaust fans to improve air quality and comfort.	\$6,286	(\$101)	\$0	-62.3
Subtotal		\$370,466	\$2,962	\$0	125.1

* Since design cost, audit cost, etc. are distributed among the FIMs, the total project cost will not go up or down by exactly the amounts shown here if a FIM or FIMs are dropped.

** For non recurring operational savings, the values are averaged over the 30 year length of this analysis.

*** Incentives are contingent on final approval and are not guaranteed. Funds are shown for reference only.

Confidential and Proprietary

