

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.



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This report was prepared by volunteers with support from Energy Corps members and input from City staff and residents in the community.

CONTENTS

Introduction

What is the City’s Baseline Energy Footprint?	D
Energy Conservation Plan.....	F

Energy Conservation Strategies

Fleet, Buildings, and Streetlights.....	1
Internal Policies and Practices.....	12
Solid Waste, Recycling and Compost.....	20
Wastewater and Water.....	33
Codes and Land Use.....	46

Implementation

Guiding Principle and Goals.....	61
Who will Implement the Plan?	62
Which Strategy do we Implement?	63
Monitoring and Reporting.....	64

Appendixes

Appendix A: Adopting Resolutions.....	A-1
Appendix B: City of Red Lodge Baseline Inventory.....	B-1
Appendix C: Public Participation.....	C-1

WHAT IS AN ENERGY CONSERVATION PLAN?

An energy conservation plan 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. It 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 energy conservation plan, including Montana communities of Bozeman, Missoula, and Whitefish.¹

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

HOW WILL THIS HELP US?

As all Red Lodge residents know, 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. It is projected that in the coming years our summers will become dryer 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. 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. Grants are currently being pursued for the proposed solar array at the Red Lodge Carnegie Library.

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 has employed an EnergyCorps member to spearhead their sustainability efforts since October of 2015.

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



Members of the Planning Committee

1. Install an anaerobic digester and methane generator at the Wastewater Treatment Plant.
2. Eliminate single-use plastic bags and water bottles.
3. Conserve our open spaces by protecting sensitive lands.
4. Pursue renewable energy projects.
5. Train City employees to conserve energy and reduce waste.

Average Response per Question

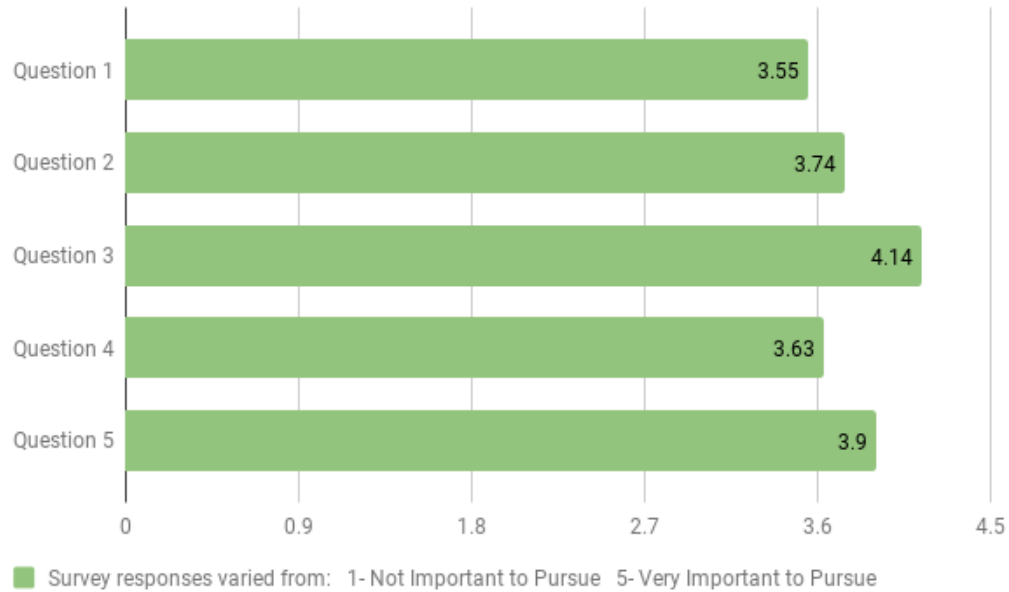


FIGURE 1. Segment of the Community Survey Results, for full results see Appendix C

What is the City's Baseline Energy Footprint?

The first step in developing an energy conservation plan is to pinpoint your baseline energy usage, costs, and emissions. Once you know this, you are able to see where improvements can be made and have data 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.

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 gases 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 member 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 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.

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.




RESULTS

In 2016, The City of Red Lodge’s operations were responsible for emitting 1,910 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 largest share of greenhouse gases came from City buildings and facilities which accounted for 1,132 mtCO₂e, or 59.5% of total City emissions. Water Treatment, which encompasses fresh water treatment, wastewater treatment, and pumps and pumping stations, was our second largest emissions producer, accounting for 577 mtCO₂e or 30% of our emissions. These were followed by our transportation fleet and streetlights, coming in at 137 mtCO₂e and 64 mtCO₂e respectively.

When analyzed by cost, our Water Treatment accounts for 51% of our total annual energy costs, followed by Streetlights at 21.4%, Buildings and Facilities at 15%, and the Transportation Fleet at 12.1%.

How much is 1,910 mtCO₂e?

-  206 homes' energy use for a year
-  4,422 barrels of oil consumed
-  4,681,373 miles driven in a passenger vehicle

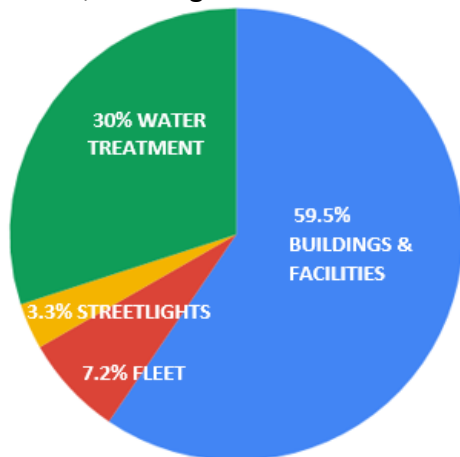


FIGURE 2. 2016 City of Red Lodge **Emissions** by Sector

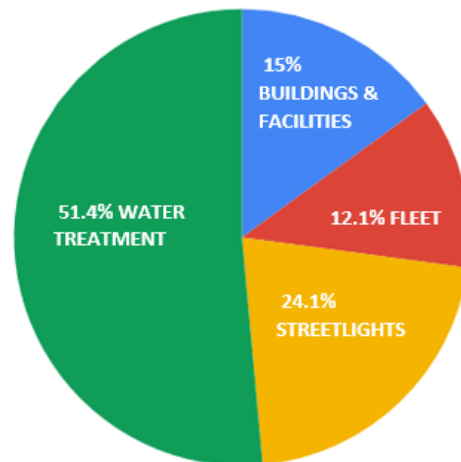


FIGURE 3. 2016 City of Red Lodge **Costs** by Sector

SECTOR	2016 COST (\$)	GREENHOUSE GASES (mtCO ₂ e)
Buildings and Facilities	\$30,272	990
Water Treatment	\$103,464	577
Streetlights	\$43,081	64
Fleet	\$24,410	137

HOW DO WE COMPARE?

To identify what our impact is as compared with other communities, mtCO₂e are divided by population. Red Lodge had a population of roughly 2,328 in 2016, which puts our mtCO₂e per capita at 0.82. This is substantially higher than other per capita mtCO₂e counts in Montana, with Whitefish coming in at 0.24, Helena at 0.36, and Bozeman at 0.22.

Another way to compare Red Lodge's impact to that of other communities is to look at which sectors are the leading emissions producers. In Red Lodge, our leading emissions producer is City Buildings and Facilities, which produce 59.5% of our greenhouse gas emissions. At the City of Whitefish, their buildings are their second highest emitter and produce only 24% of their emissions. In Missoula, buildings produce 27% of their total emissions and are their second highest emitting sector. In both Whitefish and Missoula, the Water Treatment sectors produce the largest share of emissions.

What this means for Red Lodge is that significant cost savings and greenhouse gas emissions reductions can be made by increasing the efficiency of our City Buildings and Facilities.

Energy Conservation Plan

SCOPE

This Energy Conservation Plan focuses solely on municipal operations. 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.

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.

EMISSIONS REDUCTION TARGETS

The ultimate goal is to be 50% below 2016 levels by year 2040, with an interim goal of being 10% below by 2021. No additional interim goals have been set at this point, but will be determined in 2021 once our progress toward our first 10% goal can be measured. Ideally a 10% reduction will be achieved every 5 years, but we be able to set more appropriate interim goals once the first 5 year period has passed.

Target:

50% reduction by 2040

Interim Goal:

10% reduction by 2021

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 10% by 2021 goal. 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% by 2040 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

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/.

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



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. Our fleet consists of 16 vehicles; eight trucks, six SUVs, and two small cars. Seven of these vehicles are police cars and the remaining nine are 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 our total greenhouse gas emissions and 1.9% of our total energy use but made up 21% of our 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.

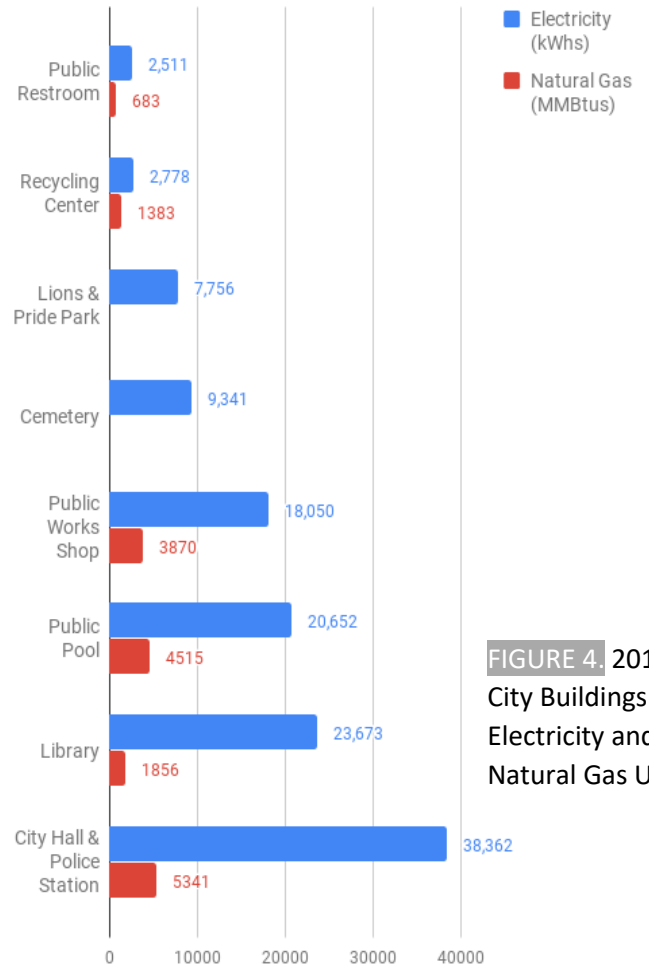


FIGURE 4. 2016 City Buildings Electricity and Natural Gas Use

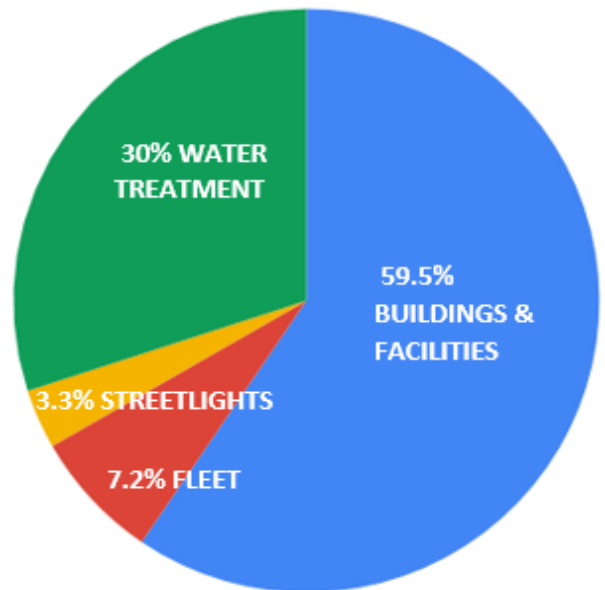


FIGURE 5. 2016 City of Red Lodge Emissions by Sector

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 Streetlights 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

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	3
FBS-2 Energy Conservation Improvements for Existing City Facilities	4
FBS-3 High Performance Building Standards on Future Construction	6
FBS-4 Fuel Efficiency Standards for Fleet Vehicles	8
FBS-5 Renewable Energy	9

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.

The City should also work to have all streetlights retrofitted to LED. Our streetlights are owned and operated by NorthWestern Energy. We should encourage them to retrofit to LED as soon as possible, and do our best to be one of the first communities to make the switch. The streetlights within Red Lodge should 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 our decorative streetlights on Broadway Avenue. As of now, we are saving around \$300 each month thanks to the retrofits. – City of Red Lodge

Potential Partners

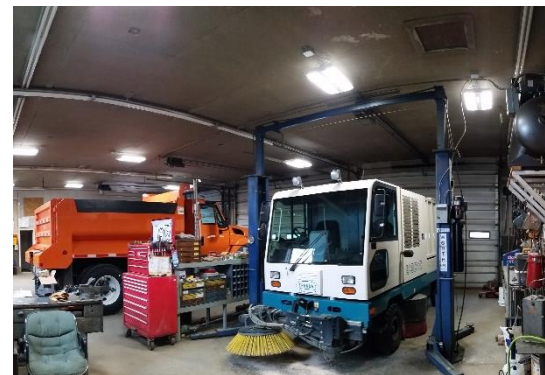
- Department Heads
- NorthWestern Energy
- Sustainability Coordinator
- Sweet Grass County High School Facility Manager

Potential Funding

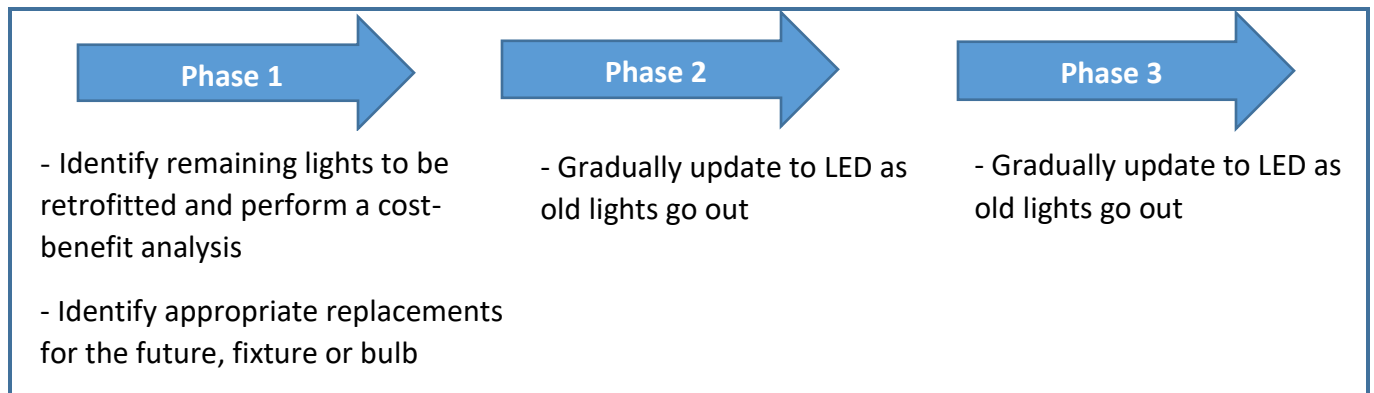
- City Funds
- NorthWestern Energy Rebates

Install Goal

- Convert all City lighting to LED by 2022



LED lighting at the Public Works Shop



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. Some obvious 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, we will be able to more cost-effectively install renewable energy technology and further decrease our energy costs.

Energy usage reduction goals should be set yearly by the City employees who work in each building. Goals should be made for each building and should be built off of the previous year's NorthWestern Energy bills. This will make employees more involved and aware of their energy usage while at work. The employees in buildings that reach their goals and reduce their energy usage should be rewarded with an afternoon off or given official recognition by the Mayor and City Council.

Potential Partners

- City Architect/Engineer
- City Mayor
- Community Development Director
- NorthWestern Energy
- Public Works Council Committee
- Public Works Council Representative
- Public Works Director

Potential Funding

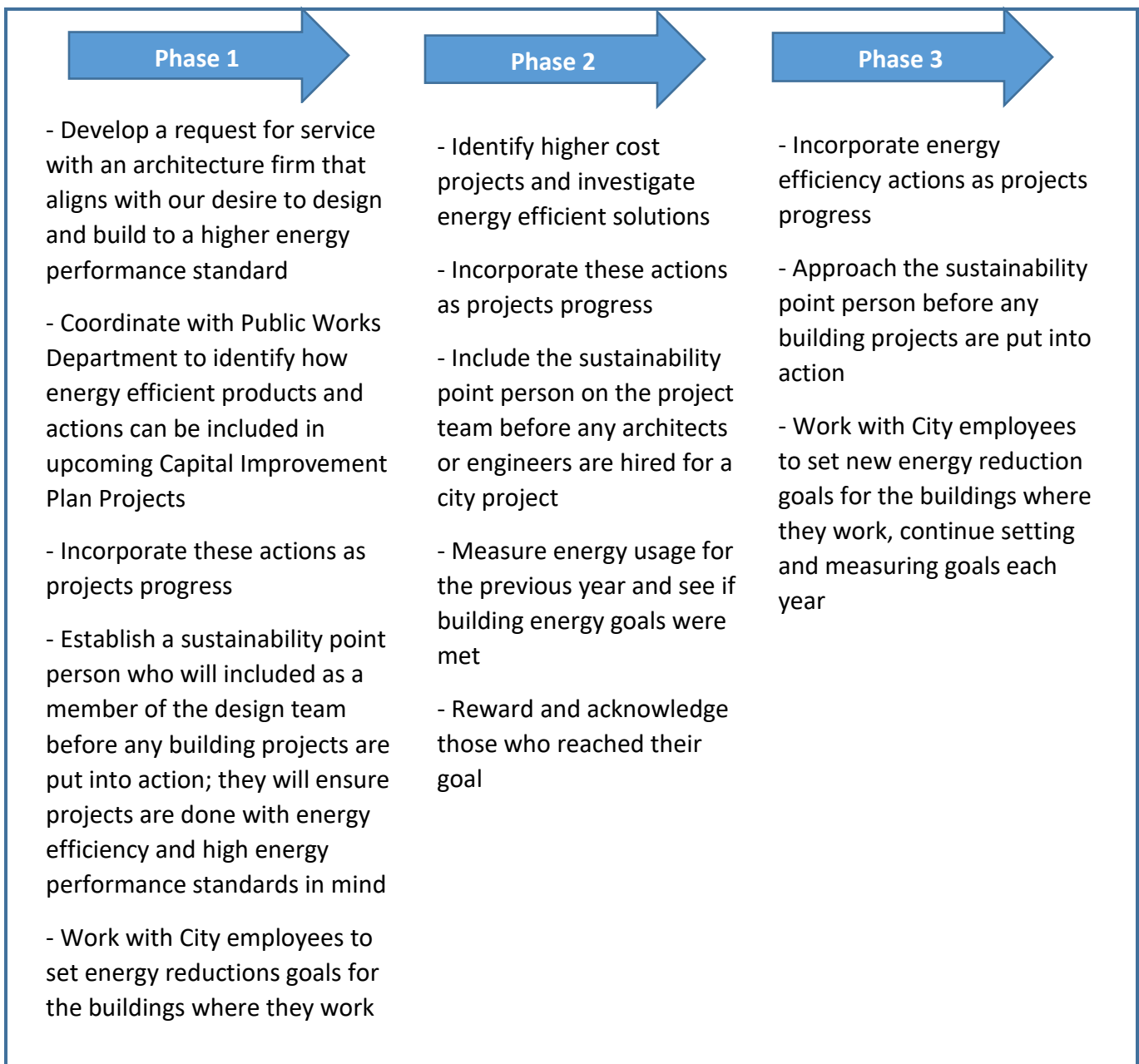
- City Funds
- NorthWestern Energy Rebates
- USDA Community Facilities Direct Loan and Grant Program



Insulation being installed at City Hall

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. 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 we could expect to save up to \$9,050, or 30%, annually on our energy costs. – City of Red Lodge and NorthWestern Energy



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 2015 State of Montana High-Performance Building Standards.

BACKGROUND

The 2015 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 2015 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. 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

Potential Partners

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

Potential Funding

- No funding required



Butte Justice Center, built to 2015 MT High Standards

Phase 1

- Investigate the potential costs and benefits of building to 2015 State of Montana High-Performance Buildings Standards
- Ensure that the City Architect/Engineer designs to 2015 State of MT High-Performance Buildings Standards and incorporates solar-ready features or passive solar where possible

Phase 2

- Draft an ordinance stating that new City buildings will be built to these standards
- Develop a new request for service with Great West Engineering that aligns with our desire to build in an energy efficient manner

Phase 3

- Pass an ordinance stating that new City buildings will be built to these standards
- Continue to build to this standard into the future

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. We recommend implementing 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. With the increase in hybrid, electric and biofuel vehicle technology, this should be achievable.

We also recommend performing a lifetime cost analysis 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.

WHY DOES THIS MATTER?

In 2016, the City spent \$24,410 on fuel for its City fleet vehicles, which average 19 MPG. If all of these vehicles were to have been electric, our annual fueling costs would have been \$5,713, saving the City \$18,697. If our fleet vehicles would have averaged 30 MPG in 2016, it would have dropped our fuel costs to \$15,459.67 and saved the City \$8,950.33. – City of Red Lodge

Potential Partners

- City Mayor
- Public Works Director

Potential Funding

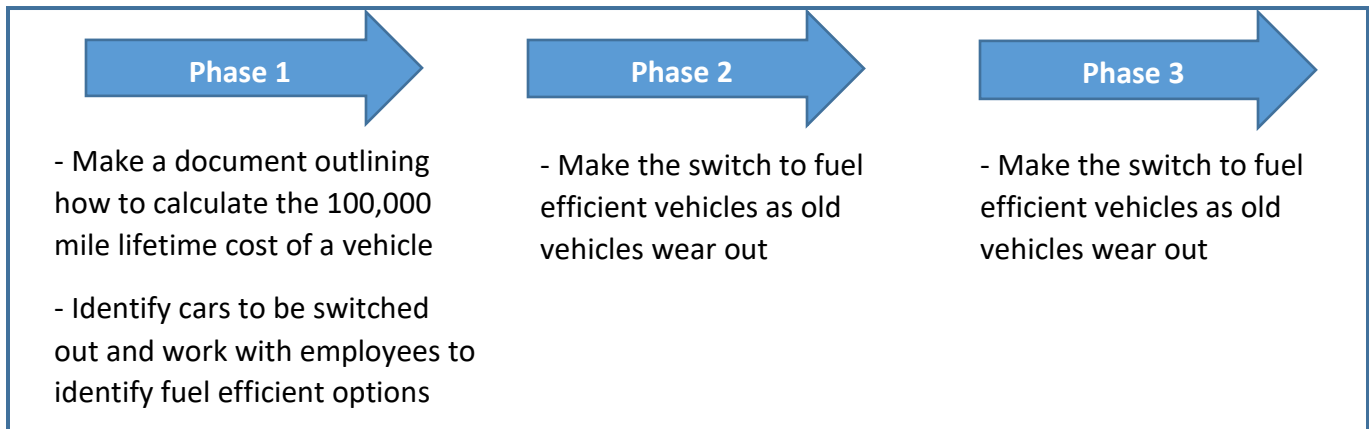
- No City funding required

Fleet Goal

- All light duty fleet vehicles average 30 MPG by 2030



Tourists utilizing the EV Chargers in Red Lodge



FBS-5 Renewable Energy

RECOMMENDATION

Implement renewable energy technologies once our buildings are as energy efficient as possible.

BACKGROUND

Once energy improvements have been made to our City buildings and facilities and we feel our buildings are as efficient as possible, the use of renewable energies such as solar and wind power should be implemented.

The City Hall and Police Station hold great 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. There is also potential to incorporate renewable energy at the City Pool, where solar arrays could produce the needed electricity for the pump system, and solar water heaters could heat the water. 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. The City also owns a large tract of land intended for treated water land application disposal to the east of the Water Treatment Plant. This land is not currently needed for land application disposal and could serve as the site for a future solar farm. 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

WHY DOES THIS MATTER?

As of June 4, 2018, the solar array at the Wastewater Treatment Plant has produced 483,094 kWh's of electricity, and has saved the City \$53,140.34 in energy bills. – City of Red Lodge

Potential Partners

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

Potential Funding

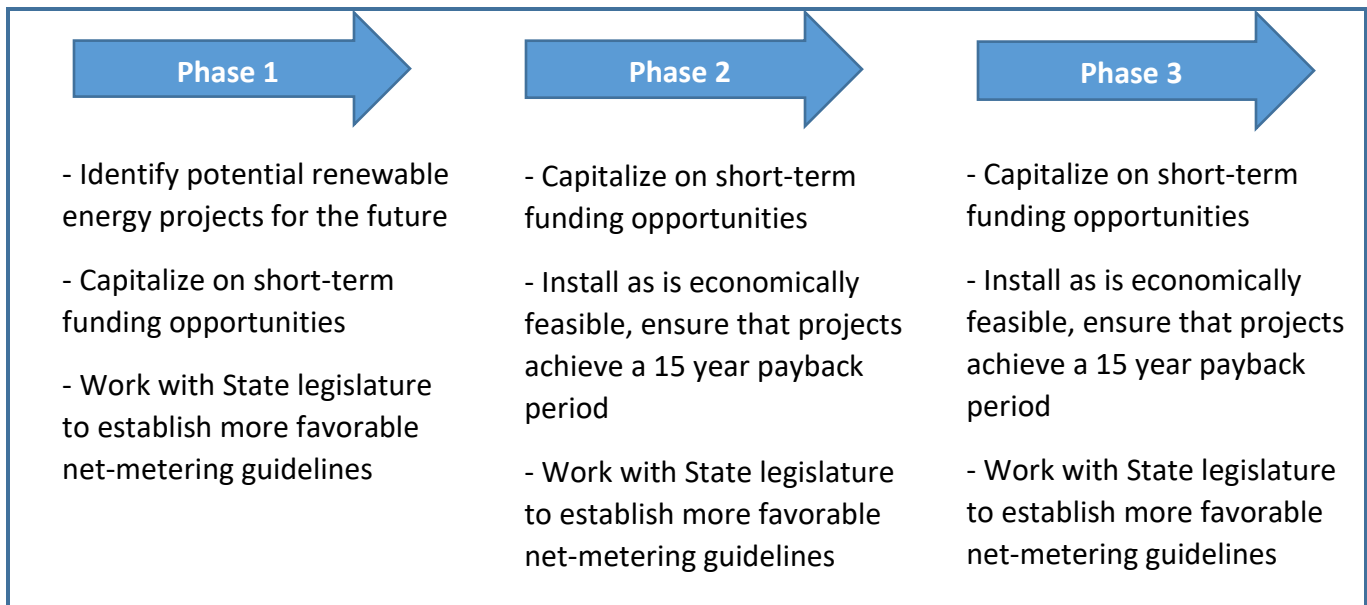
- Alternative Energy Revolving Loan Fund
- City Funds
- US Department of Energy Loan Guarantee Program

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)



Solar array at the Wastewater Treatment Plant



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

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 Single-Stream Recycling Program	13
IPP-2 Paper and Printing Policy	14
IPP-3 Energy Use of Electronics	15
IPP-4 Energy and Sustainability Training for City Employees	16
IPP-5 Sustainability in the Employee Handbook	17
IPP-6 Flexible Work Scheduling	18

IPP-1 Single-Stream Recycling Program

RECOMMENDATION

The employees at City Hall currently have a Single-Stream recycling bin; these should be installed at the remaining City facilities and used by employees.

BACKGROUND

We currently have single-stream recycling bins at City Hall, the Library, and in our most heavily trafficked Public Parks. These single-stream bins accept a wider range of recyclable materials than our local recycling center and allow the user to put all recyclable materials into the same bin. Following the Energy & Sustainability Training, single-stream bins should be installed at the Public Works Shop. Small recycling bins should also be set up inside each office at City Hall and the Police Station to increase employee use.

Periodic dumpster dives should be held at City Hall and at the Public Works Shop to see if recyclable items are ending up in the trash.

Dumpster Dives can also be a good way to visualize and quantify the impact that recycling has, and may encourage City employees to be more conscious of their recycling habits.

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

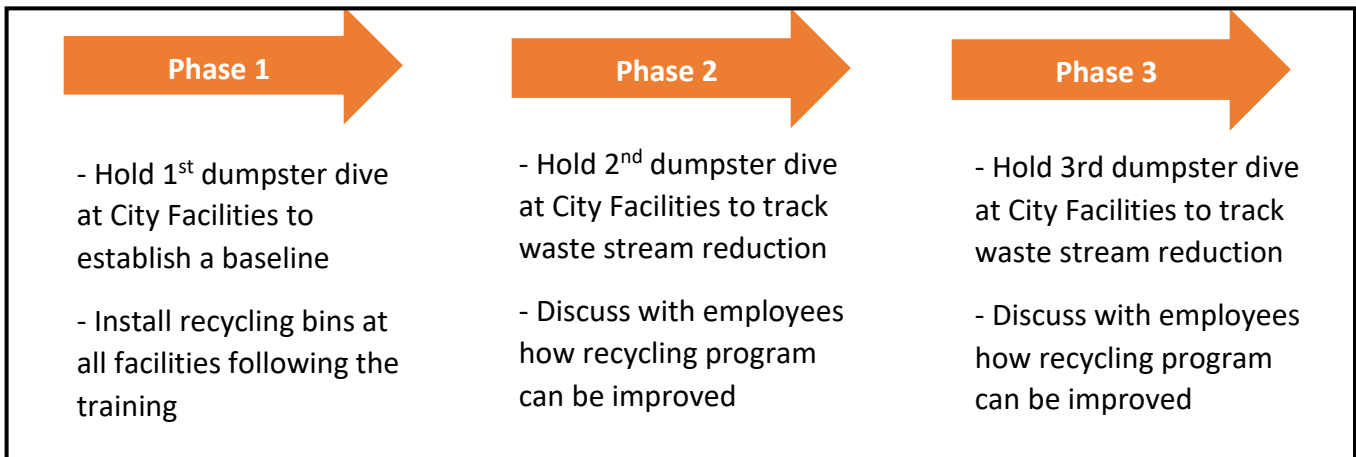
- City Recycling Board
- Republic Services

Potential Funding

- City Funds



Single-Stream Recycling bin at City Hall



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. Tablets or iPads should be made available to Council Members and Department Heads as an alternative to hard copies of Council Packets.

WHY DOES THIS MATTER?

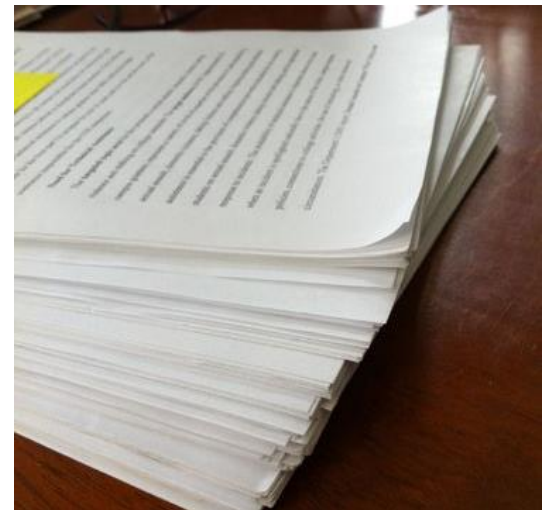
In 2011, Americans recovered only 65.6 percent of U.S. paper, which means we threw away \$2.3 billion worth of paper products. – Keep America Beautiful

Potential Partners

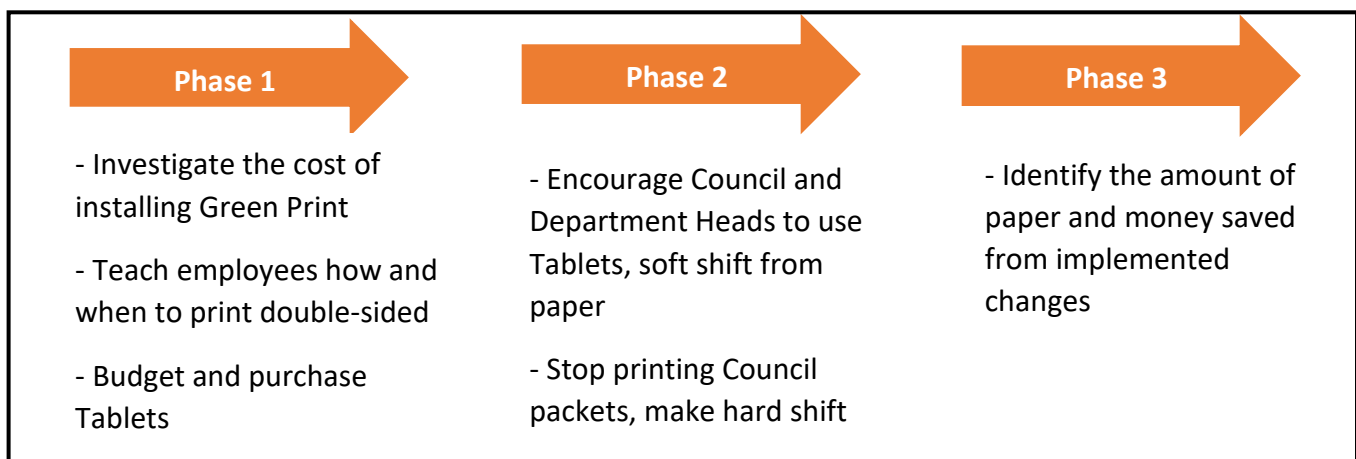
- City Mayor
- Department Heads

Potential Funding

- City Funds



A printed City Council packet



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. Recent improvements such as increased insulation and window replacements should reduce the need for air conditioners. Additionally, unnecessary electronics such as extra printers, microwaves, and space heaters should be removed. 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.

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. 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.

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

Potential Partners

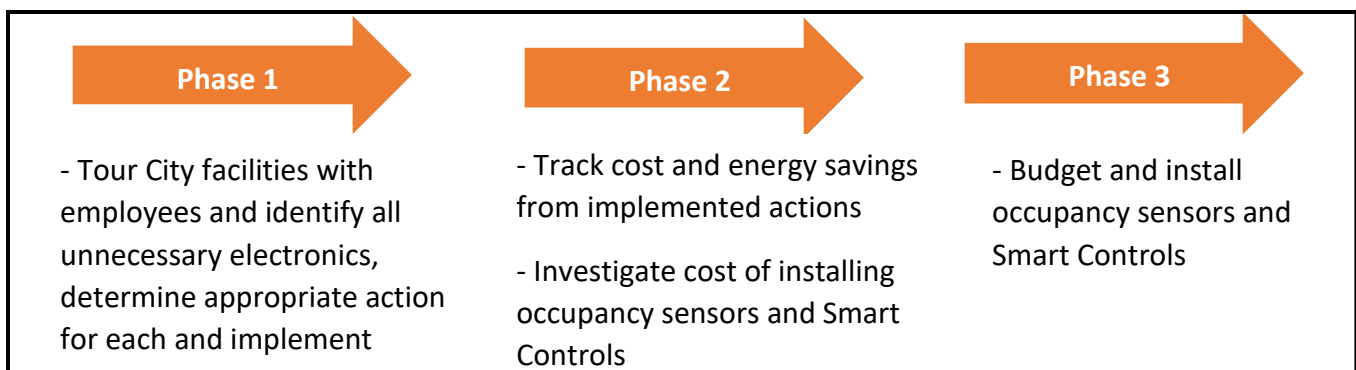
- City Mayor
- Department Heads

Potential Funding

- City Funds
- Energy Efficient Commercial Buildings Tax Deduction



An example of the electronics used at City Hall



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. Trainings 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.

In addition, Council members, Planning Board members, and any groups who use the building for meetings should be given a similar training on the recycling policy and energy usage so they know how to conduct themselves in a sustainable manner while at City Hall.

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

Potential Partners

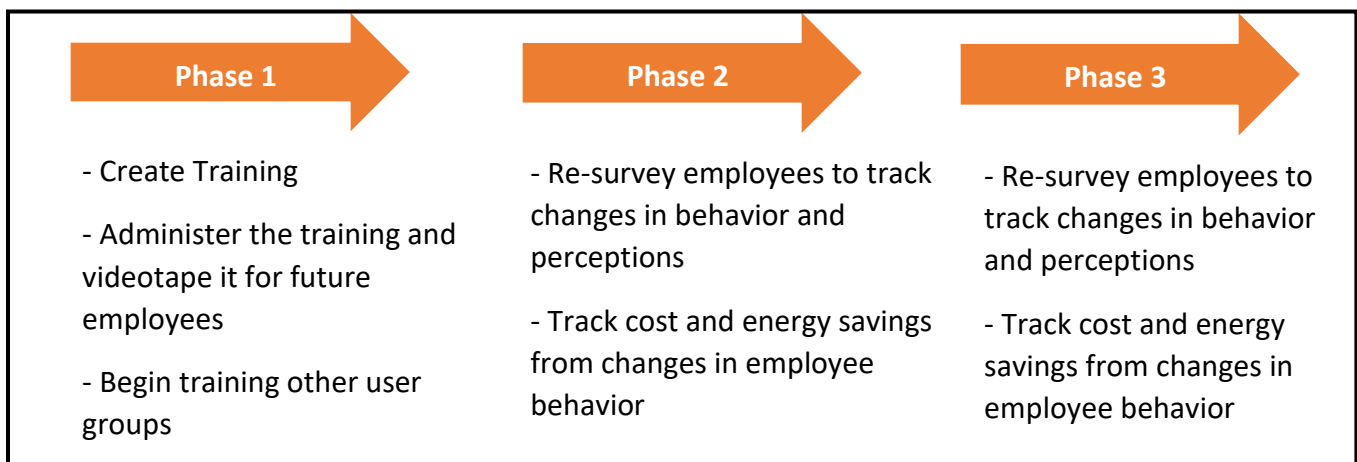
- City Mayor
- Department Heads
- Sustainability Coordinator

Potential Funding

- No funding required



Recycling bin in a local building



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?

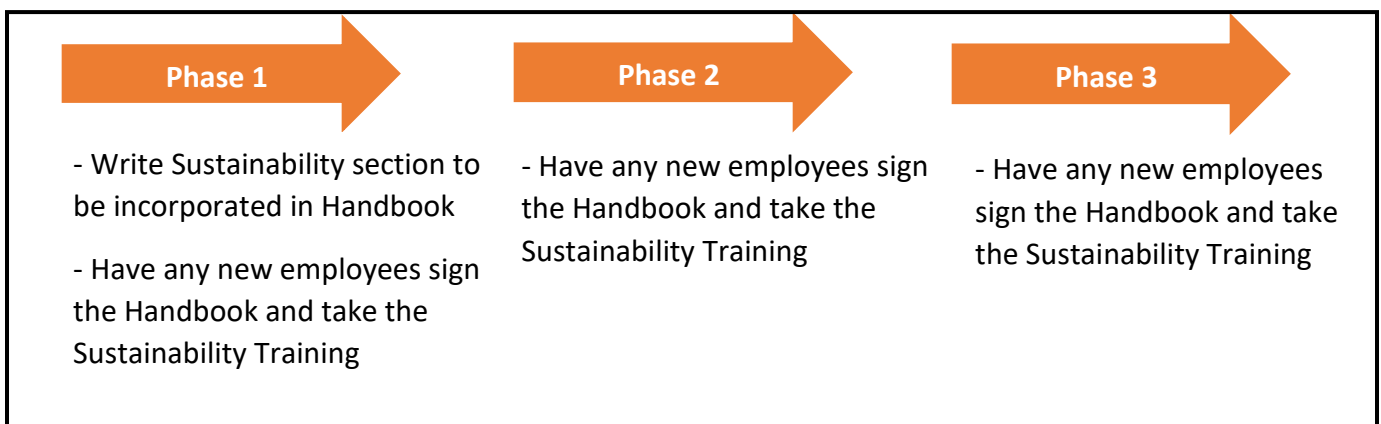
More than 80% of workers are attracted to employers with a positive environmental reputation. - Kelly Global Workforce Index

Potential Partners

- Sustainability Coordinator

Potential Funding

- No funding required



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 greenhouse gas emissions.

BACKGROUND

Several of our City employees have recently switched from working five, 8 hour days each week to working four, 10 hour days. This will reduce the amount of time they spend commuting to work, and will reduce the City’s greenhouse gas emissions. We support this initiative and recommend that flexible work scheduling be implemented for as many employees as possible while still maintaining service levels to the public. We also recommend that employees be given the option to work five, 9 hour days each week, which would result in them working every other Friday and would have the same positive impact on the City’s greenhouse gas emissions.

WHY DOES THIS MATTER?

Many of our 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, our employees spend a total of 1,018 hours per year driving. A portion of this time and subsequent carbon emissions could be avoided if employees were offered flexible work scheduling. Additionally, by reducing employee drive time we would reduce the chance of someone hitting a deer or becoming injured in a car accident, thereby protecting the safety of our employees. - City of Red Lodge

Potential Partners

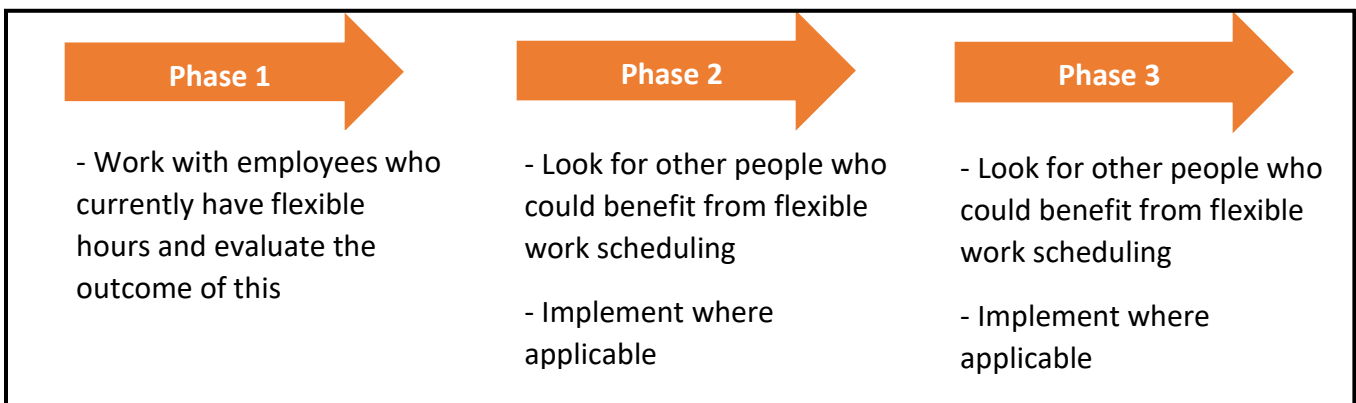
- City Mayor
- Department Heads

Potential Funding

- No City funding required



Flexible schedules would reduce employee drive time



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 2016, The City of Red Lodge's government operations produced 51 tons of waste that was sent to the landfill in Billings. When this waste breaks down it will produce 25 metric tons of carbon dioxide equivalents (mtCO₂e). This figure was not included in the original City of Red Lodge Baseline Inventory due to a lack of data, but has since been calculated. 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.

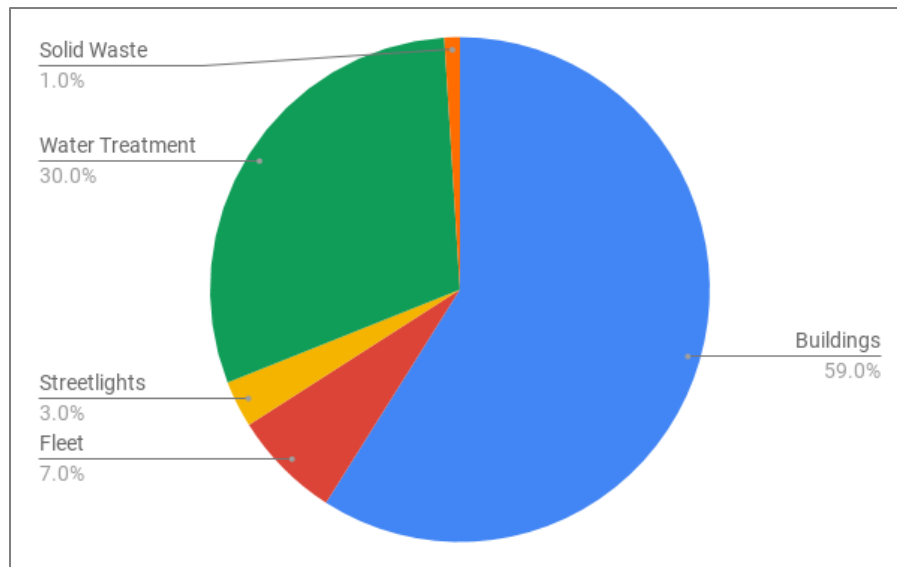


FIGURE 5. 2016 City of Red Lodge Emissions by Sector with Solid Waste

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
Single-Stream Recycling Bin at City Hall	2017
Glass Recycling in Billings	2018

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	23
SWRC-2 Single-Use Plastic Bags	24
SWRC-3 Recyclables in our Waste Stream	25
SWRC-4 Composting and E-Waste Recycling Initiatives	26
SWRC-5 Public Education on Proper Recycling	27
SWRC-6 Recycling Program Best Practices	28
SWRC-7 Recycling Center Employees	29
SWRC-8 Republic Services Contract	30
SWRC-9 Carbon Footprint of our Solid Waste System	31

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, convenient 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.

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

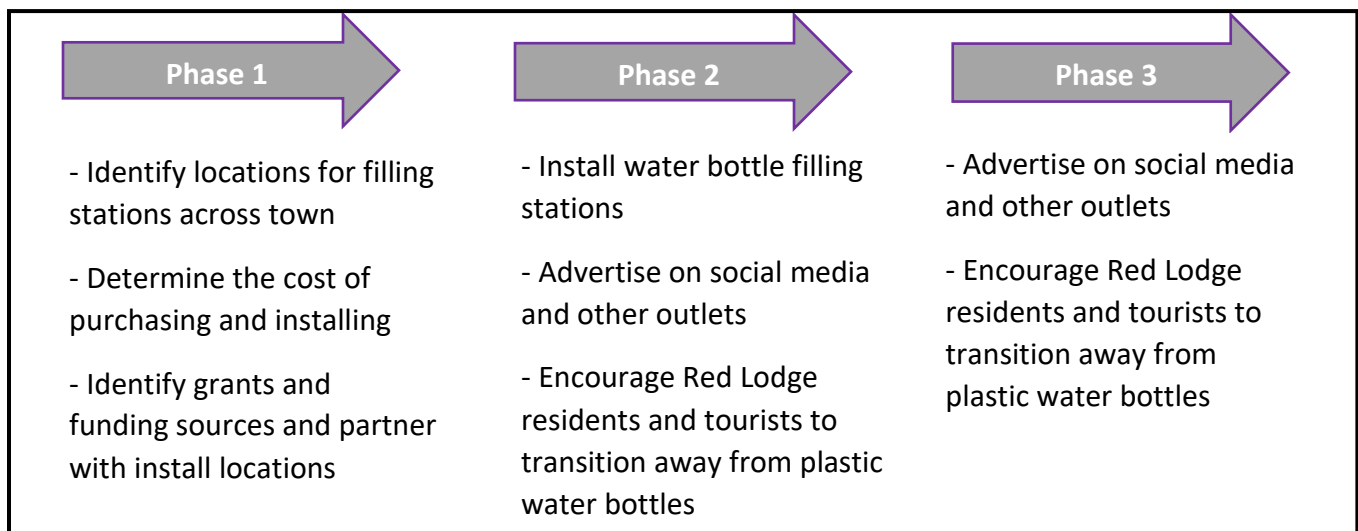
- City of Red Lodge
- High School Green Team
- Local Businesses
- Republic Services
- Visitors Center

Potential Funding

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



An example of a water bottle filling station



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 prep the community for the switch.

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

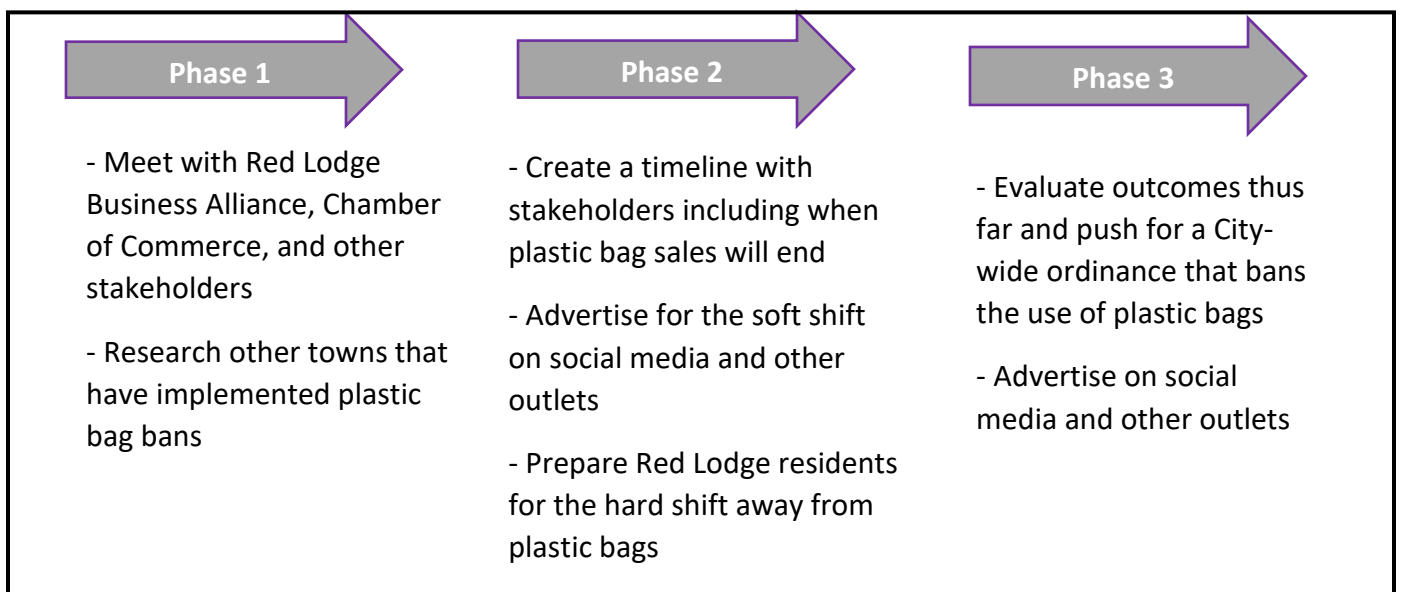
- City of Red Lodge
- Chamber of Commerce
- Jackson Hole WY City Council
- Local Businesses
- Red Lodge Business Alliance
- Republic Services

Potential Funding

- No City funding required



Single-use plastic bag in a gutter on Broadway



SWRC-3 Recyclables in our Waste Stream

RECOMMENDATION

Encourage Red Lodge residents and tourists to recycle by highlighting the single-stream bins and the Recycling Center.

BACKGROUND

In 2016, the Recycling Center in Red Lodge diverted 246,500 pounds 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 could be given a sticker to put in their window or a rating based on recycling habits.

We also recommend working 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, and encouraging more aluminum recycling.

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

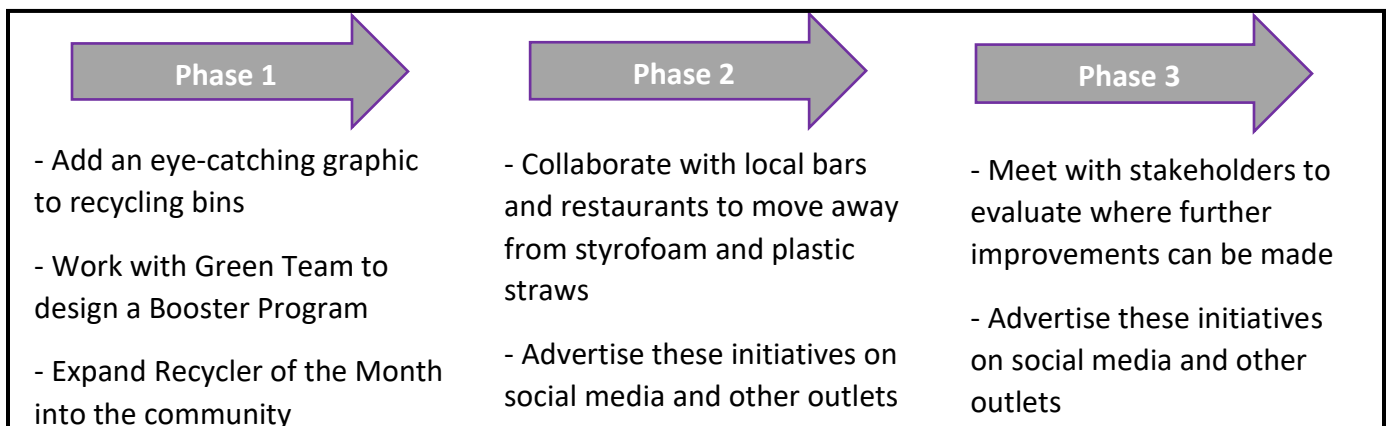
- Beartooth Industries
- High School Green Team
- Independent Recycling Organization
- Montana Department of Environmental Quality
- Recycling Board
- Red Lodge Business Alliance
- Republic Services

Potential Funding

- No City funding required



Cardboard that could be recycled



SWRC-4 Composting and E-Waste Recycling Initiatives

RECOMMENDATION

Follow the lead of our local grassroots organizations as they work to 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.

REWIND also facilitates an annual electronic recycling event each summer. This program is supported financially by the City and Republic Services, but more coordination of activities by the City would be beneficial. A conversation with Republic Services should also be started around the electronic recycling program they offer.¹

WHY DOES THIS MATTER?

Food scraps and yard waste currently make up 20 to 30 percent of what we throw away, and could be composted instead. Between 2012 and 2017, REWIND has provided electronic recycling and diverted 139,455 pounds of electronic waste from the landfill. – U.S. EPA and REWIND

Potential Partners

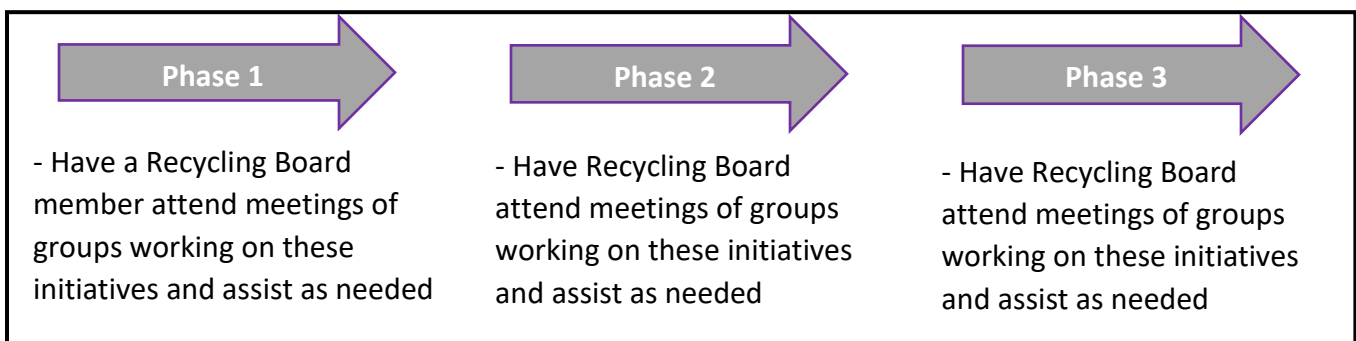
- Beartooth Industries
- Carbon Country Resource Council
- High School Media Class
- Local Businesses
- City Recycling Board
- Recycling Electronics into New Devices (REWIND)
- Republic Services

Potential Funding

- No City funding required



Electronic recycling event in 2017



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 is currently being 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.

WHY DOES THIS MATTER?

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

Potential Partners

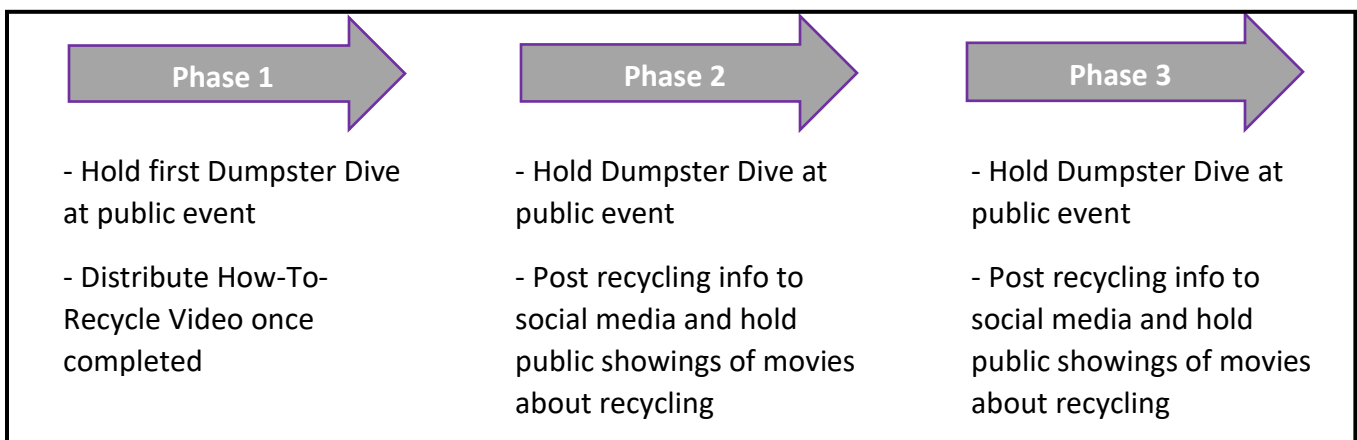
- Beartooth Industries
- Carbon Country Resource Council
- Independent Recycling Organization
- Recycling Board
- Republic Services
- Recycling Electronic Waste into New Devices

Potential Funding

- No City funding required



Students performing a Dumpster Dive



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.

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

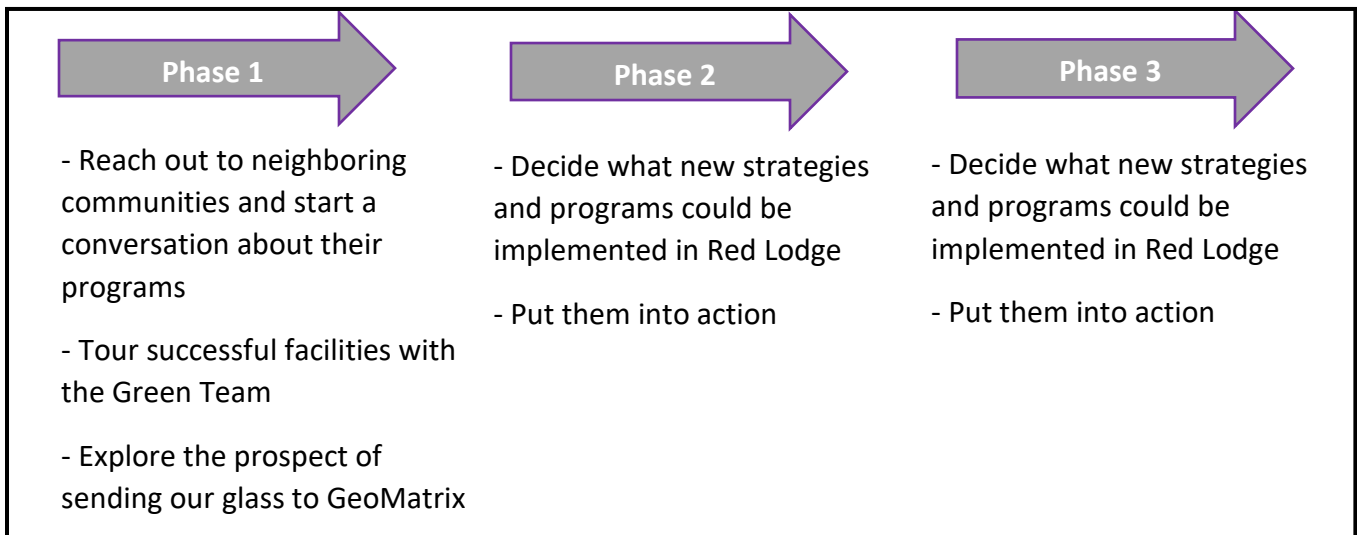
- Beartooth Industries
- City Recycling Board
- High School Green Team
- Independent Recycling Organization
- Neighboring Communities
- Republic Services
- Yellowstone National Park Sustainability Department

Potential Funding

- No City funding required



Picnic tables made from recycled glass in Yellowstone



SWRC-7 Recycling Center Funding

RECOMMENDATION

Investigate alternative funding sources for the Recycling Center in order to reduce the City’s subsidy.

BACKGROUND

The Beartooth Industries Recycling Center in Red Lodge provides many benefits to our community; however it is not a profitable venture for the City. To address this and potentially create a sustainable revenue stream, data should to be gathered on City versus County use and the projected impact of charging Recycling Center users. Users could pay a yearly fee or daily fee for using the center. Another way to address the cost of operating the Recycling Center would be to seek grant funding for those employed there. Grants provided by the Red Lodge Area Community Foundation, ProCut, and Rotary should be examined as possible funding sources. Other means of funding the Recycling center should 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.

WHY DOES THIS MATTER?

During the 2016-2017 fiscal year, the City paid \$32,436.55 to Beartooth Industries for recycling labor and facility maintenance, which kept 246,500 lbs of recyclable out of the landfill. For that same fiscal year, the City received \$1,767.67 for recycled materials. - City of Red Lodge

Potential Partners

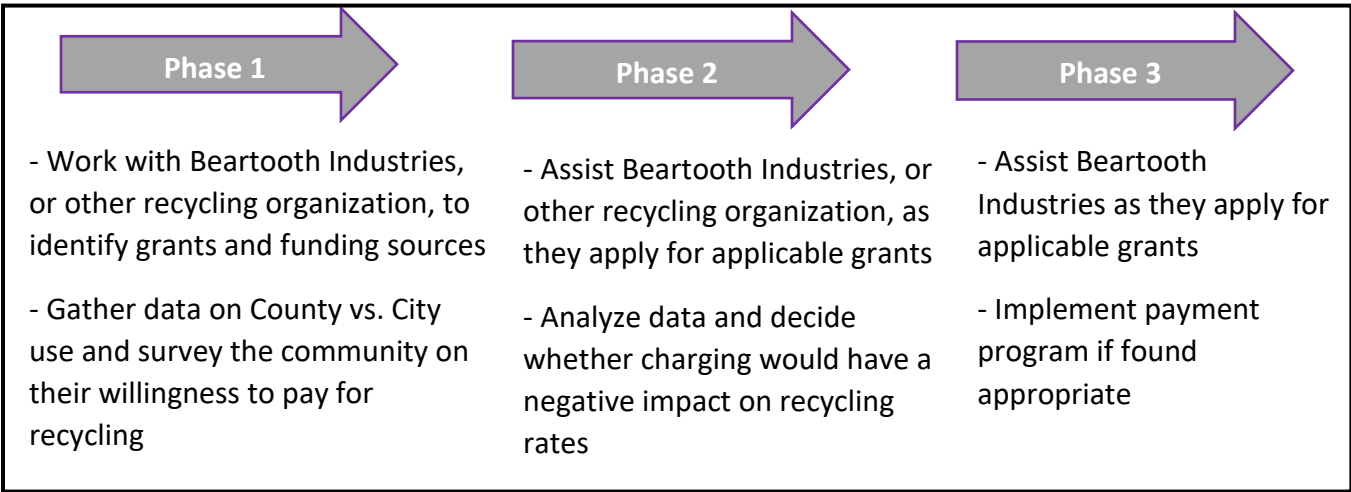
- Beartooth Industries
- Independent Recycling Organization
- Recycling Board

Potential Funding

- Dennis and Phyllis Washington Foundation
- ProCut
- Red Lodge Area Community Foundation
- Red Lodge Rotary Club



Beartooth Industries, our local Recycling Center



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 trashcans 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.

WHY DOES THIS MATTER?

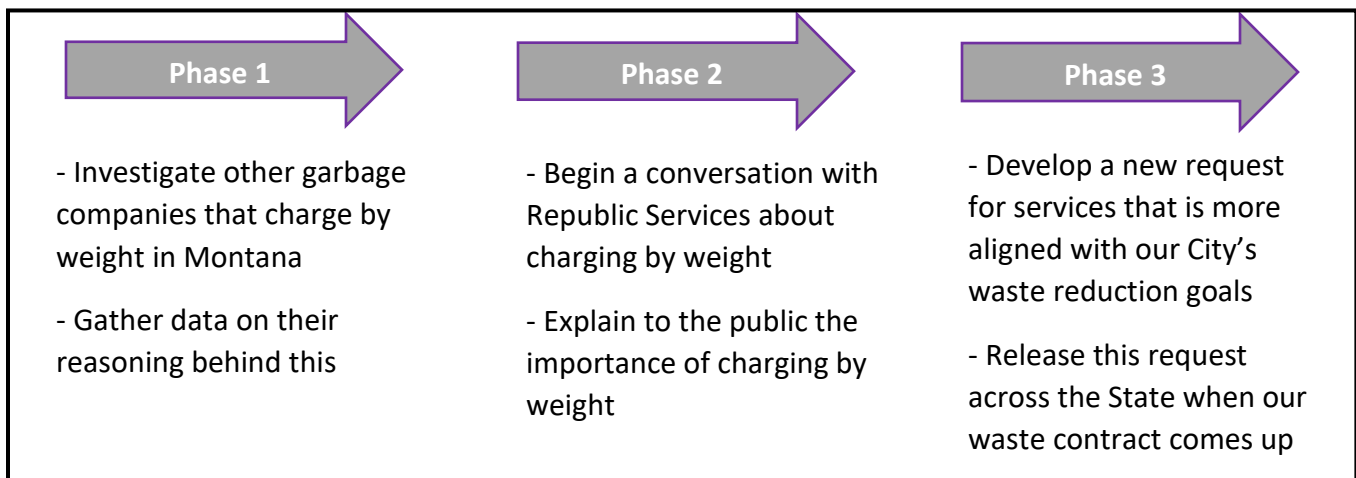
In Red Lodge, residents and the City are charged \$307.82 annually (as of September 2018) for one trash can with once a week pick up service. People who only produce one bag of trash per week, and those who produce 10 bags of trash are charged the same, and no financial incentive exists for those who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

Potential Partners

- City Recycling Board
- Republic Services

Potential Funding

- No funding required



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 and use this information to guide our process as we renegotiate our contract with Republic Services and develop a new request for services.

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

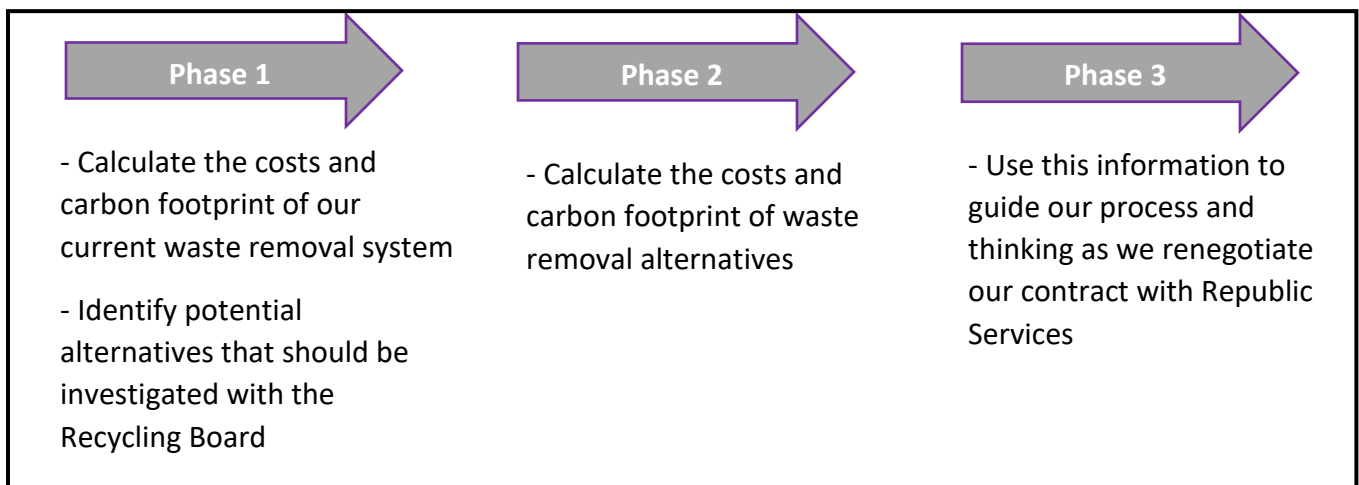
- City Council
- City Mayor
- Neighboring Communities
- City Recycling Board
- Republic Services

Potential Funding

- No funding required



The Billings landfill where our trash is hauled



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 second highest energy consumer behind Buildings and Facilities. Combined, our water services produce 577 mtCO2e and cost the City \$103,463.60 to operate annually.

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 Plan 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 are 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.

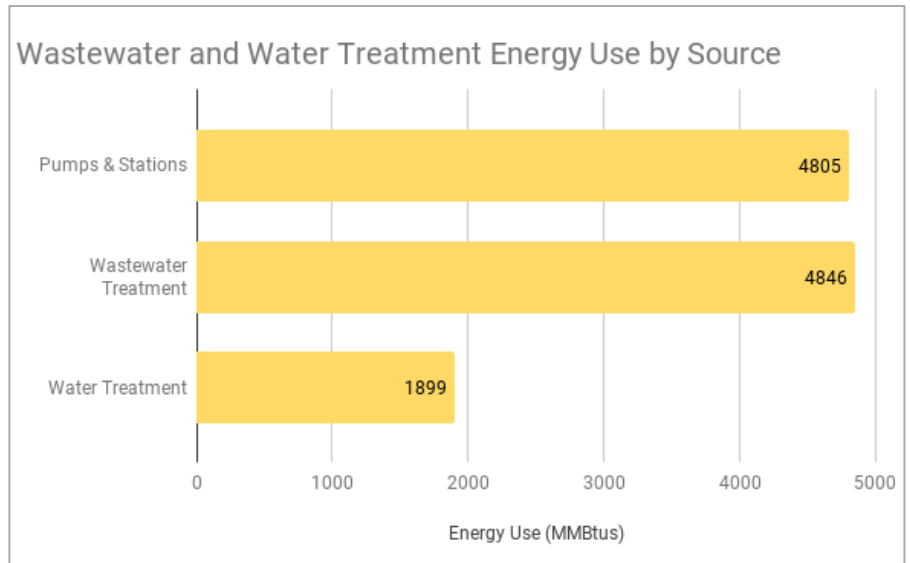


FIGURE 6. 2016 Energy Usage by Source in Wastewater and Water

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



Two of the new Variable Frequency Drives at the Wastewater Treatment Plant

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	36
WW-2 Wastewater Treatment Plant Solid Waste	38
WW-3 Water Delivery System	40
WW-4 Stormwater Inputs	42
WW-5 Water Pipe and Wastewater Treatment Plant Upgrades	43
WW-6 Water Conservation	44

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.

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

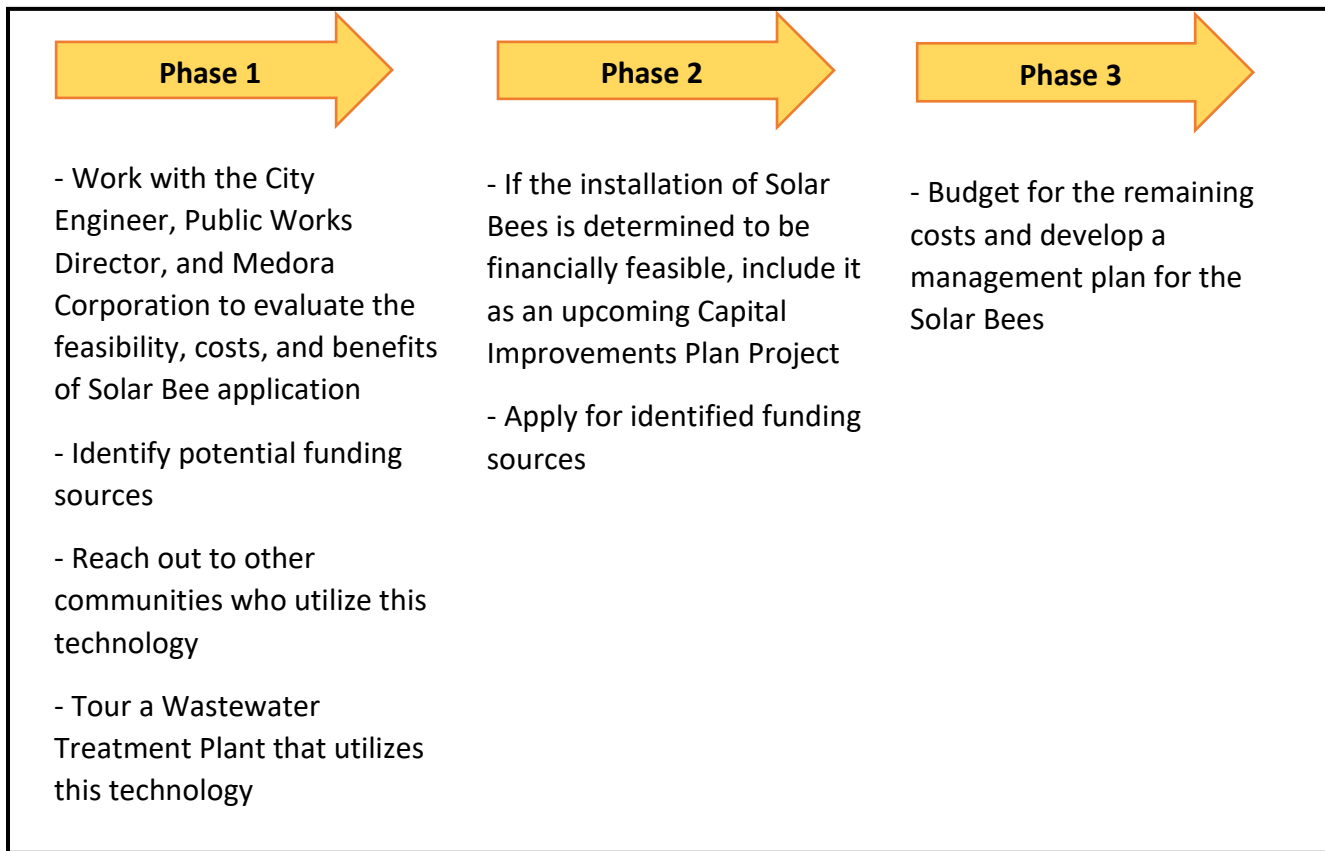
- City Council
- City Engineer
- Medora Corporation
- Public Works Director

Potential Funding

- Alternative Energy Loan Program
- City Funds



An example of a Solar Bee at a wastewater lagoon



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.

Potential Partners

- City Council
- City Engineer
- Public Works Director

Potential Funding

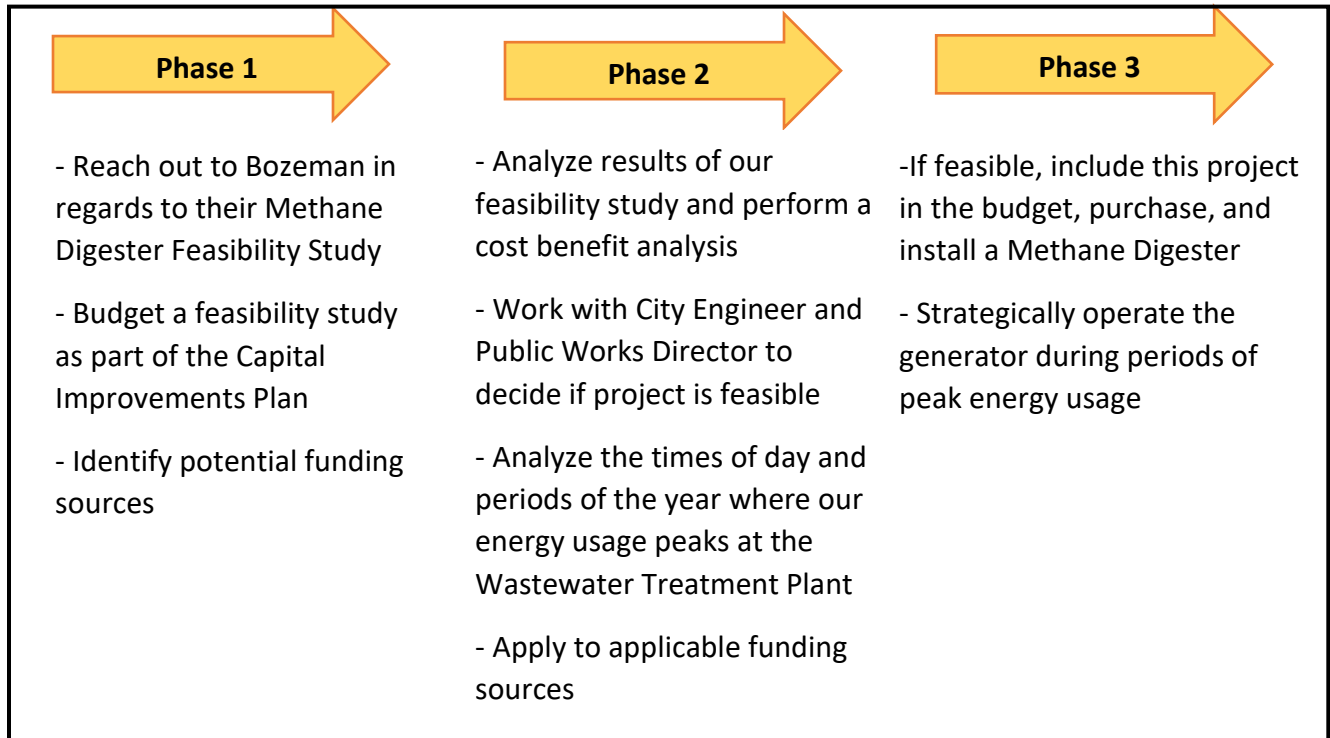
- Alternative Energy Loan Program
- City Funds
- Montana DNRC Renewable Resource Grant
- Montana DNRC Renewable Resource Project Planning Grant
- USDA Renewable Energy Development Assistance Grant



An example of an Anaerobic Digester

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



WW-3 Water Delivery System

RECOMMENDATION

Investigate the installation 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.

Potential Partners

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

Potential Funding

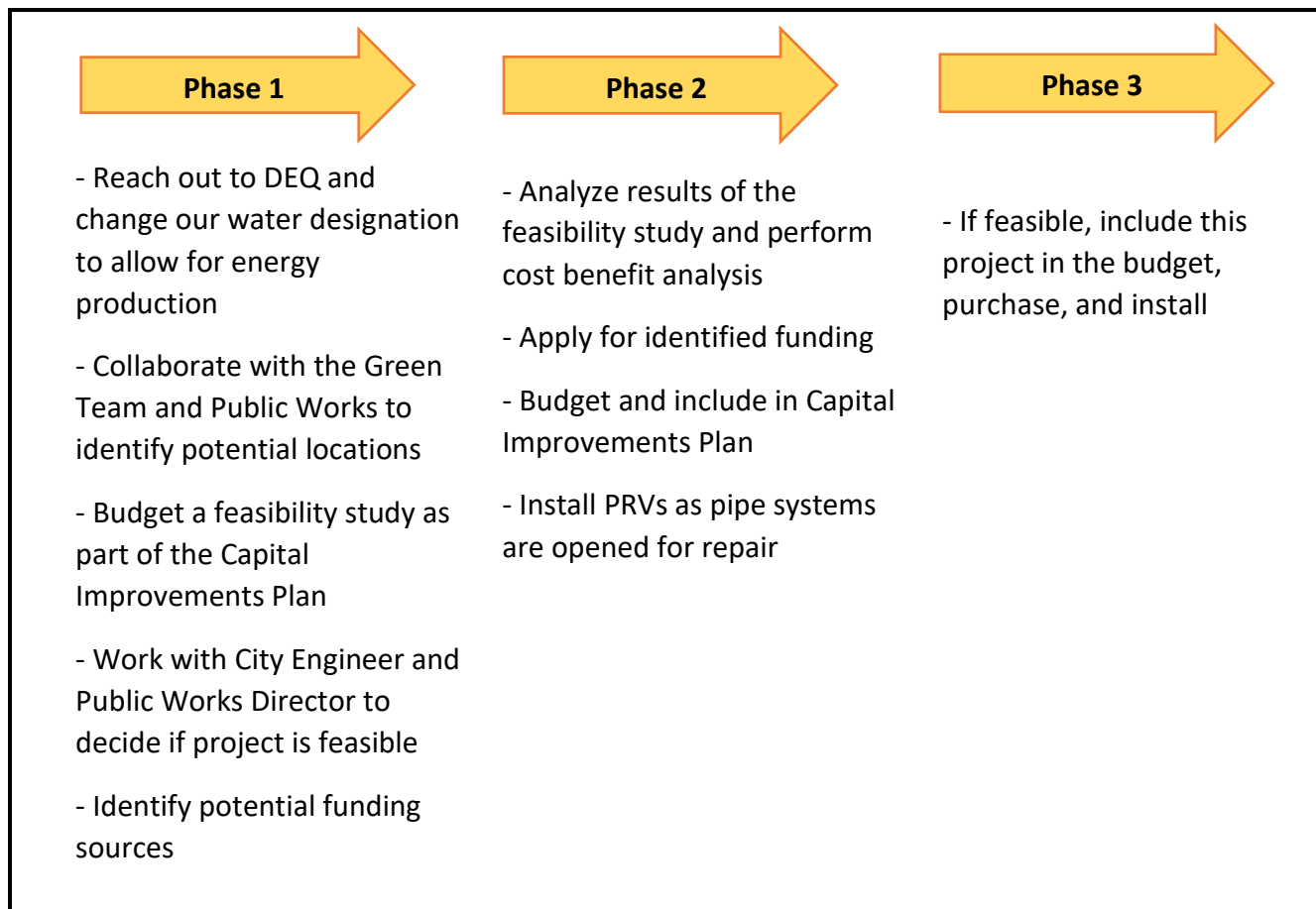
- Alternative Energy Loan Program
- US Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant
- City Funds
- Montana DNRC Renewable Resource Grant
- Montana DNRC Renewable Resource Project Planning Grant
- USDA Renewable Energy Development Assistance Grant



An example of an installed PRV

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.



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.

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). – City of Red Lodge

Potential Partners

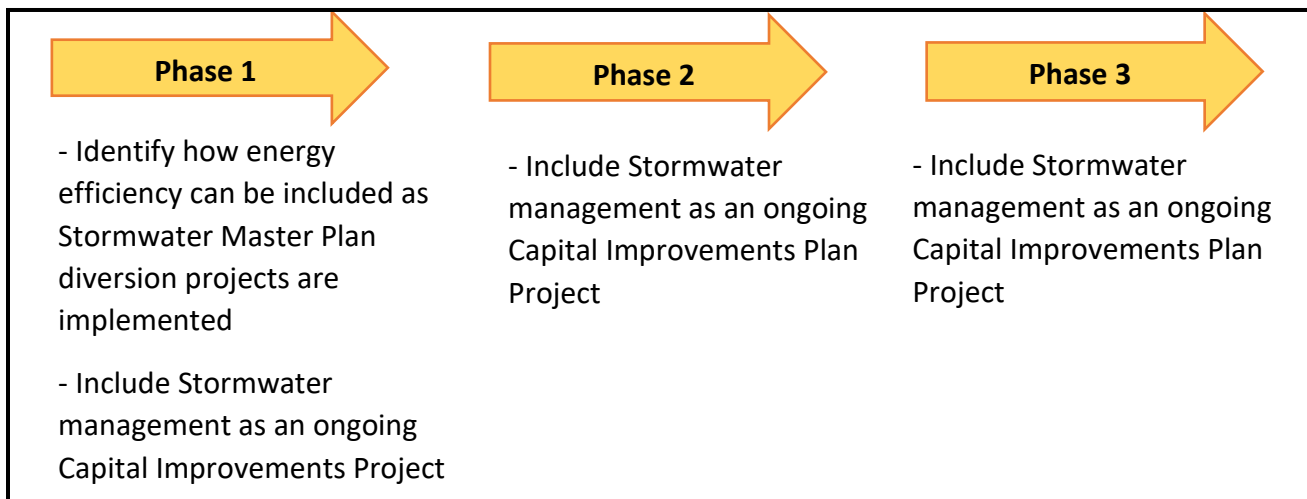
- Great West Engineering
- Public Works Director

Potential Funding

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



Stormwater runoff following a rainstorm in town



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.

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

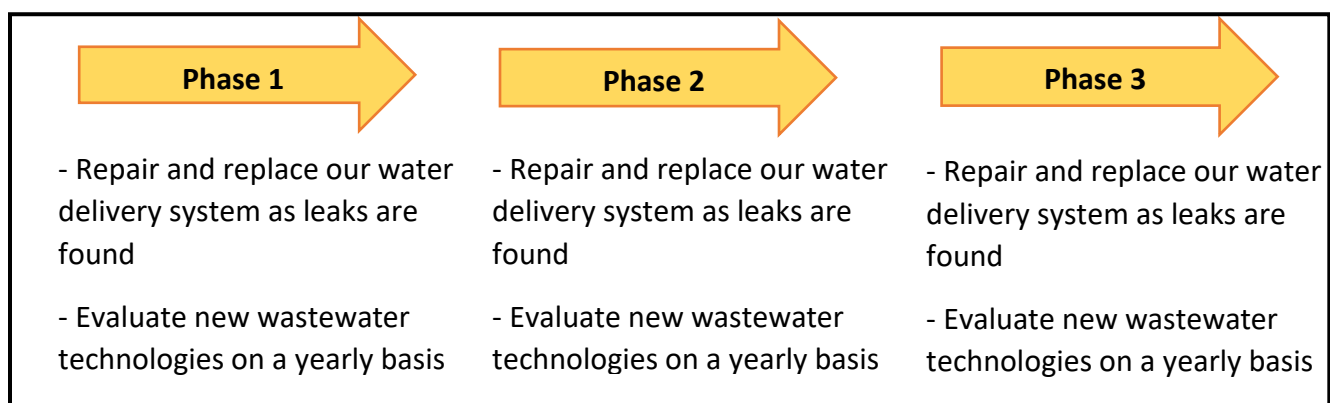
- Public Works Department

Potential Funding

- City Funds



Manhole cover on Haggin Avenue



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.

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. – City of Red Lodge

Potential Partners

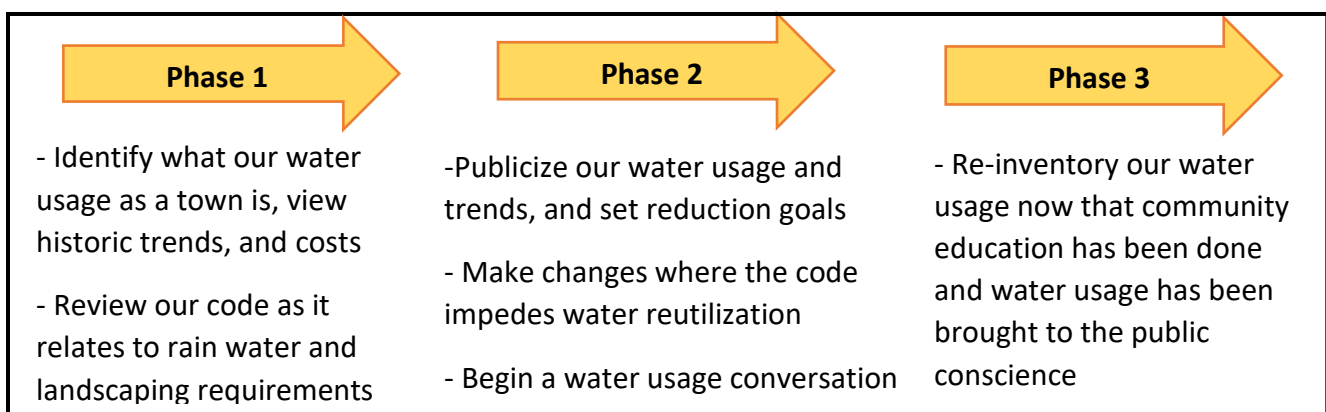
- Beartooth Front Community Forum
- City Planner
- Community Development Director
- Planning and Zoning Board
- Public Works Director

Potential Funding

- No funding required



Rainwater collection system at a residential home



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 infill 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 18 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	2018
Converting a Coal Slack Pile to a Soccer Field	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	49
CLU-2 Urban Forestry Tree Planting and Maintenance	51
CLU-3 Impermeable Urban Surface Reduction and Future Surface or Re-surface Design	54
CLU-4 Landscaping and Water Management Systems	56
CLU-5 Vacated, Unused, or Open Municipal Lots	57
CLU-6 Tree Nursery	58

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.

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

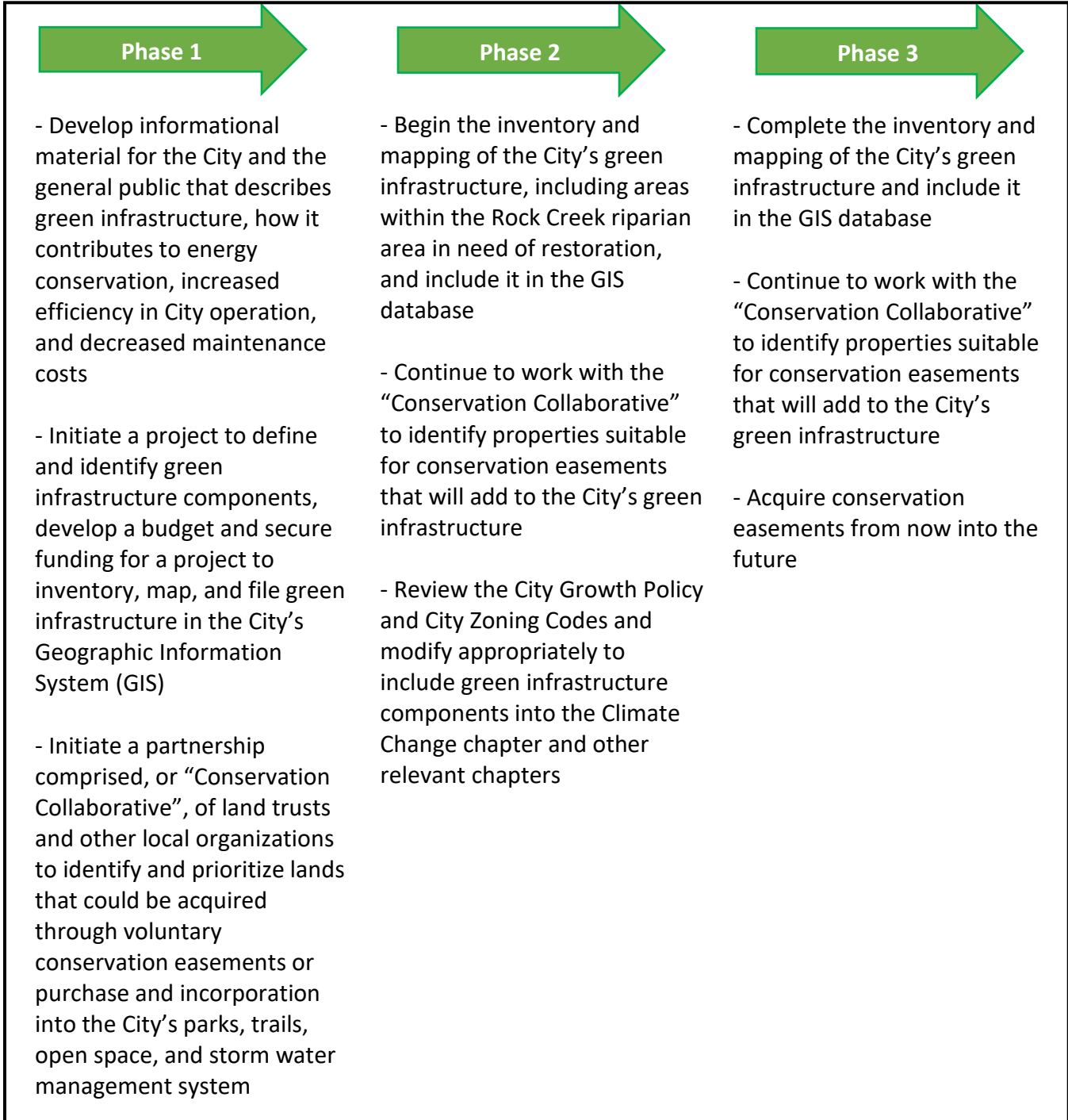
- Land and Water Conservation Fund
- Montana Land Reliance
- Open Space Levy
- Special Improvement District



Rock Creek, a portion of our Green Infrastructure

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



CLU-2 Urban Forestry Tree Planting and Maintenance

RECOMMENDATION

Strategically densify and diversity 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). 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 storm water 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



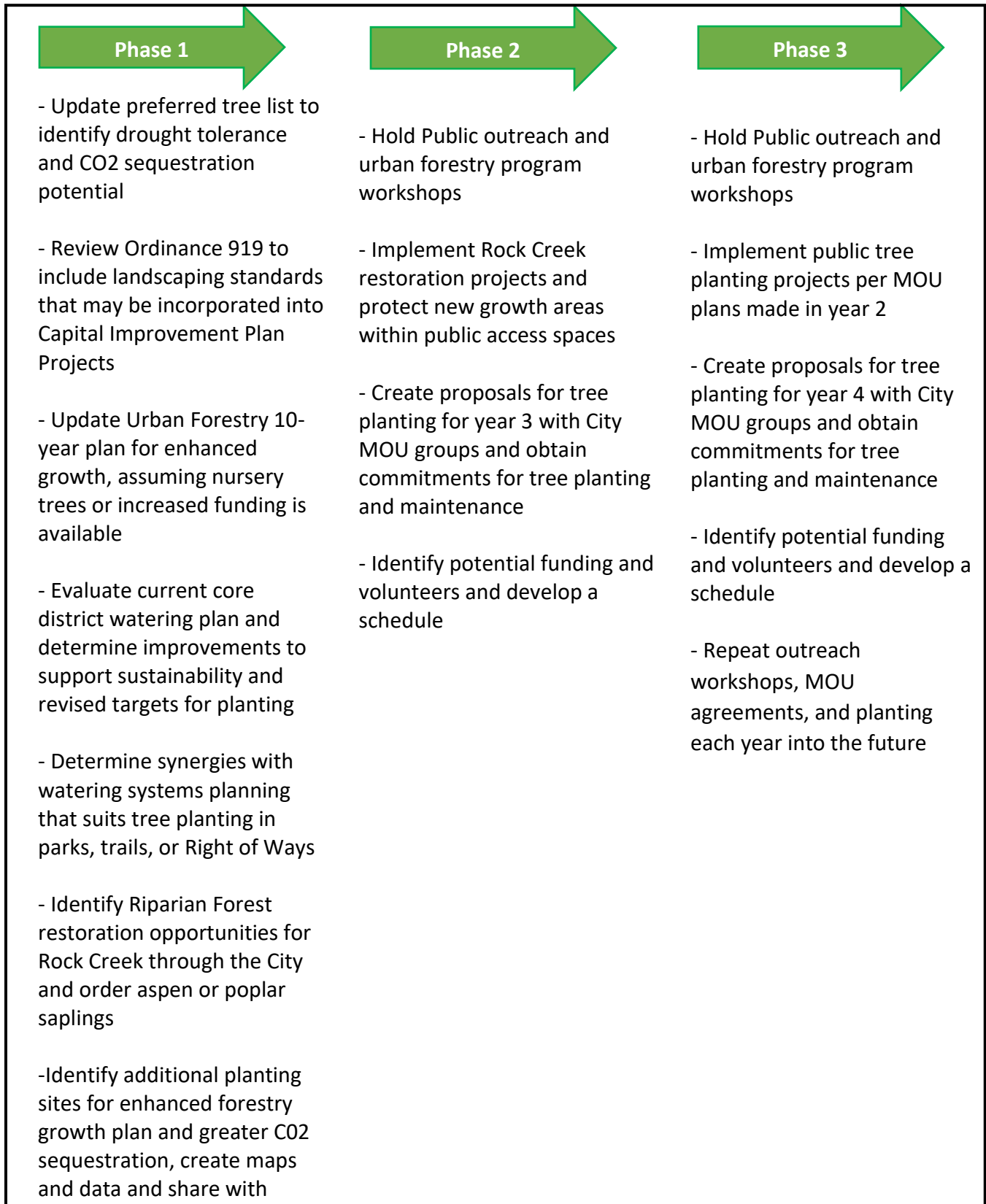
Red Lodge residents helping prune trees downtown

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 the 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.

WHY DOES THIS MATTER?

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



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.

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

Potential Partners

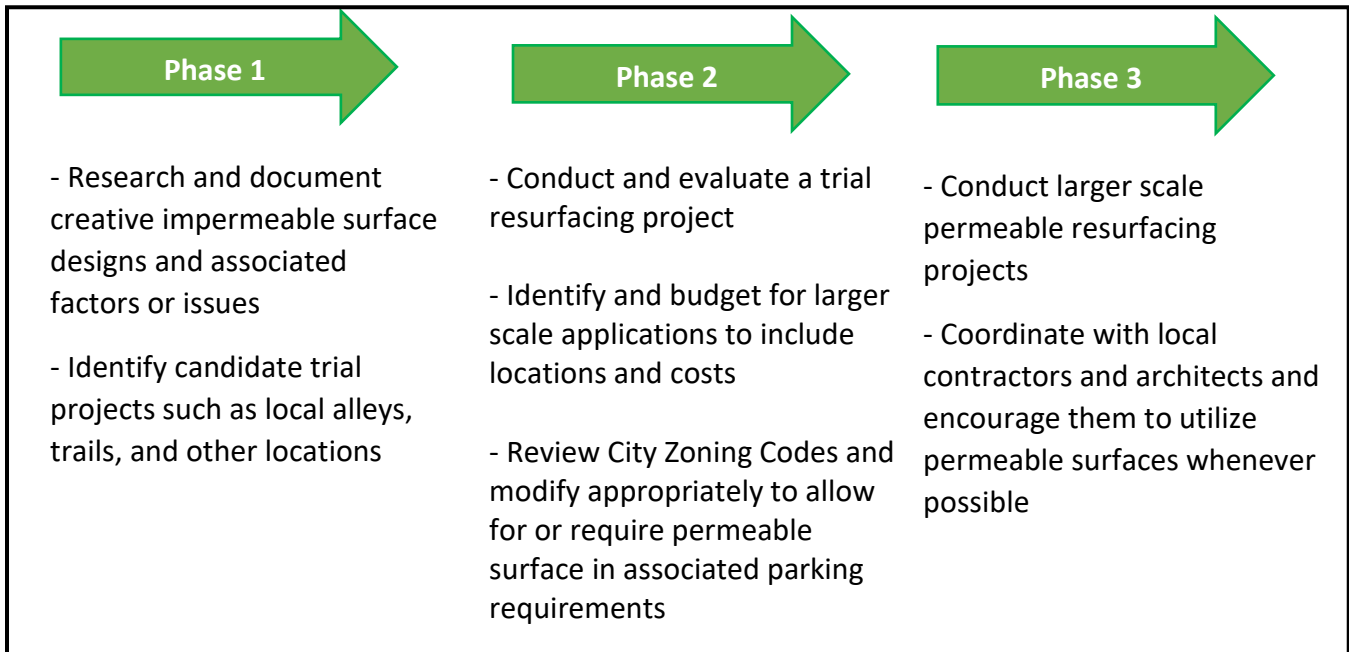
- Beartooth Recreational Trails Association
- Carbon County Resource Council
- Local Contractors
- Northern Plains Resource Council
- Planning and Zoning Board
- Public Works Council Committee
- Public Works Department

Potential Funding

- City Funds



Permeable parking lot made of recycled glass in Billings



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.

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

Potential Partners

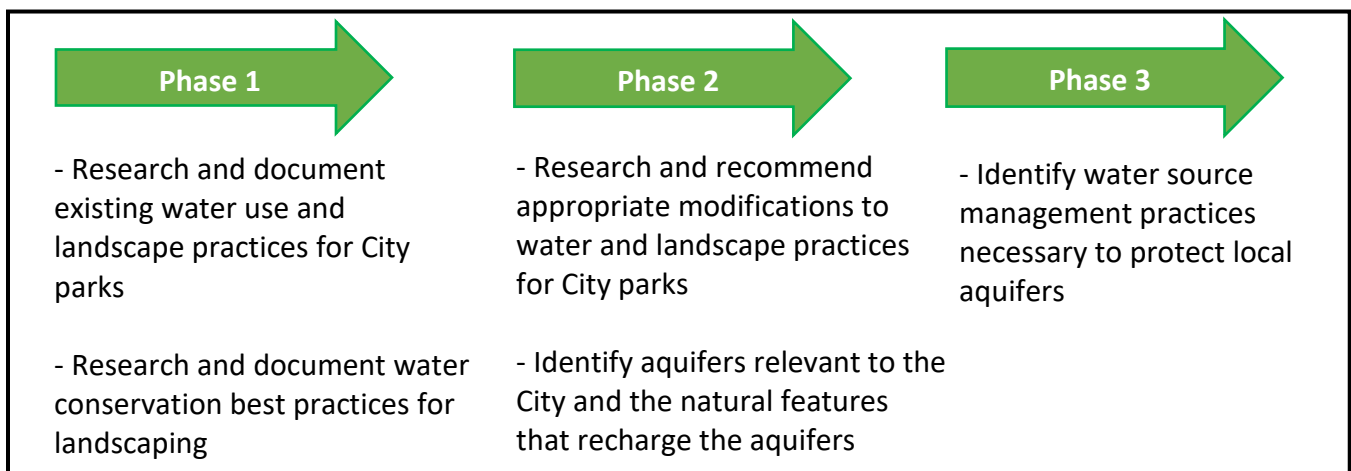
- Carbon County Resource Council
- Montana Bureau of Mines and Geology
- Montana Department of Environmental Quality, Water Quality Division
- Parks, Trees and Recreation Board and affiliated MOU Groups
- Public Works Council Committee

Potential Funding

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



Sprinkler system that uses less water



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.

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

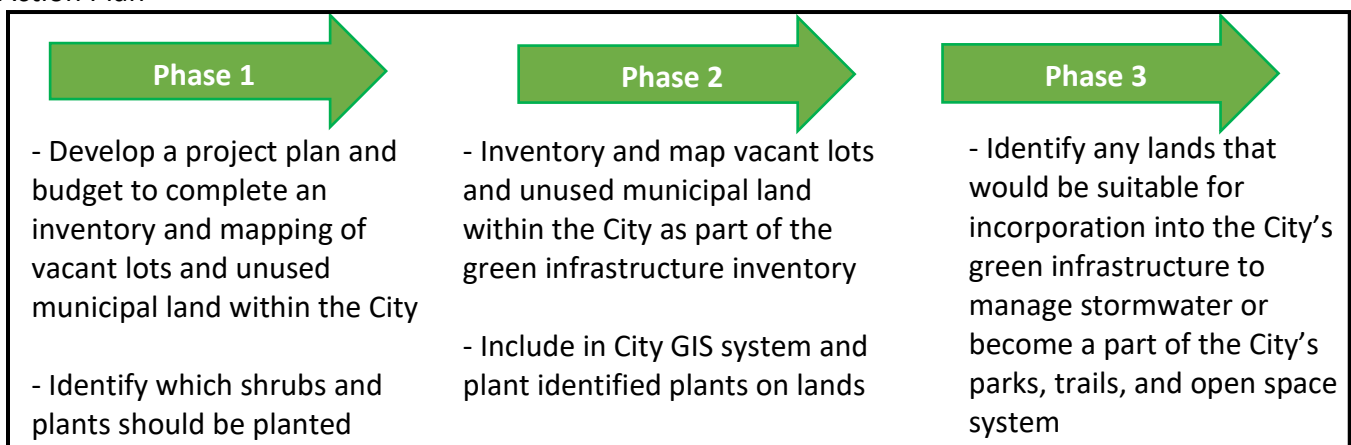
- Active Transportation Plan Steering Committee
- Beartooth Recreation Trails Association
- Carbon County Conservation District and Weed District
- Land Use Council Committee
- Parks, Trees and Recreation Board and affiliated MOU Groups
- Public Works Council Committee

Potential Funding

- City Funds



Vacant City property near the airport



CLU-6 Tree Nursery

RECOMMENDATION

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

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 planted around town in lots, sold to community members, 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 for agricultural purposes, such as growing grass or alfalfa.

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 back up 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.

Potential Partners

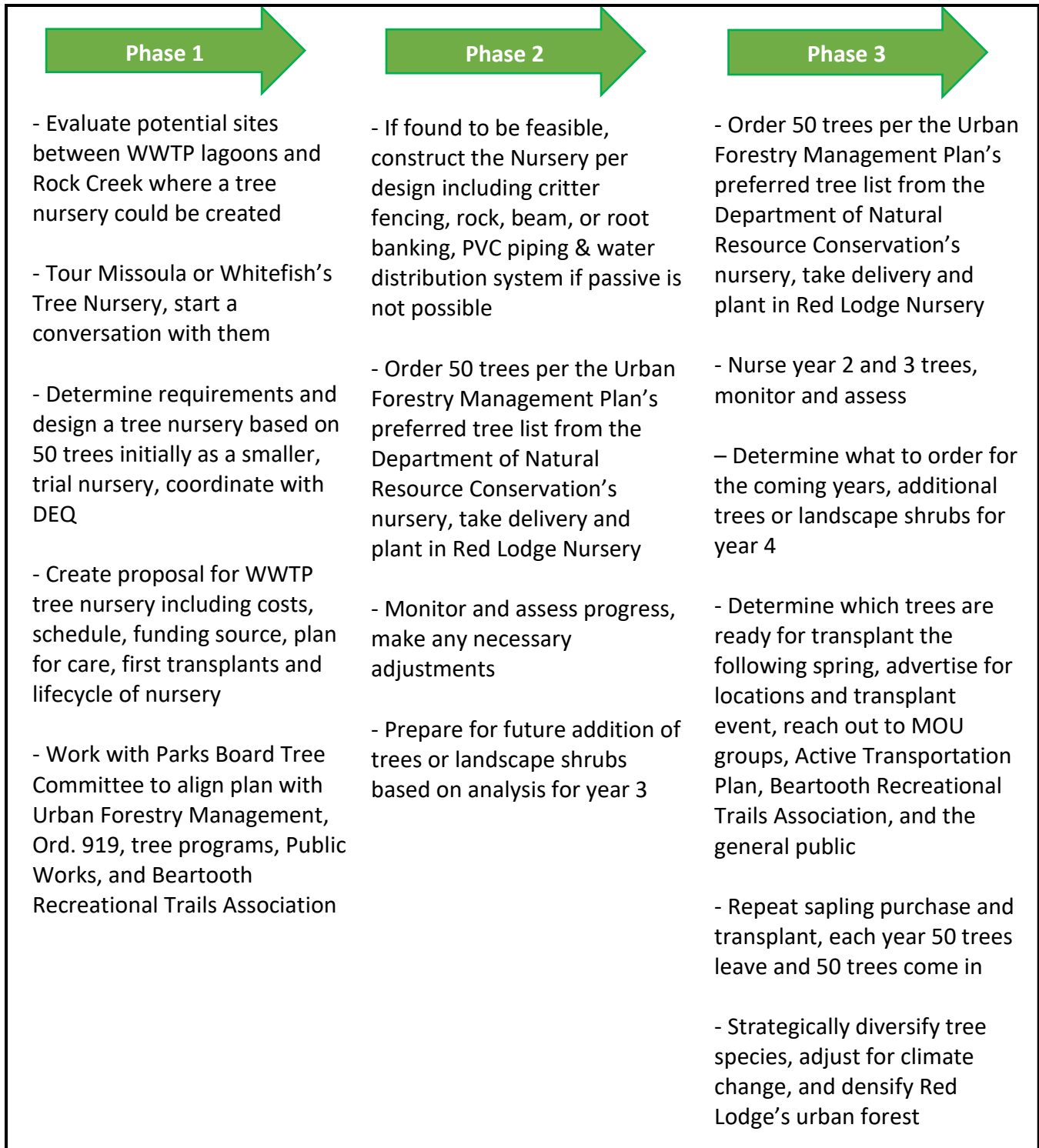
- Beartooth Recreation Trails Association
- Carbon County Conservation District
- Land Use Council Committee
- Montana Department of Environmental Quality
- Montana Department of Natural Resource Conservation Urban Forestry Program
- Parks, Trees and Recreation Board
- Public Works Council Committee

Potential Funding

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



Poplar Grove adjacent to Missoula's WWTP



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>.

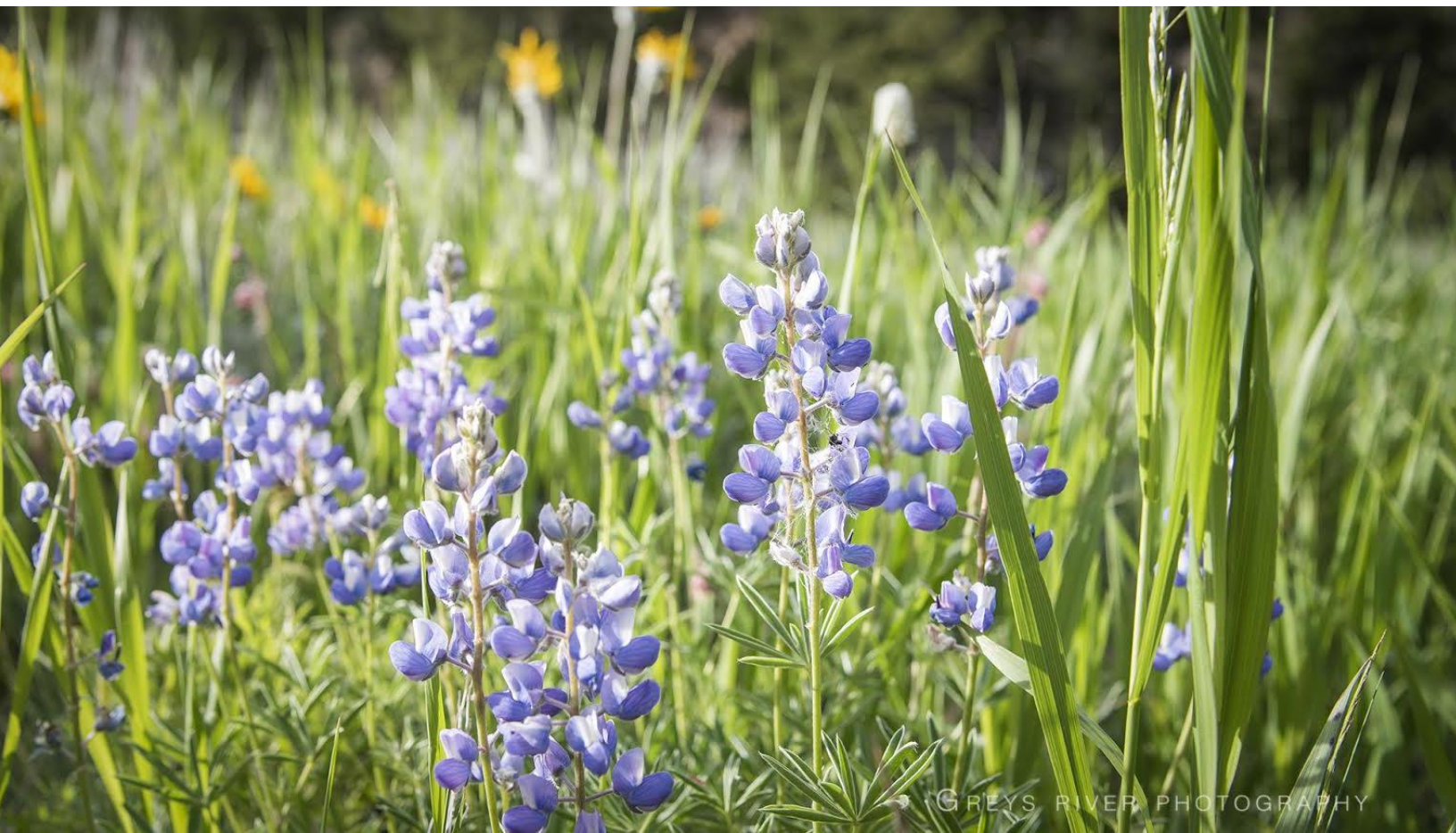
⁴ “Trees: The Carbon Storage Experts.” New York State Department of Environmental Conservation. <http://www.dec.ny.gov/lands/47481.html>.

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

Guiding Principle and Reduction Goals

This Energy Conservation Plan has identified a goal of reducing City emissions by 10% by year 2021, and a long-term goal of reducing 50% by year 2040. Implementing strategies in a financially feasible manner was also identified as a guiding principle of the Plan.

This chapter identifies priority actions to be taken in order to accomplish our 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, we believe that we will reach our goal of 10% emissions reduction by 2021 and be on track to reach our 50% by 40 goal.

INITIAL ACTIONS

This Plan identifies numerous strategies which will all 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 our first goal of 10% by 2021, the Energy Conservation Plan Taskforce has identified the following strategies to be implemented within the next three years before 2021. 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 allow us to reach our first goal of reducing City emissions by 10%, or 196 mtCO₂e.

Completed Actions since Baseline Inventory in 2016	Projected Emissions Reduction in 2021 (mtCO ₂ e)
Variable Frequency Drives at WWTP and Grant Avenue Well	6
LED Retrofits at City Hall, Police Station, Public Works	12
LED Retrofit on 12 Decorative Streetlights between 3rd and 8th	1
Subtotal	19
Budgeted Actions as of 2018	
Window Replacements at City Hall and Public Works (FBS-2)	14
24 Historic Streetlight Retrofit (FBS-1)	10
Citywide LED Streetlight Retrofit (FBS-1)	56
Subtotal	80
Actions to be Implemented	
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

Our focus over the next three years should be placed on the strategies under Actions to be Implemented, 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.

These five actions, coupled with budgeted and completed actions, are estimated to reduce our emissions by 301 mtCO₂e. This would put us ahead of the 10% reduction goal and off to a good start.

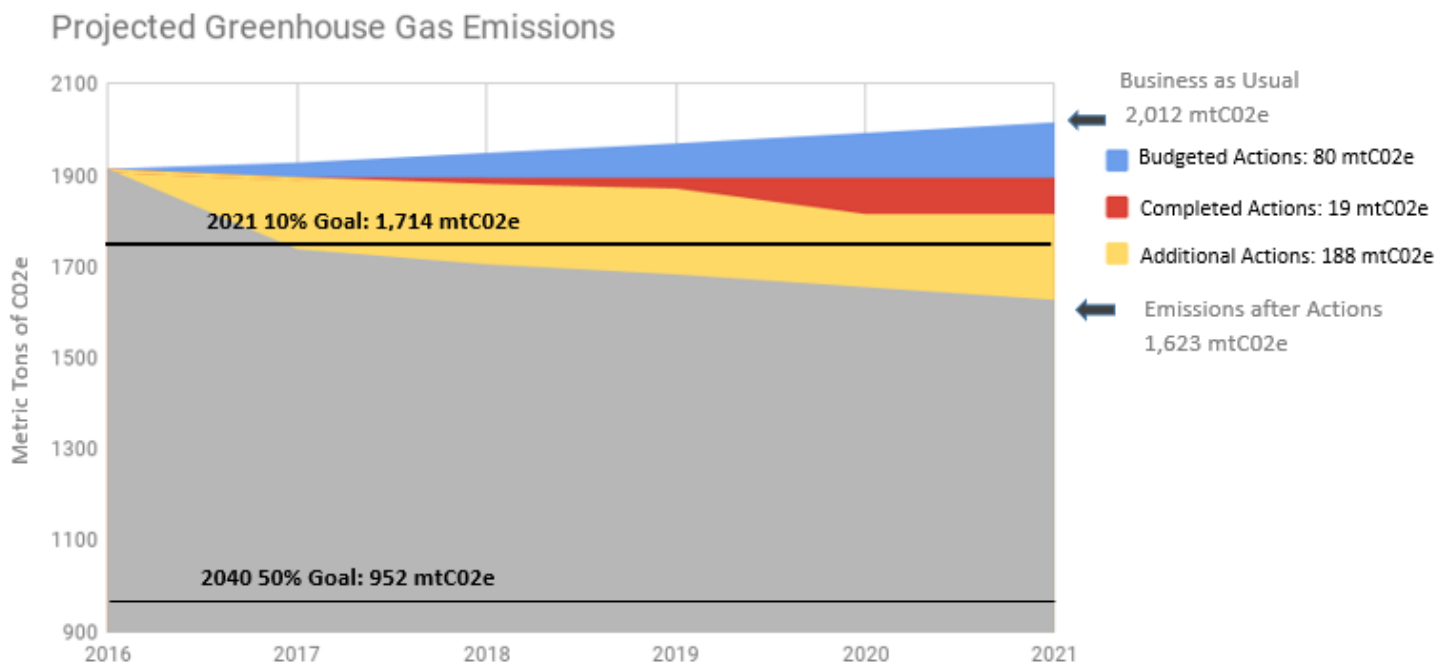


FIGURE 7. Projected impact of Budgeted, Completed, and Additional Actions on our Greenhouse Gas Emissions

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

We understand that the City has limited funds, and hiring a full-time or part-time Sustainability person may not be feasible at this time. However, 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 Assistant Planner, Community Development Director, and the Planning and Zoning Board. 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 has employed an AmeriCorps EnergyCorps member for the last 3 years to spearhead sustainability initiatives. These employees have successfully implemented cost-saving projects and in the future, EnergyCorps members could be hired to serve as the sustainability point person for plan implementation. It is important to compare savings realized in terms of salary costs expended, as the financial savings an employee may facilitate could exceed or match salary costs.

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 creating a Sustainability Board made up of community members and a City Council representative. This Board would function much like the Recycling Board and report 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. It is also customary for towns who implement Energy Conservation Plans to form boards who work on the strategies identified in the Plan. This board would also be tasked with providing an annual review of Plan progress to the Council and the public. They would oversee the re-inventory process and any major Energy Conservation Plan review and revisions.

Which Strategy do we Implement?

The Energy Conservation Plan Committee has identified 5 strategies that will get the City of Red Lodge our first 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, we would like plan progress to 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

Every 5 years, starting in 2021, our greenhouse gas emissions, energy usage, and energy costs should be re-inventoried. 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.

City Emissions Goals

1,910 mtCO₂e	2016 City Emissions
1,714 mtCO₂e	2021 City Emissions Goal
2,012 mtCO₂e	2021 Projected City Emissions if no action is taken
196 mtCO₂e	Amount City must trim from current level to meet Goal

This data is then entered into the ClearPath software, as was done in 2016, 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 2040. 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 5 years, starting in 2022. 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>