RE-POWERING THE FLATHEAD

for a New Energy Economy

A Report on Energy in the Flathead Valley




Prepared by: Lauren Casey, Montana Energy Corps

Author Bio:

Lauren Casey joined the Re-Powering the Flathead team in October 2010 as part of the Montana Energy Corps program. Lauren grew up in Somers, Montana where she developed a passion for stewardship through a childhood spent almost entirely outdoors. She graduated in 2006 from Stanford University with a masters degree in Engineering with an emphasis on energy and spent the next four years working as a consultant helping cities, utilities, and private sector clients implement renewable energy and energy efficiency projects. She joined the Energy Corps as an opportunity to bring some of her experience home, to serve Montana, and also to learn about and promote strategies to help her community become healthier and more resilient.

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A Report on Energy in the Flathead

October 6, 2011

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Executive Summary

Background

Re-Powering the Flathead is a community driven project that sprang from a desire to understand the role energy plays in shaping the local economy, community, and environment. The result of the first three years of the Re-Powering the Flathead Project is this: a local guide to understanding energy issues – how much we use, where it comes from, what are the costs, and what opportunities exist to improve energy use and the economy.

Mission

The Re-Powering the Flathead Project seeks to understand opportunities in energy efficiency and the use of local energy resources in order to achieve greater regional energy independence and sustain a healthy economy and environment in the Flathead Valley for current and future generations.

History

In 2009, a group of community members hosted a conference called "Re-Powering the Flathead for a New Energy Economy." The goal of the conference was to understand ways to prepare and position the Flathead for an active role in new and emerging sectors.

Interest and participation in the conference were so great that the group of individuals who organized it decided to formalize themselves as a committee that would oversee continued exploration of energy issues in the Flathead.

The Steering Committee proceeded to facilitate a series of Community Dialogues that were open and publicized broadly in the community. The dialogues were intended to bring energy issues into the public spotlight in order to increase understanding and visibility of projects and programs that could have a positive impact on energy use and the economy in the Flathead.

Between the original conference and the community dialogue series, Re-Powering the Flathead has explored myriad energy topics including:

- Harvesting Clean Energy in the Flathead – A Workshop for Growers
- Designing Energy Efficient Subdivisions: Building Green
- The Basics: Energy 101: Essential Knowledge in a New Energy Economy
- Bringing the Green Recovery Home
- Re-Powering the Flathead: The Path Forward
- Energy Policy for a New Energy Economy: Opportunities and Challenges
- Energy Efficiency: How Your Business Can Take Advantage of the Savings
- Challenging Choices! Planning to Meet Our Growing Electric Energy Needs
- Energy, the Economy, and Jobs – Planning for the Future
- Greening Public Places; Saving Tax Dollars – Is it Working?
- Forest Biomass to Energy: Opportunities, Options, and Challenges
- Building Green Homes for Today and Tomorrow
- Alternative Energy: Emerging New Technologies for the Flathead
- Moving Toward Energy Independence in the Flathead
- Energy Entrepreneurs: Bringing New Technologies and Jobs to the Flathead

In 2010, the Steering Committee applied to host a member of the Montana Energy Corps who could be full time on the project for ten months and allow the Committee to expand the community dialogues, conduct more thorough research and analysis, and to facilitate a significant stakeholder involvement process, all of which culminated in the drafting of this comprehensive report on energy in the Flathead.

Stakeholder Involvement

The Re-Powering the Flathead project conducted a significant stakeholder outreach process in order to inform the report by discussion with representatives from a wide spectrum of local interests. Stakeholder outreach included one on one interviews as well as a series of focus groups and an online survey on energy issues. Invitations to the focus groups and online survey were sent out to several hundred local stakeholders in different sectors in order to try to solicit input on the biggest energy related challenges and opportunities encountered around the valley.

The outreach process was able to harness input from representatives of the following organizations:

Construction
Bridgewater Innovative Builders
Habitat for Humanity
Sun Works Architecture

Economic Development
Community Action Partnership
Montana West Economic Development

Education
Flathead Valley Community College
The Glacier Institute

Health Care
North Valley Hospital
Summit Medical Fitness

Local Government
City of Kalispell
City of Whitefish
Flathead County

Oil, Gas, & Biodiesel
Clearwater Biological
General Synfuels International

Natural Resources
F.H. Stoltze Land & Lumber

Non-profit
AERO
Citizens for a Better Flathead
National Center for Appropriate Technology
Rails to Trails
Swan View Coalition

Real Estate
Partners West Realty

Regional Planning
Northwest Power and Conservation Council

State Government
Montana Department of Environmental Quality

Technology
Inner Sight
Zinc Air, Inc.

Tourism
Winter Sports, Inc.

Utilities
Flathead Electric Co-op
Northwestern Energy

While much insight was gained in working with stakeholders, the opinions and conclusions expressed in this report are those of its authors and do not necessarily represent the views of any contributing entity unless otherwise stated.

The Big Picture

Drivers for Re-Powering the Flathead

The importance of thinking ahead for energy use in Flathead County is clear in recognition of the following:

Big Picture Drivers
Economic conditions in the Flathead Valley and the nation are uncertain.
We currently depend on uncertain energy sources.
Wasted energy is affiliated with unnecessary expenses.
Energy use has impacts – negative and positive – on environmental and human health.

Benefits

In recognition of these drivers, the goal of Re-Powering the Flathead is to explore, understand, and highlight ***opportunities*** to achieve economic, social, and environmental benefits from investments in various energy programs and projects.

The primary goal of the Re-Powering report is to provide information to decision makers in the Flathead Valley about current and future opportunities in energy use, and to best position these decision makers to harness those opportunities as they arise. With abundant renewable energy sources, innovative technology, and outstanding entrepreneurship, the Flathead has an extraordinary opportunity to create a new direction for energy use and development in our region.

Harnessing the opportunities explored in this report will benefit the Flathead Valley in many ways:

Expected Benefits from New Energy Opportunities
Reduced costs for city and county governments
Reduced costs for residents and businesses
Reinvestment in the local economy
Growth in new and emerging market sectors
A more secure future
Improved quality of life and public health

However, simply understanding the multiple benefits to organizations and individuals to be gained by investments in energy efficiency and local energy may not lead to widespread adoption of energy solutions. There are a variety of barriers that prevent adoption of even proven, cost-effective energy technologies and significant challenges faced by decision makers.

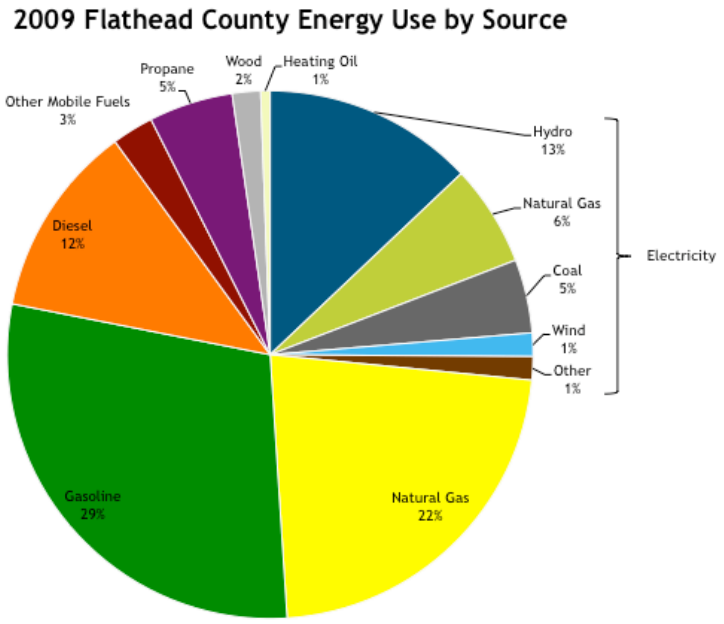
Re-Powering the Flathead worked with stakeholders to better understand the current picture of energy use in the Flathead, the challenges created by the current picture, and how those challenges relate to opportunities for cost savings and economic benefits.

The Flathead Picture

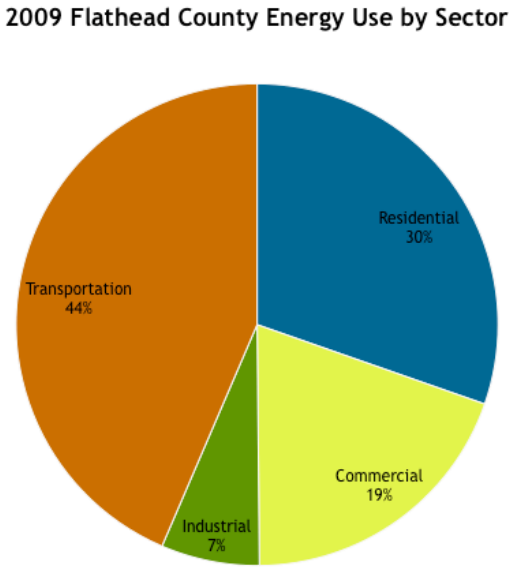
One of the most important steps towards harnessing new energy opportunities in the Flathead is understanding the current context in which energy decisions are made.

The baseline energy profile for Flathead County was developed to help decision makers to understand where we currently use energy, where that energy comes from, and the implications of status quo consumption patterns. A baseline can also help provide a benchmark against which to measure progress to increase energy efficiency and to diversify energy supply. The Re-Powering project assembled a snapshot of existing energy use by compiling consumption data from multiple sources. Data presented is from calendar year 2009; this was the most recent year for which complete data was available when the analysis began.

The baseline energy profile provides insight into roughly how much of each major energy source is used in the Flathead. The baseline reveals that a majority of current energy sources are neither produced nor controlled locally:



It also helps provide insight into the relative amount of energy consumed by different sectors and that a majority of energy use (roughly 74%) is consumed by vehicles and residential buildings:



Re-Powering explored not only existing energy use by source and sector, but also the status of existing facilities and infrastructure (utility transmission and distribution, roads, water, sewer, etc). While Re-Powering the Flathead does not have extensive data on the conditions of existing infrastructure, anecdotal evidence and the data available suggest that the age and constraints of existing infrastructure present significant challenges.

Re-Powering also investigated the many existing programs to support greater adoption of energy efficiency measures and use of local energy resources, such as those led by local utilities and the state and federal governments. Understanding what programs are in place is an important step in understanding what might be needed to enhance those programs' effectiveness or to meet needs not currently being addressed.

The last piece of the existing picture explored by Re-Powering the Flathead was a number of success stories from around the valley, state, or region. Re-Powering found many examples of pilot projects, energy efficient building projects, incentive programs, infrastructure improvements, and job creation and training programs that have already been implemented in the Flathead, providing cost savings and other benefits to residents and businesses. The success stories illustrate the massive potential for better energy management in the Flathead.

The existing picture assembled by Re-Powering the Flathead was shared and refined with Stakeholders as a foundation for the discussion of energy related challenges and opportunities.

Energy Challenges and Opportunities

The fundamental goal of Re-Powering the Flathead is to understand energy related challenges experienced in the Flathead as well as opportunities to address them while harnessing economic, social, and environmental benefits in the process.

Stakeholders identified numerous energy related challenges; **however they were able to identify a far greater number of opportunities, many of which address specific local challenges.** Opportunities are defined broadly to include many different opportunities related to energy production and use, as well as the implementation of technologies and strategies that achieve benefits such as cost savings, job creation, and energy independence.

Many specific opportunities and strategies to harness benefits from energy programs and projects are provided in the full length Re-Powering Report. Opportunities were identified partly through research and the process of developing the current picture, as well as through focus groups and a series of interviews with stakeholders from diverse sectors.

The following table summarizes the main challenges expressed by stakeholders, as well as the main areas of opportunity seen to address those challenges.

Challenges	Opportunities
Managing the cost of energy	Use conservation and efficiency to reduce energy costs
Addressing the risk of supply disruptions and price spikes	Develop local energy resources
Maintaining and updating existing infrastructure and facilities	Expand energy programs to maintain and update infrastructure and facilities
Obtaining good information	Develop, consolidate, and disseminate better information
Understanding and navigating the current regulatory framework	Understand and advocate for improvements to the regulatory framework
Overcoming organizational barriers and managing cultural expectations	Use organizational policies and communication strategies to shift cultural expectations

The original conference, community dialogue series, stakeholder outreach process, focus groups, and research conducted by the Steering Committee have revealed myriad opportunities for energy efficiency and local energy resources to achieve greater regional energy

independence and sustain a healthy economy and environment in the Flathead Valley for current and future generations.

The most important conclusions of the stakeholder outreach and research process conducted by Re-Powering the Flathead are:

- That there is a clear link between energy and the local economy;
- There are many meaningful opportunities to improve upon the current picture of energy use in the Flathead;
- Reducing energy costs for residents and businesses through conservation and efficiency and investing in local energy supply could create substantial benefits for the local economy;
- Success stories demonstrate the potential for many diverse actions that can be taken to harness cost savings, energy independence, reliability, and other benefits;
- The efforts highlighted in the success stories have just scratched the surface of the potential for better energy management opportunities in the Flathead;
- Leadership is critical in identifying and acting upon opportunities.

The Re-Powering the Flathead report supports the conclusions above with research, data, resources, and best practices.

Unlike many community energy plans which focus narrowly on local government operations, the Re-Powering the Flathead report explores opportunities available for local governments, the private sector, and individuals. The result is a document that will support decision-makers throughout the community in the implementation of diverse energy projects and programs intended to improve upon energy use and the local economy.

Another benefit of this report is that it provides live links to hundreds of examples of ideas to help address challenges and harness opportunities explored within the report.

The Re-Powering the Flathead project has strived for the past three years to illuminate energy challenges and opportunities in the Flathead. The true value of these opportunities however, exists only to the extent to which decision makers choose to act upon them. The author and members of the Steering Committee hope that the hundreds of individuals involved with Re-Powering, as well as those who encounter the project for the first time, find the resources, analysis, and best practices assembled in this document to be of use as they endeavor to implement various energy programs and projects within their respective organizations.

For project updates, contact information, or a digital copy of this report visit: www.repoweringtheflathead.org.

Chapter 1: Introduction

Re-Powering the Flathead is a community driven project that sprang from a desire to understand the role energy plays in shaping the local economy, community, and environment. It began as a two-day conference that evolved into a series of community dialogues on energy issues. A steering committee was formed to guide the direction of the project and over the course of project meetings one thing became clear: Flathead Valley needed a comprehensive, local guide to understanding energy issues – how much we use, where it comes from, what are the costs, and what opportunities exist to improve energy use and the economy.

1.1 Vision

With abundant local energy sources, innovative technology and outstanding entrepreneurship, the Flathead has an extraordinary opportunity to create a new direction for energy use and development in our region. The residents, businesses, utilities, and local governments in Flathead County have the ability to move our communities forward in the new energy economy. Harnessing emerging opportunities will help secure cost-savings for businesses, homeowners, local governments, and taxpayers, while providing side-benefits of job creation, improved air quality and human health, energy security, and reduced price vulnerability.

1.2 Mission

The Re-Powering the Flathead Project seeks to understand opportunities in energy efficiency and the use of local energy resources in order to achieve greater regional energy independence and sustain a healthy economy and environment in the Flathead Valley for current and future generations.

1.3 History

Re-Powering the Flathead has a multi-year history in the Flathead during which time it has engaged hundreds of Valley residents and stakeholders.

Conference

In 2009, a group of community members hosted a conference called "Re-Powering the Flathead for a New Energy Economy." The goal of the conference was to understand ways to prepare and position the Flathead for an active role in new and emerging sectors. The conference featured seven sessions (presenters listed below session titles).

Re-Powering the Flathead for a New Energy Economy Sessions:

- **Harvesting Clean Energy in the Flathead – A Workshop for Growers**
    - Duane Johnson, Great Plains Camelina Company
    - Dr. Alice Pilgeram, Montana State University
- **Designing Energy Efficient Subdivisions: Building Green**
    - Clint Walker, His & Hers Magazine Group, Saddlehorn
    - Andrea Davis, homeWORD
    - SueAnn Grogan, Whitefish Housing Authority
    - David Fischlowitz, Fischworks Building Services
    - Paul Tschida, Montana Department of Environmental Quality
- **The Basics: Energy 101: Essential Knowledge in a New Energy Economy**
    - Ken Sugden, Flathead Electric Cooperative
    - Dave Fine, Northwestern Energy
    - Kary Tonjum, City Service Valcon
    - Ken Toole, Montana Public Service Commission
    - Greg Davis, Flathead Valley Community College
- **Bringing the Green Recovery Home**
    - Kirby Campbell-Rierson, Office of U.S. Senator Max Baucus
    - Virginia Sloan, Office of U.S. Senator John Tester
    - Larry Anderson, Office of U.S. Representative Denny Rehberg
    - Chantel McCormic, Montana Department of Commerce
    - Bill Roope, Flathead Valley Community College
    - Doug Rathe, Community Action Partnership of Northwest Montana
    - Kathi Montgomery, Montana Department of Environmental Quality
    - Len Ford, Ford Construction and Flathead Building Association
- **Re-Powering the Flathead: The Path Forward**
    - Ross Holter, Flathead Electric Cooperative
    - Duane Johnson, Great Plains Camelina Company
    - Chuck Roady, F.H. Stoltze Land & Lumber Company
    - Jeff Arcel, Mother's Power
    - Paul Stelter, Algae Aqua-Culture Technologies
    - Amy Shatzkin, ICLEI – Local Governments for Sustainability, USA
    - Mayre Flowers, Citizens for a Better Flathead
- **Energy Policy for a New Energy Economy: Opportunities and Challenges**
    - Jim Baerg, Montana Energy+Design
    - Ross Holter, Flathead Electric Cooperative
    - Ken Toole, Montana Public Service Commission
    - Ben Brouwer, Alternative Energy Resources Organization (AERO)
    - Michele Tafoya, National Parks Conservation Association
- **Energy Efficiency: How Your Business Can Take Advantage of the Savings**
    - Don Mills, Flathead County
    - Bill Yarus, Air Works
    - Kip Drobish, Oso Renewable Energy
    - Dave Renfrow, The Cosley Office Building Columbia Falls
    - Kathi Montgomery, Montana Department of Environmental Quality

Steering Committee

The organizers of the 2009 conference were inspired by the high degree of interest and participation and decided to formalize themselves as a committee that would oversee continued exploration of energy issues in the Flathead. The seven following individuals comprised the Re-Powering Steering Committee during the completion of this report.

Re-Powering the Flathead Steering Committee:

Diane Yarus, Owner, Air Works
Janet Morrow, Executive Producer, FUEL
Laura Damon, Green Team, Flathead Valley Community College
Mayre Flowers, Executive Director, Citizens for a Better Flathead
Michelle Tafoya, Clean Energy Consultant
Paul McKenzie, Lands & Resources Manager, F.H. Stoltze Land & Lumber
Ross Holter, Energy Services Supervisor, Flathead Electric Cooperative

Community Dialogues

After the success of the Re-Powering conference, the Steering Committee hosted a series of Community Dialogues to explore specific energy issues. These events involved a speaker or panel of speakers followed by questions and answers. The dialogues were open and publicized broadly in the community. The dialogues were intended to bring energy issues into the public spotlight in order to increase understanding and visibility of projects and programs that could have a positive impact on energy use and the economy in the Flathead.

Re-Powering the Flathead Community Dialogue Subjects:

- **Challenging Choices! Planning to Meet Our Growing Electric Energy Needs** (October, 2009)
  Bonneville Power Administration will cap the amount of hydropower that it sells to the Flathead Electric Cooperative in 2011, decreasing the supply of low-cost electricity in the region. How might this change affect local rates?
- **Energy, the Economy, and Jobs – Planning for the Future** (November, 2009)
  How are rising energy costs effecting local business investments and sustainability? Where is there potential for job growth? A panel discussion of challenges and opportunities.
- **Greening Public Places; Saving Tax Dollars – Is it Working?** (December, 2009)
  What savings are projected from a recent infusion of stimulus money for energy upgrades in Montana schools and other public buildings? What are potential opportunities for future energy savings and tax savings?
- **Forest Biomass to Energy: Opportunities, Options, and Challenges** (January, 2010)
  What used to be called "waste wood" is increasingly recognized as a valuable renewable energy resource. How feasible is "waste wood" today as a clean and green energy source for the Flathead? How does it compare to other forms of renewable energy? What is needed to build a viable local market for this energy source? What other complementary emerging technologies should we be watching?
- **Building Green Homes for Today and Tomorrow** (February, 2010)
  Many say new and retrofitted green buildings hold a cost-saving solution to rising energy prices and provide for healthier living. Join us for an evening of dialogue and questions. What is green building? How impressive are the cost savings for new green buildings and the green retrofitting of existing buildings? A discussion of innovative new technologies available for heating and ventilation systems.
- **Alternative Energy: Emerging New Technologies for the Flathead** (March, 2010)
  The national media is packed with new stories about the future of alternative energy. But what really works in the Flathead? How cost effective are solar, wind, and micro hydropower systems for home or business applications? Also hear about possible fuel energy savings and cleaner emissions for vehicles.
- **Moving Toward Energy Independence in the Flathead** (April, 2011)
  Many organizations are exploring ways to increase use of local energy resources in order to minimize price volatility and supply disruptions while, in many cases, reducing the costs and environmental impacts associated with energy use. An update on exciting projects underway in biomass, biofuels, geothermal, hydropower, and transmission infrastructure that are helping residents and businesses in the Flathead Valley become less reliant on imported energy.

- **Energy Entrepreneurs: Bringing New Technologies and Jobs to the Flathead** (May, 2011) Since the recession began there has been much talk about the promise for businesses in the energy sector to provide a more diversified, sustainable economic base and economic recovery. But to what extent has that promise been realized in the Flathead? The evening's panel will present stories about the business climate in the Flathead Valley and how three local energy start-ups are capitalizing on new market opportunities in biofuels and energy storage to create quality local jobs.

Montana Energy Corps

In 2010, the Steering Committee decided to apply for a position as part of the Montana Energy Corps to work on the Re-Powering project full time. The Montana Energy Corps AmeriCorps project is an initiative of the National Center for Appropriate Technology (NCAT) in cooperation with The Corporation for National and Community Service that was created to address unmet community energy needs. Energy Corps members are placed in host organizations in communities throughout the state of Montana to implement solutions for sustainable energy consumption.

Lauren Casey joined the Re-Powering the Flathead team in October 2010 as part of the Montana Energy Corps program. Lauren grew up in Somers, Montana where she developed a passion for stewardship through a childhood spent almost entirely outdoors. She graduated in 2006 from Stanford University with a masters degree in Engineering with an emphasis on energy and spent the next four years working as a consultant helping cities, utilities, and private sector clients implement renewable energy and energy efficiency projects. She joined the energy corps as an opportunity to bring some of her experience home, to serve Montana, and also to learn about and promote strategies to help her community become healthier and more resilient.

Having an Energy Corps member on board allowed the Steering Committee to expand the community dialogues, conduct more thorough research and analysis, and to facilitate a significant stakeholder involvement process, all of which culminated in the drafting of this comprehensive report on energy in the Flathead.

1.4 Stakeholder Involvement

The Re-Powering the Flathead Report was informed by discussion with representatives from a wide spectrum of local interests. Stakeholder outreach included one on one interviews as well as a series of focus groups and an online survey on energy issues. Invitations to the focus groups and online survey were sent out to several hundred local stakeholders in different sectors in order to try to solicit input on the biggest energy related challenges and opportunities encountered around the valley.

The outreach process was able to harness input from representatives from over twenty-five organizations in the Flathead.

Stakeholder Outreach Participants:

Construction
Bridgewater Innovative Builders
Habitat for Humanity
Sun Works Architecture

Economic Development
Community Action Partnership
Montana West Economic Development

Education
Flathead Valley Community College
The Glacier Institute

Health Care
North Valley Hospital
Summit Medical Fitness

Local Government
City of Kalispell
City of Whitefish
Flathead County

Oil, Gas, & Biodiesel
Clearwater Biological
General Synfuels International

Natural Resources
F.H. Stoltze Land & Lumber

Non-profit
AERO
Citizens for a Better Flathead
National Center for Appropriate Technology
Rails to Trails
Swan View Coalition

Real Estate
Partners West Realty

Regional Planning
Northwest Power and Conservation Council

State Government
Montana Department of Environmental Quality

Technology
Inner Sight
Zinc Air, Inc.

Tourism
Winter Sports, Inc.

Utilities
Flathead Electric Co-op
Northwestern Energy

While much insight was gained in working with stakeholders, the opinions and conclusions expressed in this report are those of its author and do not necessarily represent the views of any contributing entity unless otherwise stated.

1.5 Website

For project updates, contact information, or a digital copy of this report visit: www.repoweringtheflathead.org.

Chapter 2: The Big Picture

2.1 Drivers for Re-Powering the Flathead

The importance of thinking ahead for energy use in Flathead County is clear in recognition of the following:

Big Picture Drivers
Economic conditions in the Flathead Valley and the nation are uncertain.
We currently depend on uncertain energy sources.
Wasted energy is affiliated with unnecessary expenses.
Energy use has impacts – negative and positive – on environmental and human health.

Economic conditions in the Flathead Valley and the nation are uncertain.
The recession drove the unemployment rate well over 10% in the Flathead Valley and it remains high: unemployment was at 11.4% as of June 2011.[1] Many jobs lost were in the construction industry, which suffered a significant decline in new construction. Energy efficiency retrofits, energy systems installation and maintenance, and energy technology manufacturing hold promise to re-employ the out of work labor force in the Flathead. Moreover, reducing energy costs for residents and businesses will free up disposable income and budget to spend on local goods or services (rather than on imported energy).

We currently depend on uncertain energy sources.
One of the bigger challenges in the current energy picture in the Flathead is a lack of diversity in energy supply. We rely almost exclusively on hydropower for our electricity, on natural gas for heating our homes, and petroleum in our cars. Relying too heavily on these sources is a problem because of price vulnerability. Historically, the Flathead has had some of the lowest

[1] Montana Department of Labor & Industry, 2011.
http://www.ourfactsyourfuture.org/cgi/databrowsing/?PAGEID=4&SUBID=205

electricity prices in the country because of low cost hydropower purchased from the Bonneville Power Administration (BPA). However, starting in 2011, BPA will cap the amount of power sold to Flathead Electric Cooperative (FEC) at the low cost rate. FEC will need to determine how to meet demand beyond the cap. Choices include procuring more expensive power from BPA, developing less expensive or more long-term, locally sustainable generation resources, or investing in efficiency.

In transportation, the average Montana resident spends over 7% of their income on gasoline, making us the second most vulnerable state with respect to oil supply instability.[2] Energy price spikes affect businesses and residents alike, and diversifying supply will help buffer the economy from sudden changes. Harvesting energy around us – biofuels, geothermal, solar, wind, and energy efficiency – may help the Flathead gain more self-sufficiency and minimize vulnerability while invigorating economic growth in local energy resource markets.

Wasted energy is affiliated with unnecessary expenses.
Inefficient use of energy is a drain on the economy. Energy efficiency - getting the light, heat, transportation, etc. needed with less energy – saves consumers and businesses operating expenses that can instead be spent on goods or services. Paying unnecessarily high utility bills in the Flathead's homes and businesses sends money out of the local economy, hurting businesses and reducing sales tax revenue (where levied, i.e. Whitefish's resort tax). Moreover, reducing demand through energy efficiency costs far less than new energy supply. The average cost of energy saved through electric efficiency programs is $0.025 per kWh.[3] Compared to the cost of procuring even very low cost electricity – roughly $0.05 per kWh for hydropower – it is apparent that the low cost energy is the energy we don't use.

Energy use has impacts – negative and positive – on environmental and human health.
Where energy comes from and how energy is used has an effect on the health of the air, water, soil, and ecosystems that future generations of Flathead residents depend on. Also, because so much of our local economy is based on tourism, outdoor recreation, and natural resources, it is critical to acknowledge the economic implications of environmental degradation. The value of our natural resources and prosperity of the Valley can be maintained by living sustainably and using energy wisely. For example, the production of biofuels from oil seed crops has the potential to preserve open landscapes that provide jobs and habitat while improving air quality. Sustainable harvest of woody biomass may be able to boost our local timber industry while addressing forest fire risks via fuel reduction. Biking and walking reduce emissions from transportation while providing the benefits of exercise. Factoring these types of external costs and benefits associated with energy use into decision making will make decisions more informed and complete.

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[2] NRDC, 2010. Fighting Oil Addiction: Ranking States' Gasoline Price Vulnerability and Solutions for Change. http://www.nrdc.org/energy/states/

[3] Friedrich et. al, 2009. Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved Through Utility-Sector Energy Efficiency Programs. ACEEE. http://www.aceee.org/research-report/u092

2.2 Benefits

In recognition of these drivers, the goal of Re-Powering the Flathead is to explore, understand, and highlight ***opportunities*** to achieve economic, social, and environmental benefits from investments in various energy programs and projects.

The primary goal of this document is to provide information to decision makers in the Flathead Valley about current and future opportunities in energy use, and to best position these decision makers to harness those opportunities as they arise. With abundant renewable energy sources, innovative technology, and outstanding entrepreneurship, the Flathead has an extraordinary opportunity to create a new direction for energy use and development in our region.

Harnessing the opportunities explored in this report will benefit the Flathead Valley in many ways, as outlined in Table 1.

Table 1 - Expected benefits from new energy opportunities

Expected Benefits from New Energy Opportunities
Reduced costs for city and county governments
Reduced costs for residents and businesses
Reinvestment in the local economy
Growth in new and emerging market sectors
A more secure future
Improved quality of life and public health

Reduced costs for city and county governments

Energy can cost as much as 10% of a local government's annual operating budget.[4] Reducing energy consumption in local government facilities – via conservation, energy efficiency, and potentially via alternative energy sources – could save a significant amount of money for Flathead County taxpayers. For example, Table 2 illustrates the estimated budget spent on electricity, natural gas, and transportation fuels by two local governments.

[4] U.S. EPA, 2009. Clean Energy Strategies for Local Governments. Chapter 6: Energy Efficiency in Local Government Facilities and Operations. http://www.epa.gov/statelocalclimate/resources/strategy-guides.html

Table 2 – Estimated energy expenses by local governments

Government	FY10 Energy Budget	Energy Cost as % of Operating Budget
Flathead County[5]	$2,382,543	9%
Kalispell[6]	$348,650	19%

Reduced costs for residents and businesses

State level indicators reveal the importance of energy efficiency to Montana residents. Currently, residents of the state use more (on a per capita basis) than residents in all but 8 other states.[7] At 448 million Btu (MMBtu) per person, Montana per capita energy use is 32% higher than the national average (of 339 MMBtu per person).

One reason that Montanans use more energy than average Americans is that we face more extreme weather and driving distances than in many other states. However inefficiency is also a significant driver of higher energy use in the state. One measure of inefficiency is the amount of energy consumed per dollar of gross economic output. In Montana, we consume 14 MMBtu per dollar of gross state product. This is nearly double the U.S. energy intensity of 8.1 MMBtu per dollar of output.[8] Reducing our energy intensity by reducing the amount of energy needed to provide the services our economy requires will also reduce wasted money.

Reduced energy costs could benefit all Montanans, however the impact might be greatest on individual residents. The average Montanan makes $29,015 per year.[9] The average resident spends about $2,000 or 6.9% of their income on energy to light and heat their home,[10] and about $2,066 or another 7.1% of their income on gasoline.[11] This means that many low-income residents spend 14% or more of their income on energy use. A ten percent improvement in energy efficiency could yield a 1.4% increase in gross income, putting money directly into pocketbooks to be used on food, goods, or services.

Finally, the recession has illustrated why conservation and efficiency are so important to the individual resident of the Flathead Valley. Energy use for a given entity is a product of many factors, however the most influential are energy prices, economic activity, and weather. For

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5 Based on energy and operating budgets reported by department in the County Budget Detail Report: http://flathead.mt.gov/finance/downloads.php?requestedsubfolder=FY2010+Budget\

6 Based on energy expenditures on general government services funded by the general fund: http://www.kalispell.com/manager/kalispell_hot_topics_news.cfm

7 EERE, 2010. Economic Indicators for Montana and State Goals for Energy Efficiency under the Energy Policy Act of 2005. http://apps1.eere.energy.gov/states/economic_indicators.cfm/state=MT

8 Ibid.

9 EERE, 2010.

10 Montana DEQ, 2008. Montana Energy Saver's Guidebook. http://deq.mt.gov/energy/default.mcpx

11 Natural Resource Defense Council, 2010. Ranking States' Gasoline Price Vulnerability and Solutions for Change. http://www.nrdc.org/energy/states/

industrial entities, price and economic activity is the main driver of energy use – a company will operate at the highest level of output that the market will bear, and energy use is inextricably linked to production. Commercial entities are affected by both economics and weather, since more commercial facilities are occupied, heated, and cooled than industrial facilities. Residential energy demand is by far the most sensitive to weather, and home energy use is often dictated by the elements more than any other factor. This phenomenon was illustrated in an analysis done by Flathead Electric Co-op in which kWh sales were normalized for weather.[12] During the economic downturn between 2009 and 2010, average commercial energy use declined whereas residential energy use went up (when normalizing 2010 data to reflect similar weather impacts as 2009).

Therefore, even when times are hard, residential demand for energy changes very little. While industrial and, to some degree, commercial entities can scale back energy use according to economic activity, residential consumers have much less flexibility. As income declines under hardship, energy costs (especially during cold winters) comprise a more substantial share of household budgets. Conservation and efficiency measures can help reduce vulnerability of Flathead families to energy price fluctuation, as well as buffer household budgets from economic hardship.

Reinvestment in the local economy

Investment in local energy and energy efficiency can boost the local economy in a few different ways. For one, it is often more labor intensive than fossil fuels. Energy efficiency retrofits and small, distributed renewable energy systems (like geothermal or solar) require skilled labor that can be found and/or developed locally. Moreover, labor makes up a significant amount of a clean energy project budget. This is in stark contrast with fossil fuel or utility scale electricity projects that are capital and resource intensive. For example, much more of the money invested in natural gas goes into equipment, land, and fuel than into wages.

The estimated difference in job creation is staggering. Each $1 million invested in clean energy generates an average of 17 jobs – more than 3 times higher than the 5 jobs generated per $1 million spent on fossil fuels.[13] Of course this comparison looks only at dollars spent, and not at the energy benefits per dollar spent. It is important to understand that the cost effectiveness of labor-intensive energy investments will vary widely. For example, energy efficiency investments cost less per kWh saved than purchasing utility supplied electricity, but a solar system may cost more per kWh of energy supplied than utility supplied electricity (depending on avoided electric costs and system life). Job creation is just one of many impacts to be weighed in an energy investment.

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[12] FEC, 2010. kWh Sales Normalized for Weather.

[13] Robert Pollin et al., "The Economic Benefits of Investing in Clean Energy: How the Economic Stimulus Program and New Legislation Can Boost U.S. Economic Growth and Employment," Department of Economics and Political Economy Research Institute, University of Massachusetts Amherst and Center for American Progress, June 2009, www.peri.umass.edu/economic_benefits

The local benefits of investment in clean energy extend beyond the jobs created for conducting retrofits or installing onsite power generation. Cost savings experienced by a home or business owner are often passed back into the local economy through increased spending on goods or services; most consumer goods and services have a higher "local content" than fossil energy, so these dollars stay close to home.

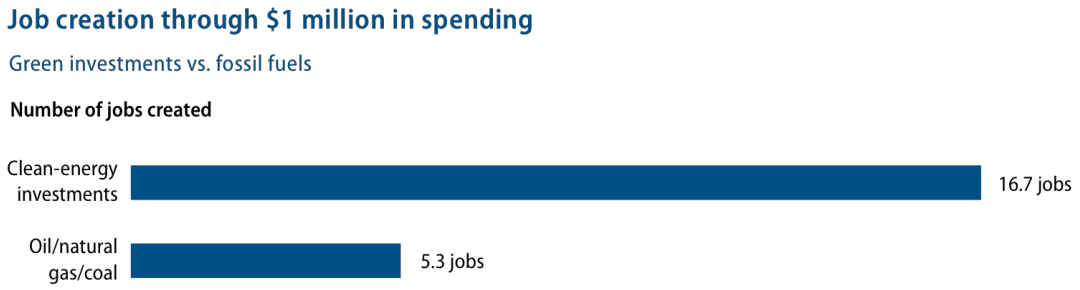

Figure 1 – Job Creation per $1 million spent, clean energy vs. fossil fuels[13]

Growth in new and emerging market sectors

It is apparent on a national scale that energy markets are shifting. Clean energy jobs – including engineers, scientists, teachers, electricians, and others – grew by 9.1% between 1998 and 2007, while total jobs grew by only 3.7%.[14] Even since the recession began (in December 2007), business investment in clean energy remains strong. In 2008, 80 percent of total venture capital (VC) investments were in the sectors of clean energy and energy efficiency. While total VC investment in all sectors was down 61% during the first quarter of 2009 compared against a year earlier, the impact of the recession on clean energy investment was less severe. Clean energy VC investment was down 48%, faring significantly better than investment economy-wide.

The massive business interest in energy efficiency and clean energy is a signal that changes in energy markets are here to stay. Investors expect that renewable power demand will continue to grow, as will a market for energy efficiency. Increasing the capacity of local businesses to participate in these markets will help the Flathead economy keep pace with the evolution of markets happening around the nation. Strategies to support local clean energy businesses may also help attract some of the private investment pouring into this sector.

A more secure future

Harnessing local energy resources – both new energy supply and energy efficiency – will help reduce the risk associated with the Flathead's current reliance on relatively few energy sources. An estimated 98% of local energy demand is met using natural gas, petroleum, and electricity. With the exception of wood burned in homes, electricity generated at the landfill and local hydroelectric facilities, and a small number of renewable energy systems (i.e. solar, wind, geothermal), all of our energy comes from outside the Flathead. Further discussion of current energy supply follows in Chapter 3: The Flathead Picture.

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[14] Pew, 2009.

Diversifying energy supply and increasing use of local energy resources will help reduce our reliance on energy sources that are uncertain. Harnessing local energy resources can provide more predictability in resource availability and price. Reducing demand through efficiency can reduce the impact of price spikes while utilizing retrofit materials and appliances made in the U.S., and sometimes locally. Table 3 illustrates the percentage of various materials and products used in energy efficiency retrofits that are sourced and manufactured in the U.S. When using domestic materials and local contractors, investments in retrofitting existing buildings can provide a boost to the construction industry, which has suffered since the recession began in 2008 due to a massive slow down in new construction.

Table 3 – Domestic content of retrofit materials[15]

Remodel Category	Subcategory	% Domestic
Air Sealing	Caulk	95.7%
	Spray Foam	90.4%
Attic Insulation	Fiberglass and Mineral Wool	93.7%
Duct Sealing and Replacement	Caulk (includes duct mastic)	95.7%
	Duct Sheet Metal	99.4%
Wall Insulation	Fiberglass and Mineral Wool	93.4%
	Spray Foam	90.4%
	Rigid Foam (Polystyrene)	95.9%
Replacement Windows	Vinyl Windows	98.4%
Furnaces	Gas furnaces and Other	94.2%
A/C and Heat Pump	Air and Ground Source	82.3%
Water Heaters	Electric, Gas, Solar (tank and tankless)	77.9%
Refrigerators	Household Refrigerators & Parts	62.3%
Clothes Washers	Household Clothes Washers & Parts	76.8%

The importance of reducing the security threat of reliance on foreign fossil fuels through investments in efficiency and alternative supply sources was highlighted in a 2011 testimony by retired U.S. Navy Vice Admiral and Marine Corps Colonel Dennis McGinn before the Montana State Legislature.[16] According to McGinn "America needs a diverse portfolio of energy, to reduce the security threat created reliance on foreign oil and reduce the need to place American forces overseas to protect fossil fuel sources." He added "Every year that goes by, the options are less and the cost is more. Montana is in a great spot to be really, really pro-active in formulating the kind of policies that will create a great energy future."

Improved quality of life and public health

Most traditional energy sources, especially those based on combustion, produce harmful environmental impacts that pose threats to human health and welfare. The combustion of fossil fuels in vehicles and facilities produces carbon monoxide, nitrogen oxides, sulfur dioxides, and particulate matter. These emissions, referred to as criteria pollutants, cause myriad problems including air quality impacts like smog, and human health impacts like asthma, higher risk of heart attack, lung disease, and diabetes, and reduced life expectancy.[17]

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[15] Home Performance Research Center, 2011. http://www.hprcenter.org/industry-research

[16] Dennison, 2011. Montana lawmakers hear from military about dangers of relying on oil, coal. Published by the Missoulian on Saturday, February 5, 2011.

[17] American Lung Association, 2011. State of the Air. http://www.stateoftheair.org/2011/health-risks/

In the Flathead, wood burning and forest fires, industrial processes, road dust, and transportation fuel use all contribute to criteria pollutants in the Flathead. For example, transportation fuels are by far the biggest source of carbon monoxide pollution in Flathead County (Figure 2).

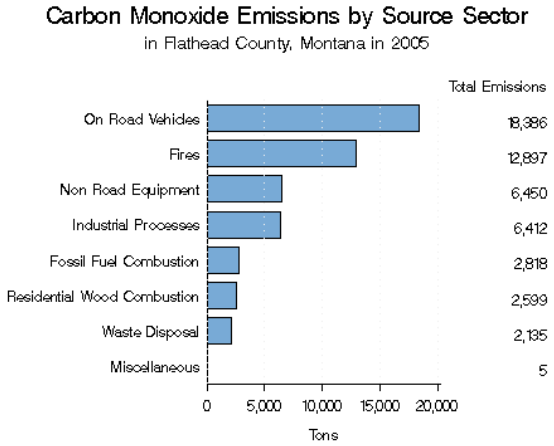

Figure 2 - Carbon monoxide emissions by source sector[18]

The connection between energy use, such as transportation fuel use and residential wood and fossil fuel combustion, and air quality is clear and important to understand; any programs to reduce fossil fuel energy costs will have an additional benefit of improved air quality and lower human health risks.

2.3 Understanding Challenges

Simply understanding the multiple benefits to organizations and individuals to be gained by investments in energy efficiency and local energy may not lead to widespread adoption of energy solutions. There are a variety of barriers that prevent adoption of even proven, cost-effective energy technologies and significant challenges faced by decision makers including:

Table 4 - Energy related challenges

Energy Related Challenges
Growing energy demand
Insufficient local consideration
First cost bias
Lack of financing mechanisms
Externalities
Tradition and inertia
Low demand for alternatives
Lack of a skilled workforce
Split incentives

[18] U.S. EPA, 2011. Air Emissions Sources, http://www.epa.gov/air/emissions/index.htm

Growing energy demand

Flathead County has been one of the fastest growing counties in the state, with an estimated population increase of 20.0% from 2000 to 2009. [19] While that growth has slowed significantly due to the economic downturn, the county population is still projected to grow over time. With population growth, demand for energy will grow. Competition for low cost energy resources in other parts of the region will make meeting growing demand increasingly challenging. The pending cap on low cost hydropower resources from BPA is a perfect example of how low cost energy is not guaranteed in the future and new strategies will be needed to provide for growing demand.

Insufficient local consideration

The concept of "buy local" is sometimes applied to purchasing decisions related to goods or services, but rarely to decisions related to energy. Energy consumption decisions frequently lack consideration for local impacts, negative or positive. For instance, the decision to develop Montana coal reserves to generate power at low wholesale rates does not accurately reflect the damage done in state. The Colstrip Steam Plant, a coal fired electricity generation facility located in eastern Montana, exports most of its electricity to Puget Sound Energy. While PSE makes profits selling electricity to residents in the state of Washington, residents of Colstrip suffer the cost. This facility was dubbed the ninth dirtiest plant in the nation by Environment America for the damage it has done to the local environment.[20] PSE was forced to pay a settlement of $25 million to Colstrip residents for damages to public health and the local aquifer, but this cost was excluded from the cost of power. Had it been included, the electricity from this facility would have cost much more than that from cleaner facilities.

Local benefits are also frequently excluded in energy consumption decisions. For example, installing a wood-fired cogeneration facility (that creates both heat and power) in a local industrial facility could use mill residues, forest slash, and other wood waste. The benefits of the project would include not only useful energy, but also reduction in forest fire fuel and diversion of waste from landfill. Unfortunately, there is no mechanism for assigning economic value to the latter benefits. The price of energy from such a facility is still likely to be higher than wholesale power, imported from out of state. Without consideration of the local benefits, a new biomass cogeneration facility is less likely to compete with traditional resources.

First cost bias

Many decisions makers are guilty of "first cost bias" in energy related purchasing behavior. That is to say that many people are more concerned with the upfront cost of a piece of equipment (a furnace or a car) or an entire building than they are with the life cycle cost – a cost that takes into account both the upfront cost, as well as recurring costs over the life of the investment. First cost bias can arise because of lack of information. Decision makers may not have the

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[19] Montana Department of Commerce, 2009. Demographic & Economic Information for Flathead County. Census and Economic Information Center.

[20] Environment America, 2009. "America's Biggest Polluters: Carbon Dioxide Emissions from Power Plants in 2007." http://www.environmentamerica.org/

information, tools, or knowledge to calculate the benefit of spending more upfront in order to spend less over time. They may also simply be in the habit of spending as little money up front as possible.

However first cost bias frequently arises not only due to lack of information but also to a lack of capital. When operating on a limited budget it can be difficult or impossible to justify a more expensive investment even knowing that it makes more economic sense.

Lack of financing mechanisms

Many home or business owners want to invest in energy efficiency or on-site energy generation, but lack capital to do it alone. Many projects – especially those involving energy efficiency – create enough energy cost savings to warrant investment, whether considered from a simple payback, net present value, or rate of return perspective. However, the up-front cost of an investment may still be prohibitive. Financing an investment in a renewable energy or energy efficiency project can help overcome this barrier. In many cases, the loan payment may even be less than the energy cost savings, yielding savings to the owner from day one of the project.

Some energy financing solutions have emerged such as alternative energy revolving loan programs, property assessed clean energy (PACE) programs, federal guaranteed loans, energy efficient mortgages, and utility financing programs. However, the availability of these funds are often limited, the application requirements onerous, and public awareness of them low.

Information limitations

Many decision makers simply lack complete information. They may not have the tools or resources to understand all of the alternatives in a given investment decision. In other cases, there may be too much information – some of it conflicting – about energy options. Standards and certifications, as well as education campaigns are the types of mechanisms that have emerged to help consumers make more informed decisions. Third party, non-profit organizations, like Pennsylvania's Keystone Help program and The Energy Trust of Oregon, have been emerging to run efficiency programs. These organizations provide an unbiased clearinghouse of information on programs, technologies, and contractors.

Externalities

The term "externalities" refers to the costs and benefits of a given investment that are not included in the economic cost. Externalities are a market failure that is pervasive in many markets, energy markets being no exception. They are considered a market failure because they exist when a consumer does not provide compensation for the full cost of consuming a good, and as a result consumption exceeds (or is less than) what is socially optimal. A commonly referenced negative externality is air pollution associated with gasoline use. When we buy gasoline for use in our cars, we do not pay the breathers of the air in the area in which we drive for the associated negative impacts on air quality. An example of a positive externality is a homeowner installing a grid-tied photovoltaic system that generates electricity that can be

fed into the grid. The system increases reliability of the power supply in an area, but the property owner is not compensated for this benefit to other electricity consumers.

Tradition and inertia

Many decisions are made simply based on how things have "always been done." Habits are difficult to break and it takes extra effort to find a new contractor, to develop a new design, to apply for a rebate, or even to research alternatives. Many strategies are needed to help convince traditional "laggards" to adopt new technologies (or ideas). The importance of overcoming inertia and tradition is clear when considering the technology adoption curve (Figure 3), which demonstrates that technology adoption typically follows a normal distribution. This curve was developed by sociologists at Iowa State University, and has been widely used to understand the diffusion of innovations in society. Very few people (innovators) are likely to adopt brand new technologies, whereas roughly half of most societies (late majority adopters and laggards) are conservative about adopting new technologies.

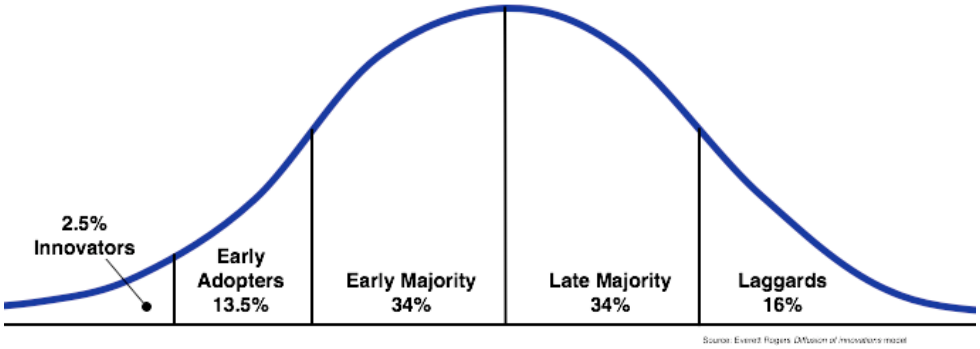


Figure 3 – The Roger's technology adoption lifecycle[21] source

Low demand for alternatives

Many factors affect demand for new energy technologies and services including some of those challenges previously discussed – awareness, information, and habit. However in the Flathead Valley one of the biggest challenges preventing new businesses from entering energy markets is low population. In bigger urban areas, a new renewable energy or energy retrofit business can find a market for their services even when a nascent technology is in demand by innovators or early adopters alone (see Figure 3). In a community like the Flathead, demand has to come from more of the population in order for businesses to be confident about finding an adequate market. Many strategies are needed to create demand for new products or services, ranging from education and demonstration projects, to incentives and mandates. Before significant demand has been established, business incentives can also support the entry of new businesses into the energy marketplace.

Lack of a skilled workforce

Low demand for new energy products and services creates a chicken and egg problem with respect to labor: having few market opportunities in an area cannot support growth in service

[21] Wikipedia, 2011. Technology Adoption Lifecycle. http://en.wikipedia.org/wiki/Technology_adoption_lifecycle

providers but without skilled service providers, new markets cannot grow. Training programs and credentialing programs can help existing laborers transition to the provision of new services. Integrating new services into existing businesses can also support initial growth in new markets until demand is high enough to support business specialization.

Split incentives

Split incentives occur when the incentives between two parties affected by a decision do not align. Split incentives are particularly a problem in buildings where tenants pay the energy bills. Building owners that don't pay for energy bills have incentives to build low up-front cost buildings and to invest little in making the building energy efficient. Tenants, on the other hand may not be allowed to make retrofits to their rented property in order to reduce their energy bill. Even if the landlord allows retrofits, many renters are reluctant to make investments that pay back in more than a year or two considering that their occupancy of a space may be short-term or uncertain.

2.4 Cause for Hope

While the challenges related to energy use are many, they are not insurmountable. Many organizations are working to address energy challenges as we progress toward a more secure and sustainable energy future. Sample responses to challenges are listed in Table 5 to illustrate tools available now to solve these challenges. While additional analysis is needed to determine the validity of each for local application in the Flathead, the point is that innovation is opening the door to many new opportunities worth exploring in our community.

Table 5 – List of example strategies to address barriers to clean energy

Challenge	Example Response
Growing energy demand	The Northwest Power and Conservation Council has identified cost-effective resources capable of meeting 85% of new energy demand growth in the Northwest region by 2030. http://www.nwcouncil.org/energy/powerplan/6/default.htm
Insufficient local consideration	As part of Boulder, CO's Energy Future campaign, the city is using the concept of "localization" in order to ensure that residents and businesses have long-term access to reliable, affordable, and clean energy. http://www.bouldercolorado.gov/
First cost bias	The City of Homer, AK has grouped a suite of efficiency measures with a combined simple payback of 10 years or less, in order to achieve annual energy savings of ~$100,000. http://www.cityofhomer-ak.gov/publicworks/energy-efficiency-improvements-city-buildings
Lack of financing mechanisms	The Sonoma Valley Energy Independence Program provides residents and businesses with the option of financing energy improvements with a lien on the property, repaid through property taxes. http://sonomacountyenergy.org/index.php
Information limitations	Louisville, KY used EPA's Energy Portfolio Manager to benchmark existing city buildings and provide facility managers with information regarding how well individual facilities perform compared to similar facilities nationwide as well as how facilities perform over time. http://www.energystar.gov/index.cfm?fuseaction=challenge_community.showLead&casestudy=louisville
Externalities	The City of Boulder, CO passed the first ever municipal carbon tax in 2006, expected to generate over $1.6 million in revenues in 2010 to fund strategies to reduce emissions associated with energy use. The average annual residential tax is $21, the average annual commercial tax is $94. http://www.bouldercolorado.gov/
Tradition and inertia	Traditional lease structures that fail to monetize energy efficiency have been overcome in Mississippi through an energy efficiency lease program that allows public facilities and non-profits to lease-purchase energy efficient equipment. http://www.mississippi.org/index.php?id=38
Low demand for alternatives	Eugene, OR developed a Sustainable Business Initiative to identify and support businesses that expand quality jobs using sustainable measures. Providing public recognition, advertising, networking support, and access to financing. http://pages.uoregon.edu/cwch/programs/SBJD/SBI.html
Lack of a skilled workforce	Raleigh, NC used an EECBG grant to provide free green collar job trainings on solar technologies, sustainable landscaping, BPI and energy auditing, green plumbing, and realtor residential energy efficiency awareness. http://www.raleighnc.gov/SustainableRaleigh
Split incentives	"Green Leases" are an emerging tool that entities have used to address split incentives. They include provisions as separate metering, tenant improvement practices, and benchmarking. The Northwest Energy Efficiency Alliance shares the provisions of its green lease at: http://www.betterbricks.com/commercial-real-estate/neeas-suite-search

Exploring Opportunities

Overcoming barriers to clean energy in the Flathead Valley will take concerted efforts on the part of businesses and residents, but there is much that individual decision makers (in business, local government, education, etc) can do to help realize the multiple benefits – reduced energy bills, new jobs and economic development, enhanced community livability, and improved air quality – to be gained through clean energy.

The goal of Re-Powering the Flathead is to find specific opportunities that are locally effective, relevant, and feasible, both on the short- and long-term. Understanding what the opportunities are now will help local decision makers implement specific strategies when the political, economic, and technical time is right.

Opportunities to remove barriers to local energy and energy efficiency exist within every sector, within every type of energy use. The main purpose of Re-Powering the Flathead is to explore these opportunities.

2.5 Examples from other Actors

Many other communities have seen the importance of developing an energy plan, strategy, or report. Local governments around the state and region have undergone a similar process to the Re-Powering project – developing a baseline energy use profile, identifying and analyzing strategies to improve energy use and stimulate the economy, and outlining implementation steps for translating opportunities into action.

Re-Powering the Flathead learned about emerging opportunities in energy and community sustainability by considering actions underway by:

In Montana:
Bozeman – Climate Action Plan
Helena – Climate Action Plan 2009
Missoula – Municipal GHG Resolution
Montana (AERO) – Repowering Montana

In other states:
Cedar Rapids, IA – Energy Management Plan
Kane County, IL – Energy Plan
Oregon - Jobs and Prosperity Campaign
Riffle, CO – Energy Village Plan
Whatcom County, WA – Climate Protection and Energy Conservation Action Plan

While many communities have chosen to develop plans to address climate change specifically, Re-Powering the Flathead chose to side-step the debate over climate change recognizing that energy use and policy are significant factors in the health of the Flathead economy. As such, energy challenges and opportunities merited a stand-alone analysis. Thus the Re-Powering

report focuses on local energy issues and economic benefits that might be harnessed through better information, coordination, and planning to harness emerging opportunities.

Also, many communities have adopted proscriptive targets for their local governments and action plans specifying measures that will be used to achieve those targets. While Re-Powering the Flathead commends such communities for their commitment to transitioning to more sustainable energy systems, the Steering Committee and many stakeholders in the Flathead felt that a report would be a more appropriate tool for our community than a plan. Better context and information on local energy issues is needed to serve as a platform from which new energy projects and programs can be developed. Moreover, because this report does not target local governments in the way that many action plans do, the Steering Committee believes that it can serve as a resource to diverse stakeholders (governments, businesses, residents, etc).

Chapter 3: The Flathead Picture

One of the most important steps towards harnessing new energy opportunities in the Flathead is understanding the current context in which energy decisions are made.

The baseline energy profile for Flathead County will help decision makers to understand where we currently use energy, where that energy comes from, and the implications of status quo consumption patterns. A baseline can also help provide a benchmark against which to measure progress to increase energy efficiency and to diversify energy supply.

3.1 Summary of the Flathead Picture

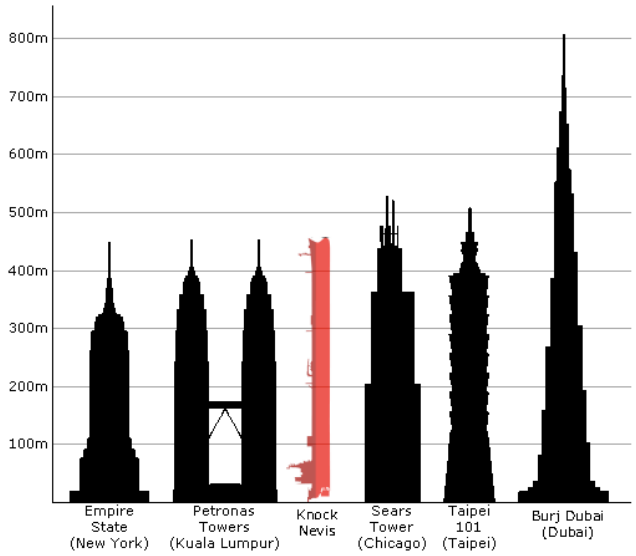
Table 6 summarizes existing energy use in the Flathead. Details on this data are provided in the following sections.

Table 6 – Summary of The Flathead Picture

The Flathead Picture – 2009 Energy Use	
Total Energy Use	16.9 Trillion Btu (or the equivalent of 2.9 million barrels of oil)
Energy Use by Source	29% - Gasoline 26% - Electricity 22% - Natural Gas 12% - Diesel 5% - Propane 3% - Jet and Aviation Fuels 2% - Wood <1% - Heating Oil
Energy Use by Sector	44% - Transportation 30% - Residential 19% - Commercial 7% - Industrial

The Re-Powering project assembled a snapshot of existing energy use by compiling data from multiple sources. Data presented is from calendar year 2009; this was the most recent year for which complete data was available when the analysis began. Considering one year as "typical" is dangerous because year-to-year energy use varies significantly, due primarily to weather patterns and economic activity. So while the 2009 data presented in the following sections can be considered as a reasonable representation of existing energy use, it should not be assumed to perfectly represent energy use in other years. Because of this, historic trends are provided for energy sources for which data was available.

3.2 Existing Energy Use by Source



In 2009, an estimated 16.9 trillion British thermal units (Btu) of energy were consumed in Flathead County. This is the same as the energy contained in 2.9 million barrels of oil, or one and a half times the amount carried by today's commercial tankers, the biggest of which are the size of a skyscraper (like the Knock Nevis, illustrated in Figure 4).[22] This comparison is presented to help conceptualize the magnitude of energy resources consumed in the Flathead each year. The footprint of our annual consumption is large (a skyscraper sized amount), but primarily not visible to us and therefore difficult to comprehend.

Figure 4 – Size comparison between World's largest oil tanker and famous skyscrapers

Total energy consumption was calculated at the point of use. Point of use means that only the energy billed to consumers and used to provide an energy service – to power lights, to heat water, to drive a car – is included. None of the energy used to supply end-use energy is included, e.g. the fuel consumed at power plants to generate electricity, the fuel used to transport oil to pumping stations, etc. Point of use data is the most appropriate to compare the magnitude of various fuel uses or sector-by-sector energy use. However it is still important to recognize the upstream implications of energy use including transmission losses, extraction and processing energy, and transportation.

Figure 5 illustrates the break down of total energy use by fuel source. Currently, a majority of our energy needs are met by three sources: electricity, natural gas, and petroleum.

[22] Assuming each ship carries 200,000 barrels of oil. http://en.wikipedia.org/wiki/Oil_tanker, image source: http://commons.wikimedia.org/wiki/File:Tanker-size-comparison.png

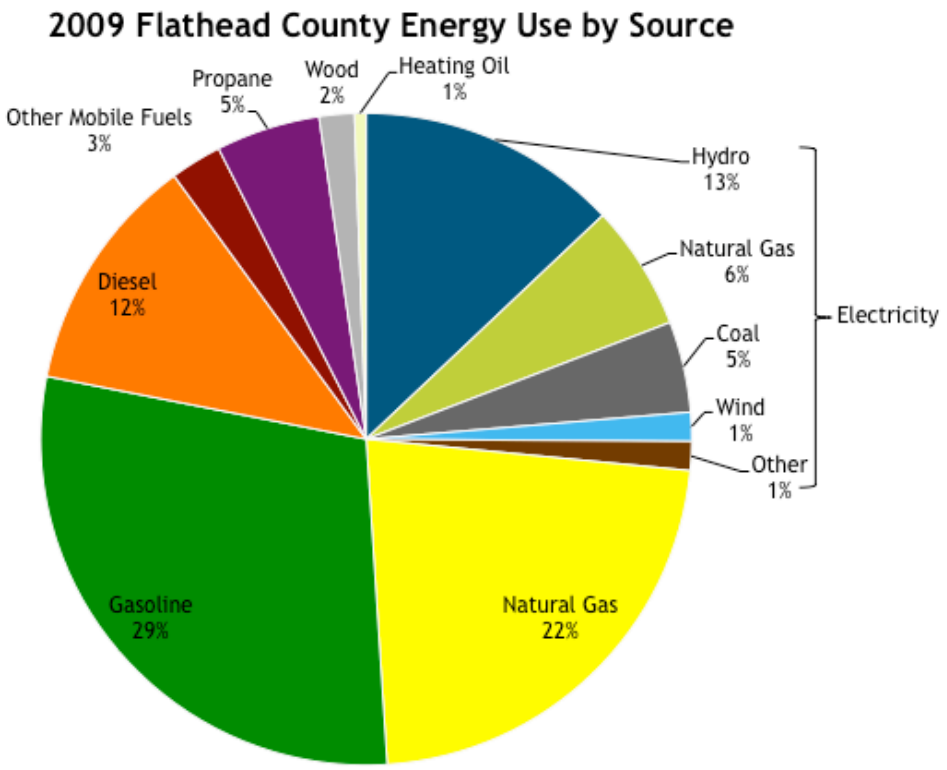


Figure 5 – Flathead County Energy Use by Fuel

The following sections describe each major fuel source and how estimates of use in Flathead County were developed.

Electricity

Nearly all utility supplied electricity used in the Flathead Valley is provided by Flathead Electric Cooperative (FEC). Flathead electric is a non-profit, member owned cooperative, established to provide power for the benefit of its members. FEC operates a distribution system of almost 4,000 miles of power lines that serve a peak load of 318 MW.[23] This historic maximum load occurred in December 2008, illustrating that heating is one of the single biggest drivers of electricity demand. The average load served by FEC is roughly 180 MW.

In 2009, members of FEC consumed approximately 1.3 billion kWh of electricity or roughly 4.5 trillion Btu of energy.[24] This total includes some members outside of Flathead County, but there is currently no easy way for FEC to extract these members from total use data.

[23] Western Electricity Coordinating Council, 2010. Flathead Electric Cooperative, Inc. Compliance Audit Report.
[24] FEC, 2010.

Of total electricity use, over half is by residential accounts (Figure 6). This represents a challenge from an efficiency standpoint because the residential sector is comprised of many, small accounts. Large scale energy efficiency potential must be harnessed through many individual projects, as opposed to the industrial sector or commercial sector where projects targeting single large users can have a significant impact on electricity demand.

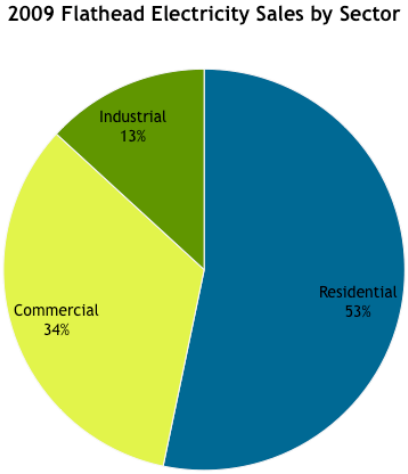


Figure 6 – Flathead Electric Sales in Flathead County in 2009 by Sector

Figure 7 illustrates a slight downward trend in overall electric sales in the last five years, however prior to the recent recession, FEC sales were steadily growing. It also shows that the industrial sector has been most affected by the recession. The commercial and residential sectors have shown less decrease, in part due to the fact that these sectors demand for electricity is more weather sensitive than the industrial sector.[25]

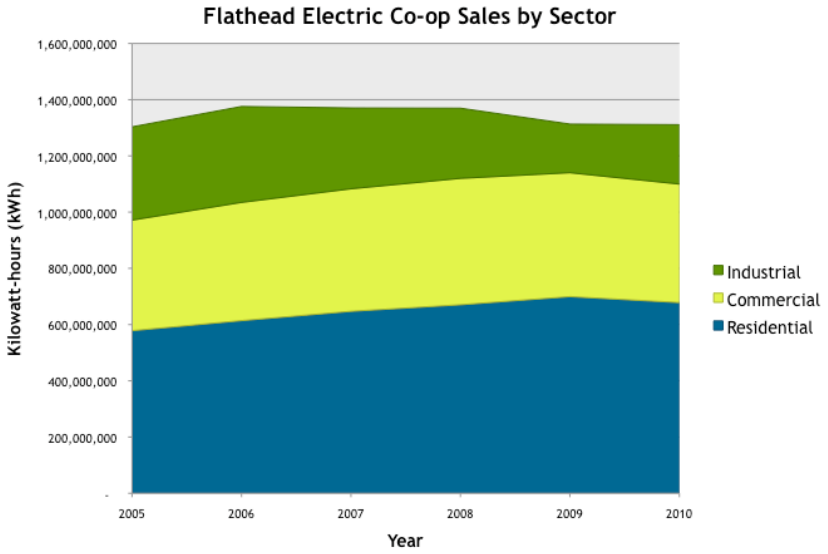


Figure 7 – Trends in FEC Electricity Sales from 2005-2010

[25] FEC, 2010. kWh Sales Normalized for Weather.

Historically, FEC has not owned generation capacity and instead has purchased power on wholesale markets to meet the needs of its members. Nearly all of the power purchased by FEC comes from the Bonneville Power Administration. BPA is a federal agency that sells power from 31 federal hydro projects in the Columbia River Basin, as well as from one nuclear and several miscellaneous facilities such as natural gas, coal, biomass, and wind.[26] The breakdown of sources used to generate electricity illustrated in Figure 5 is based of the average generation capability of Bonneville's resources.[27]

Meeting most of our local electricity demand with power supplied by BPA means that we have lower electric costs than anywhere else in the State. Flathead Electric rates in 2010 were between $0.0314 – $0.0542 per kWh, depending on account type. This is much lower than the state average price of $0.051 - $0.094 per kWh.[28]

One result of purchasing from BPA is that FEC has a very homogonous electric supply portfolio and is highly susceptible to future price spikes or changes to BPA policies. A good example is the cap on the amount of power sold to FEC at the lowest rate that began in spring, 2011. This cap, while unlikely to come into play until later in the decade when the economy has rebounded from the recession, has encouraged the Co-op to start exploring other options, including purchasing power from other producers and investing in owned generation capacity.

The landfill gas to energy project installed at the Flathead landfill in 2009 was the first substantial source of power built and owned by FEC, as well as the first landfill gas to energy facility in the state.[29] This facility generates roughly 6.5 million kWh per year, or enough to power 900 homes. As of spring, 2011, the cost of power from the system has cost FEC roughly $0.05 per kWh, which is competitive with the cost of imported electricity.[30]

Natural Gas

Northwestern Energy supplies most natural gas used in Flathead County, however a few industrial entities purchase natural gas on open markets. Northwestern Energy is an investor owned utility (IOU) that provides natural gas and electricity in Montana, South Dakota, and Nebraska. While the Flathead Valley is not served by Northwestern's electric system, it is one of the many communities served by its natural gas system. Northwestern operates a distribution system of over 6,900 miles of transmission and distribution pipelines in Montana alone.

In 2009, Northwestern Energy sold nearly 38 million therms, or 3.8 trillion Btu, of natural gas to residential and non-residential customers in Flathead County. Non-residential sales are not broken down by commercial and industrial accounts as they are by Flathead Electric, but the

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[26] Bonneville Power Administration, 2009. 2009 BPA Facts. http://www.bpa.gov/corporate/about_BPA/Facts/

[27] Northwest Power and Conservation Council, 2011. Generating Projects. http://www.nwcouncil.org/energy/powersupply/Default.asp

[28] EIA, 2011. State Energy Profiles: Montana. http://www.eia.gov/state/state-energy-profiles.cfm?sid=MT

[29] FEC, 2009. Flathead Electric Landfill Gas to Energy Plant. www.flatheadelectric.com/PDF/Landfill.pdf

[30] FEC, 2011.

breakdown of non-residential sales was estimated based on the relative size of electricity consumed locally by these sectors (Figure 8).

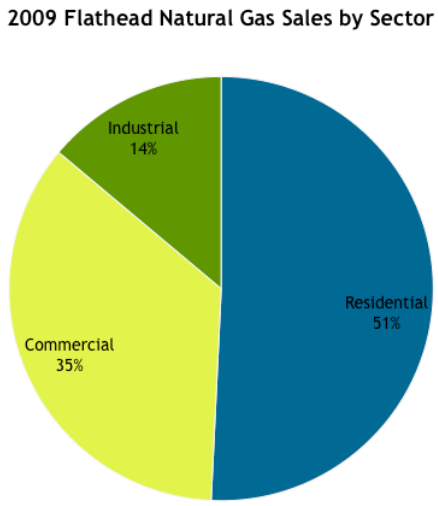

Figure 8 – Northwestern Energy Natural Gas Sales in Flathead County in 2009 by Sector

Approximately half of the natural gas sold in the Flathead is to residential customers. This creates the same challenge as for electricity demand management: it is more difficult to reach many accounts with efficiency programs than few large commercial or industrial accounts.

Figure 9 illustrates a slight downward trend in overall natural gas sales in the last five years as a result, primarily, of the recession. Natural gas use fell less in the residential sector than in either commercial or industrial, again illustrating that the residential sector is the most weather sensitive sector and least able to reduce demand for natural gas in response to high prices or poor economic conditions.

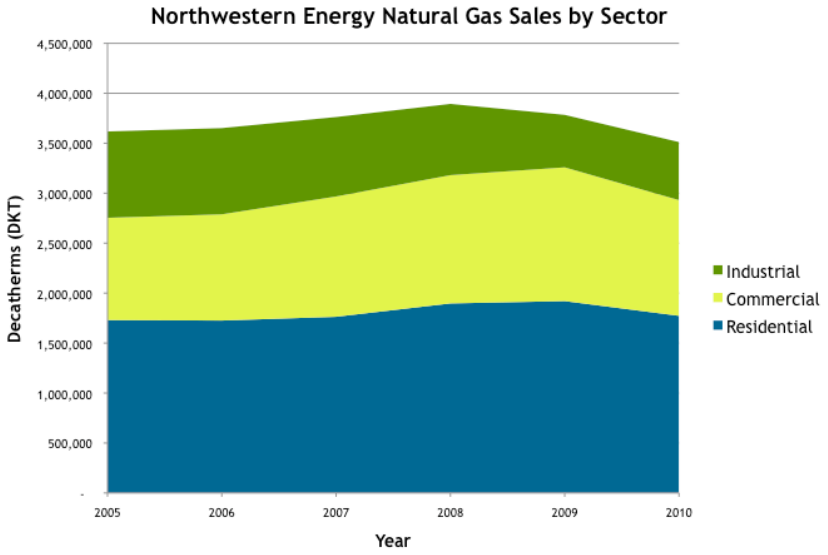

Figure 9 – Trends in NWE Natural Gas Sales from 2005-2010

Most of the natural gas consumed in Montana comes from Alberta, Canada.[31] While Montana has significant natural gas reserves in the north central part of the state, most of the gas produced there is exported. This is primarily due to Montana's proximity to Alberta's large natural gas reserves and the configuration of pipelines. Most gas produced in Montana enters the Havre pipeline system and flows to out of state markets (Figure 10).

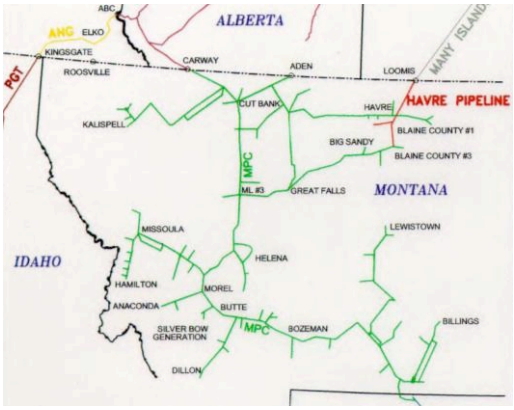

Figure 10 - Northwestern Energy's Gas Transmission System

The current natural gas transmission system creates several supply challenges. As of 2006, the Northwestern Energy natural gas transmission system had no unused firm capacity.[32] This means that new large customers were unlikely to secure guaranteed, uninterrupted gas delivery without significant upgrades to the system. In 2006, NWE added a loop (additional pipeline capacity) along the existing line to the Flathead Valley, in anticipation of demand growth in the area. The expansion created more flexibility in natural gas supply and there is currently unused capacity that can be used to meet new demand. However if the Valley recovers to pre-recession levels of growth, natural gas supply pipeline constraints may again become an issue.

Another supply challenge is the risk associated with nearly all of the Valley's natural gas being delivered through one pipeline. Were a disaster or other event to cause disruption to the supply of natural gas from the Cut Bank line, residents and businesses in the Flathead that rely on natural gas for heating and cooking would have no alternative source.

The price of natural gas is affected by several factors, but the wholesale price of natural gas in Montana depends primarily on the interplay between supply and demand for Alberta's gas. Generally, natural gas supply has increased in the last few decades because of improvements to exploration and production technologies, investments in pipeline and transmission expansions, deregulation of the natural gas industry, and air quality regulations that favor natural gas. As a result, natural gas is providing for an increasing amount of electricity generation, especially in

[31] Montana Department of Environmental Quality, 2010. Understanding Energy in Montana.
[32] Ibid.

the Northwest. As a result, demand for natural gas has increased significantly. The result is that natural gas price volatility is expected to increase.[33]
The delivered price of natural gas in Montana has historically been relatively low, however prices have risen in recent years to be more in line with prices in the rest of the U.S. In 2009, the average price paid by NWE's residential customers was $10 per dekatherm (dkt).

Near term future gas prices are expected to decrease on average because of better recovery technologies, but remain volatile because of increasingly well integrated natural gas markets nationally (better connected distribution systems mean there is more competition for supply), the increasing role of natural gas in electricity generation, and the constraints of the distribution and storage system in responding to extreme events (like prolonged cold winter temperatures).

Propane

Propane is used in the Flathead Valley for a variety of end-uses – heating, cooking, and transportation. However its use is not sold through a single entity in the same manner as electricity and natural gas; there are at least nine different suppliers of propane in Flathead County. Therefore collecting data on the amount of propane used locally is a challenge.

Instead, the estimate of propane consumption in Flathead County is based off of Montana State data. In 2009, total propane use statewide was 9.5 trillion Btu. Assuming that Flathead County residents consume the average amount of propane used statewide, 2009 use was approximately 873 billion Btu, or approximately 5% of all energy consumed in the Flathead.

Most propane is used to heat homes and businesses. There are an estimated 8,000-9,000 customers in the County.[34] In 2009, the average price of propane sold in Montana was $1.78 per gallon.[35]

Wood

Wood is also a common fuel in Flathead County, used primarily for space heating but sometimes for cooking and other heat demand. Wood is harvested by individuals as well as by commercial businesses. No complete central data on wood use is available as a result. However, the U.S. Energy Information Administration (EIA) estimates that statewide wood use was roughly 15% of residential natural gas use. If this proportion holds true in Flathead County, residents consumed an estimated 293,000 MMBtu of wood in 2009, or less than 2% of total energy use.[36]

Heating Oil

Heating oil is becoming an increasingly smaller source of energy in Montana. In 2009, statewide use of heating oil was estimated to be 5% of residential natural gas use. If this holds

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[33] Ibid.

[34] Estimate based on information from City Service Valcon, one of the largest single propane suppliers.

[35] EIA, 2011. Petroleum & Other Liquids Data. http://www.eia.gov/dnav/pet/pet_pri_prop_dcu_r40_m.htm

[36] EIA, 2011. State Energy Profiles: Montana, http://www.eia.doe.gov/state/state_energy_profiles.cfm?sid=MT

true in the Flathead, residents consumed roughly 98,000 MMBtu of heating oil, or less than 1% of total energy use.[37]

Petroleum

Petroleum fuel sales data was obtained from the Montana Department of Transportation, which levies a tax on all mobile fuels sold in the state. A public records request was used to solicit gallons of fuel sold in Flathead County each year for the last five. Data is reported by fiscal year, which for the state government runs from July 1 to June 30. This data was reallocated to match calendar year use data reported for other fuels by assuming half of FY fuel use occurred in each calendar year within the fiscal year. Because of this, yearly data reported for transportation fuels is not necessarily precisely allocated to the appropriate year. However, because total fuel use reported is accurate, fuel tax data allocated in this way is still a good snapshot to use in understanding existing annual use.

In total, approximately 7,350,000 MMBtu of refined petroleum fuels were sold in Flathead County in 2009, which represents roughly 43% of total energy use. Some percentage of this fuel is consumed by through traffic, but there is no way to determine what percentage of fuel sales in the County is actually consumed locally.

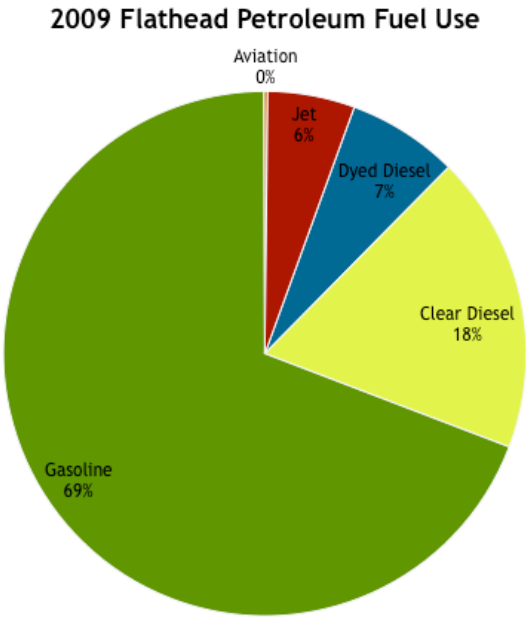


Figure 11 – Petroleum Fuel Sales in Flathead County in 2009 by Fuel Type

Montana has been producing petroleum products from wells in the central part of the state since the 19th century, however this production peaked in 1968. Better exploration and drilling techniques increased production again in the early 2000s, but since 2006, oil production has

[37] Ibid.

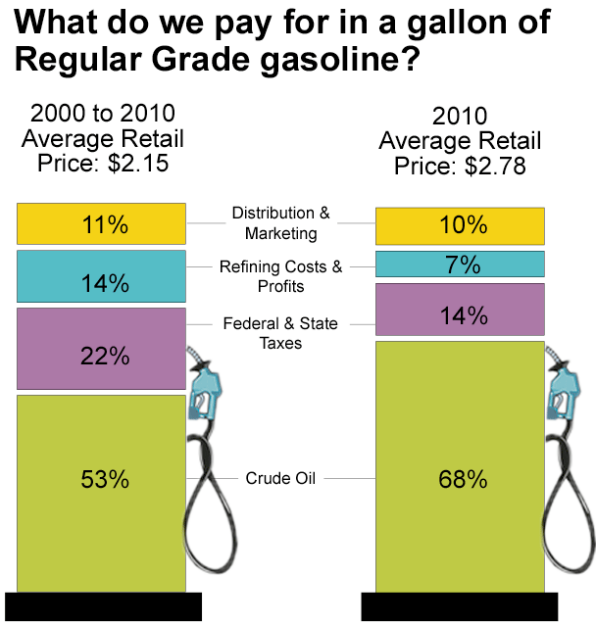
declined by 6% per year.[38] Nearly all (96%) of the crude oil produced in the State is exported. Instead, most of the crude oil refined and consumed in Montana comes from Alberta (85%).

Gasoline

More gasoline is consumed locally than any other petroleum product by far (at 69%). This is consistent with petroleum use on a national level, as gasoline accounts for 46% of all petroleum consumption in the United States, making it the largest product of crude oil. [39]. Gasoline also represents 17% of total U.S. energy consumption – at 380 million gallons per day.

In 2009, nearly 40 million gallons of gasoline were sold in Flathead County. This equates to a per capita gasoline consumption of roughly 440 gallons per year, which is actually lower than the state average of 528 gallons per year.[40] On heat content basis, gasoline provided about 4,900,000 MMBtu or 29% of total energy consumed in the Flathead.

According to the Montana DEQ, the price of gasoline in Montana tends to be close to the national average. In 2010, the average retail price of gasoline in the U.S. was $2.78 per gallon. This cost includes production, refining, distribution, and taxes (Figure 12).



Source: U.S. Energy Information Administration.

Figure 12 – Breakdown of what is covered in the retail price of a gallon of gasoline

The price of gasoline in Montana has risen dramatically since the 90s, and has expressed significant volatility in the last few years (Figure 13).

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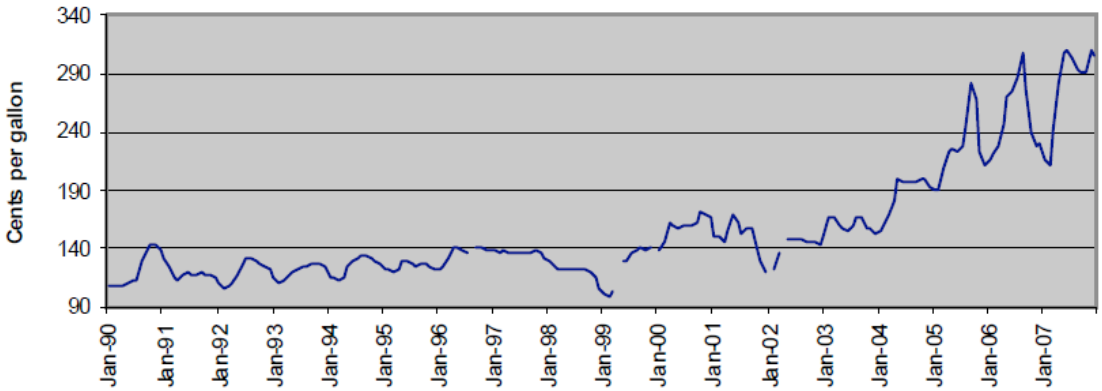
[38] Montana Department of Environmental Quality, 2010. Understanding Energy in Montana.

[39] EIA, 2009. http://www.eia.doe.gov/energyexplained/index.cfm?page=gasoline_use

[40] EIA, 2011. State Energy Profiles: Montana. http://apps1.eere.energy.gov/states/energy_summary.cfm/state=MT



* Average of all grades of gasoline statewide, in nominal dollars (some data missing).

Figure 13 - Historic Average Price of Gasoline in Montana[41]

Diesel

Diesel fuel is the second biggest source of transportation energy. In 2009, over 14,000,000 gallons of diesel fuel were sold in the County. Of this, a majority (~10,500,000 gallons) was clear diesel intended for use in on-road vehicles. The rest (~3,900,000 gallons) was dyed diesel intended for use in equipment and other off-road vehicles. Dyed diesel is not taxed, but data on dyed diesel sales is still collected by MT DOT.

On a heat content basis, diesel fuel provided approximately 2,000,000 MMBtu or roughly 12% of total energy use.

Jet and Aviation Fuel

Roughly 3,200,000 gallons of jet and aviation fuel were sold in Flathead County in 2009. This is about 430,000 MMBtu, or roughly 3% of total energy use.

Biodiesel and Ethanol

Biodiesel is an ester fuel produced by processing vegetable or animal oils that can be used in place of diesel fuel. It can be blended with regular diesel fuel (a 20% blend called B20 is most common) or used in pure form (B100) in most new diesel engines. A B20 blend is less toxic than regular diesel fuel, can improve fuel lubricity, and reduce carbon monoxide, particulate matter, and hydrocarbon emissions, without creating some of the operational challenges caused by using B100 (which has significantly lower energy content per gallon, can gel at cold temperatures, and can have issues of solvency).[42]

Ethanol is an alcohol fuel produced by fermenting sugars found in crops such as corn. Ethanol has been blended in some gasoline in Montana since the 1990s. A ten percent ethanol gasoline blend (E-10) can be used in regular engines and is commonly sold in most gas stations. Ethanol use has been encouraged by the U.S. DOE and the Montana DEQ because it can reduce carbon

[41] Montana Department of Environmental Quality, 2010. Understanding Energy in Montana.

[42] U.S. DOE, 2011. Alternative Fuels Data Center. http://www.afdc.energy.gov/afdc/fuels/index.html

monoxide emissions from transportation and it can displace imported oil. However, ethanol has been somewhat controversial because as a solvent it can negatively affect engine parts, especially those in older engines. The exact amount of ethanol sold in the Flathead is unknown because the ethanol portion of E-10 blends is not taxed by the state.

There are many efforts underway in Montana to better understand the role of locally produced biofuels, as well as to better understand the performance of such fuels. The Montana State University Northern 's Bio-energy Center and the Energy Research Center at MSU Bozeman are two leaders in U.S. biofuel research.

3.3 Existing Energy Use by Sector

Energy use data has also been broken down by sector in order to better understand the end-uses that account for energy demand.

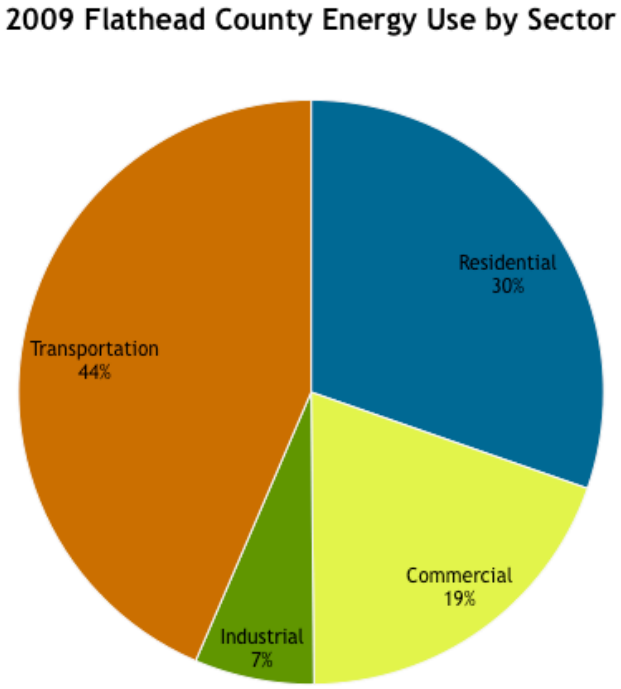


Figure 14 – Flathead County Energy Use by Sector

Buildings and facilities account for a majority of energy use in the Flathead, at just over 60%. However buildings and facilities have very different characteristics and associated challenges and opportunities (which are discussed in greater detail in Chapters 4 and 5), depending on the sector.

Residential

The residential sector consumed approximately 5.1 trillion Btu[43] and accounts for an estimated 30% of total energy use in the Flathead. The residential sector is comprised of facilities whose primary purpose is housing.

A typical Montana residence that has natural gas space and water heating, uses an estimated 7,000 kilowatt hours (kWh) of electricity and around 115 decatherms (dkt) of natural gas each year, for the following end uses:

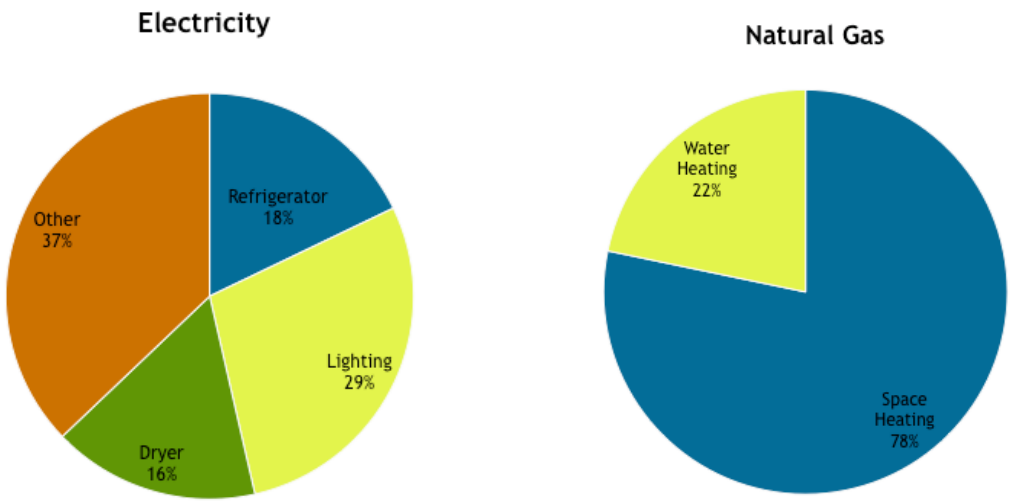


Figure 15 - Typical Montana Residential Energy End Use Breakdown[44]

While the typical home statewide uses natural gas for heat, many homes in the Flathead do not have natural gas and so water- and space-heating are instead provided by electricity, wood, propane, or heating oil.

There were 38,406 dwelling units reported in Flathead County during the 2010 census.[45] Of these, a majority (73%) is owner occupied which is good from an efficiency perspective since rented units often have a split incentive (the owner doesn't pay the energy bills). The most common type of residential unit is a detached, single family home (69%), followed by mobile homes (16%), and multifamily homes (13%). Most housing units (56%) were built before 1980, at which time the State had no energy code in place.[46]

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[43] Note: the sector energy use subtotals in Btu do not add to the total of 16.9 trillion Btu due to rounding.

[44] MT DEQ, 2008. Energy Savers Guidebook. http://deq.mt.gov/energy/default.mcpx

[45] U.S. Census, 2010. 2009 Census Data for Flathead County, MT. http://quickfacts.census.gov/qfd/states/30/30029.html

[46] Flathead County, 2007. Growth Policy, Chapter 3: Demographics and Housing.

Commercial

The commercial sector consumed approximately 3.3 trillion Btu[43] in 2009 and accounts for an estimated 19% of total energy use in the Flathead. The commercial sector is comprised of a wide spectrum of facilities with non-residential and non-manufacturing uses. Flathead Electric Cooperative makes the distinction between commercial and industrial accounts, but Northwestern Energy does not characterize non-residential in this way. As a result, some natural gas use characterized as commercial would be more appropriate to attribute to the industrial sector. The commercial sector encompasses a wide variety of building types and energy demands.

Industrial

The industrial sector consumed roughly 1.1 trillion Btu[43] in 2009 and accounts for an estimated 7% of total energy use in the Flathead in 2009. Industrial accounts are defined by Flathead Electric and are typically large energy users. Energy use in this sector fluctuates widely with economic productivity. The relatively small share of end-use energy use by the industrial sector illustrated in the 2009 baseline is likely to be a poor representation of the size of this sector during periods of greater economic activity. The relative size of the industrial sector in the Flathead depends heavily on the operational status of single entities like the Columbia Falls Aluminum Company (CFAC), F.H. Stoltze Land & Lumber, and Plum Creek.

CFAC provides an excellent illustration of the impact of single industrial entities. In 2011, Bonneville Power Administration proposed entering into a power purchase agreement with CFAC to provide 140 average MW of power, allowing the company to restart two of five potlines.[47] This electricity demand is roughly half the size of the peak demand for all Flathead electric customers, indicating that large users like CFAC can create an energy-use break-down that is dominated by the industrial sector.

Transportation

Treating transportation as a separate sector means that it is the single largest end-use of energy in the Flathead, at an estimated 7.3 trillion Btu[43] or 44% of total energy use. Data on the transportation sector in the Flathead includes all finished petroleum product sales reported by the State based on fuel tax revenues from Flathead County. This means that the data includes fuels purchased for many different transportation needs: personal vehicle use, commercial trucking, agricultural equipment, etc. It also includes fuels purchased by through traffic and as a result, some percentage of fuel use reported in the County is unaffected by any transportation strategies designed to reduce local fuel use (e.g. public transportation, trail networks, etc).

3.4 Existing Infrastructure

The condition of infrastructure – including facilities, utility transmission and distribution systems, roads, water and sewer systems, etc – has clear implications for energy use. Older facilities and systems are more inefficient than modern infrastructure, due to the out-dated

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[47] Bonneville Power Administration, 2011. Fact Sheet: Proposed Power Sales Agreement with Columbia Falls Aluminum Company.

design and materials used when it was built, or simply because its performance has degraded over time. Re-Powering the Flathead does not have extensive data on the conditions of existing infrastructure, but anecdotal evidence and the data that is available suggest that the age and constraints of existing infrastructure present significant challenges.

As stated in the discussion of the residential sector, many of the existing buildings in the Flathead are relatively old and constructed prior to any building energy code. This means that the quality of construction with respect to energy use is highly variable. Some buildings were built to be relatively efficient because energy efficient design concepts – good insulation, passive solar heating, etc – have been around for years. Prior to code adoption however, there was less to guarantee the energy performance of a building.

Energy supply infrastructure – most notably the electric and natural gas distribution systems – are also old and in need of significant upgrades to improve efficiency and ensure reliability. For example, Flathead Electric spent roughly $20 million in 2010 to expand substations, replace transformers, upgrade from 34.5 kV to 69 kV transmission lines, and replace defective underground cable installed in the 1970s, among other capital improvement projects. This was roughly 23% of FEC's total budget for 2010.[48]

Northwestern Energy also faces the challenge of aging and failing infrastructure. The distribution systems installed in the 1970s and 1980s are nearing the end of their expected life, and the statistical likelihood of failure is increasing. Also, NWE must repair gas lines when third parties accidentally hit lines while digging, an event that occurs nearly twice as often in Montana than the national average.[49] In 2011, the Public Service Commission approved a natural gas rate increase of about 5% to cover the costs of infrastructure improvements.

Transportation infrastructure – such as roads, rail lines, and trails – determines the efficiency of transportation system. The design of roads and signals affects traffic flow, vehicle miles traveled, idling time, and transportation mode choice. The highway 93 bypass is an example of investment in transportation infrastructure that can reduce fuel use by allowing through traffic to avoid start and stop driving through downtown. The growing trail network around the valley has enabled greater use of the bicycle, however the lack of any bike lanes on city streets makes in-town bike commuting less viable due to safety concerns than if lanes were in place.

Infrastructure challenges like these are important to understand when weighing the costs and benefits of maintaining and upgrading existing systems against the costs and benefits of building new facilities and infrastructure.

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[48] FEC, 2010. Your Flathead Electric Cooperative…2010 Rate Increase, Budget, and Facts.

[49] NWE, 2011. Distribution System Infrastructure Project.

3.5 Existing Energy Programs

There are many policies and programs already in place at a local, state, and national level that support greater adoption of energy efficiency measures and use of local energy resources. A few of those identified and explored by Re-Powering the Flathead are summarized in the following tables.

Table 7 – Existing Utility Programs	
Audits	
Flathead Electric	Provides free energy audits to customers whose primary source of heat is electricity through the Energy Fix Program. Audits identify cost effective energy saving improvements that could be made. More info: http://www.flatheadelectric.com/energy/
Northwestern Energy	Northwestern Energy provides free audits to Homeowners in the E+ Program. The small business appraisal program is only available to businesses that are on NEW's electric system. More info: http://www.northwesternenergy.com/NWEplus/index.aspx
Education	
Flathead Electric	Publishes a monthly newsletter called *Light Reading* that provides members with information about energy related current events. More info: http://www.flatheadelectric.com/newnews/newsletter/ Publishes several online educational resources such as the Home Energy Library, Kids Korner, and Fundamentals of Electricity. More info: http://www.flatheadelectric.com/
Northwestern Energy	Publishes a monthly newsletter called *Energy Connections* that provides members with information about energy related current events. More info: http://www.northwesternenergy.com/display.aspx?Page=Energy_Connections
Policies	
Flathead Electric	In 2011, FEC introduced a tiered rate structure for residential accounts that will encourage energy efficiency and conservation. Under the new rates, members will pay a different price per kWh for any use over certain thresholds: • 0—600 kWh 5.018¢ per kWh • 601—3,500 kWh 6.097¢ per kWh • > 3,500 kWh 8.719¢ per kWh More info: FEC Overview, 2010, http://www.flatheadelectric.com/

Table 7 – Existing Utility Programs	
Rebates	
Flathead Electric	Provides rebate incentives for a variety of residential and commercial energy efficiency programs, as well as custom incentives to large commercial and industrial customers. More info: http://www.flatheadelectric.com/energy/Rebates.html
Northwestern Energy	Provides rebate incentives for a variety of residential and commercial energy efficiency programs, as well as custom incentives to large commercial and industrial customers. More info: http://www.northwesternenergy.com/NWEplus/index.aspx
Renewable Energy Programs	
Flathead Electric	Provides customers with the option to pay a monthly premium to purchase green energy tags to support the development of wind energy. More info: http://www.flatheadelectric.com/efp/renew.html Provides net metering to members that install renewable generation systems on their homes or businesses, allowing them to credit generation against their bills. More info: http://www.flatheadelectric.com/energy/netmeter.html Adopted a policy on the procurement of renewable resources subject to its effects on rates, reliability, and FEC's financial resources. More information: www.flatheadelectric.com/newnews/Overview.pdf
Northwestern Energy	Provides incentives for the installation of small wind and solar systems, but only to electric customers. More info: http://www.northwesternenergy.com/display.aspx?Page=Renewable_Energy_Program
Tools	
Flathead Electric	Provides several free online tools to help members evaluate energy use and make energy related purchasing decisions including the Home Energy Calculator, Appliance Calculator, and Lighting Calculator. More info: http://c03.apogee.net/clients/?hostheader=flatheadelectric&utilityid=flatheadelectric
Northwestern Energy	Provides the Calc-U-Pal and the Commercial Energy Calculator to help customers understand energy use and savings opportunities. More info: http://www.northwesternenergy.com/display.aspx?Page=Calculators_MT&Item=330

Table 8 – Existing State Government Programs
Code
Montana adopted the 2009 Energy Conservation Code (IECC) in 2010. The 2009 version is expected to produce 15-18% in energy efficiency gains in comparison to the old standards. More info: http://deq.mt.gov/Energy/conservation/homes/NewHomes/BuildingCodes.mcpx
Education
Montana Department of Environmental Quality (DEQ) publishes a wide variety of energy related information for residents, businesses, schools, and other entities on the Energize Montana site: http://deq.mt.gov/energy/default.mcpx
Policies
Montana enabled net metering of small renewable resources in 1999, which allows utility customers to be credited for generation that they feed into the grid. Flathead Electric adopted a net metering policy in 2001. More info: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MT05R&re=1&ee=1
The Renewable Portfolio Standard (RPS), adopted in 2005, requires that 15% of electricity sold by private utilities in the State come from renewable energy by 2015. The RPS includes provisions for community scale renewable projects where local owners have a vested interest. While cooperative and municipal utilities are exempt, FEC adopted a policy to promote and maintain renewable energy if they can be purchased for less than a 10% premium over other resources. More info: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MT11R&re=1&ee=1
Programs
Montana established the Alternative Energy Loan Program (AELP) to allow residents and businesses to install alternative energy systems, which can also be packaged with efficiency improvements. In 2011, the AELP provided up to $40,000 to be repaid over 10 years at 4% interest. More info: http://deq.mt.gov/energy/renewable/altenergyloan.mcpx
Tax Credits
The Energy Conservation Installation Credit provides 25% of an investment in energy efficiency, up to $500 per individual, $1,000 per couple. More info: http://www.dsireusa.org/
The Alternative Energy Investment Tax Credit provides a 35% income tax credit on systems of $5,000 or more. More info: http://www.dsireusa.org/
The Renewable Energy Systems Exemption provides 100% property tax exemption to renewable energy properties for 10 years, up to $20,000 residential and $100,000 commercial/multifamily. More info: http://www.dsireusa.org/
The generation Facility Corporate Tax Exemption provides facilities of less than 1MW, 100% property tax exemption for 5 years. More info: http://www.dsireusa.org/
Tools
The Montana Department of Environmental Quality is providing free access to public entities for use of the EnergyCAP benchmarking tool in use for compliance with the Governor's 20X10 initiative. The City of Whitefish began using EnergyCAP in 2011. More info: http://svcalt.mt.gov/deq/EnergyCAP/

Table 9 – Existing Federal Government Programs
Education
The U.S. Energy Information Administration collects, analyzes, and disseminates independent and impartial information related to energy use in the U.S. More info: http://www.eia.gov/
The Office of Energy Efficiency and Renewable Energy provides a multitude of information on energy efficiency and renewable energy sources. More info: http://www.eere.energy.gov/
The Database for State Incentives for Renewable Energy (DSIRE) provides information on incentives and grant programs available from the federal government and in each state. More info: http://www.dsireusa.org/
Policies
The last Federal energy legislation – The Energy Independence and Security Act of 2007 (EISA) enacted a variety of key energy provisions including: • *Corporate Average Fuel Economy (CAFE)*. The law sets a target of 35 miles per gallon for the combined fleet of cars and light trucks by model year 2020. • *Renewable Fuels Standard (RFS)*. The law sets a modified standard that starts at 9.0 billion gallons in 2008 and rises to 36 billion gallons by 2022. • *Energy Efficiency Equipment Standards.* The adopted bill includes a variety of new standards for lighting and for residential and commercial appliance equipment. The equipment includes residential refrigerators, freezers, refrigerator-freezers, metal halide lamps, and commercial walk-in coolers and freezers. • *Repeal of Oil and Gas Tax Incentives.* The enacted law includes repeal of two tax subsidies in order to offset the estimated cost to implement the CAFE provision.
Programs
Rural Energy for America Program (REAP) Grants: grants up to 25% of project cost, loan guarantee up to 75%; for agricultural and small rural businesses. There are several other related grants offered by the USDA. More info: http://www.rurdev.usda.gov/RD_Grants.html
Energy Efficiency Mortgages (EEMs) are loans insured by the Federal Housing Authority that allow lenders to add up to 100% of the cost of energy efficiency improvements to an existing mortgage. More info: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US36F&re=1&ee=1
Clean Renewable Energy Bonds (CREBs): 0% interest rate bonds; bondholder receives tax credits in lieu of interest; available to public entities only. The last round of allocations closed on 11/01/2010, but the program may be extended. More info: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US45F&re=1&ee=0
Tax Incentives
There are many energy related tax incentives offered by the Federal Government including: • Energy Investment Tax Credit (ITC): income tax credit of some % of system costs • Energy Production Tax Credit (PTC)/Renewable Energy Production Incentive (REPI): per kilowatt hour credit based on generation • Residential Energy Efficiency Tax Credit: credit against a % of efficient equipment costs More info: http://www.dsireusa.org/incentives/index.cfm?state=us&re=1&EE=1
Tools
The DOE/EPA Energy Star collaboration created a tool called Portfolio Manager that allows facility managers to benchmark and monitor energy use. More info: http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager
The DOE Building Technologies Program has a directory of Building Energy Software Tools: http://apps1.eere.energy.gov/buildings/tools_directory/

3.6 Energy Success Stories

Re-Powering the Flathead has discovered many stories of residents and local organizations harnessing cost savings and other benefits from investments in energy efficiency or local energy supply. The following table lists success stories that Re-Powering efforts have identified, and more details on specific examples are contained in Appendix B.

Table 10 - Energy Success Stories	
Pilot Projects	
Calm Animal Care	Installed a photovoltaic system that reduces power costs and provides needed reliability for equipment and operations during outages.
City of Boise, Idaho	Built a district heat system that supplies heat and hot water to over 55 businesses in downtown Boise.
City of Boulder, Colorado	Incorporated eight hydroelectric generators into the city's municipal water system that provide enough electricity to support 18% of city residential electricity needs.
City of Kalispell	Utilizes methane generated by the wastewater treatment process as a heat source that displaces natural gas, which would cost roughly $30,000 annually.
	Audited lift stations and identified energy and cost savings that will be achieved through upgrading and consolidating old stations.
	Installed roundabouts at several intersections around Kalispell, which are saving traffic signal energy and operation costs, while increasing safety.
City of Midland, South Dakota	Installed geothermal heating systems in elementary and high schools over 30 years ago that have helped keep the annual utility costs for the district down to about $10,000.
City of Whitefish	Signed a power purchase agreement with Flathead Electric to help finance the refurbishment of a city hydroelectric project.
	Built the new Police and Fire Building to utilize solar hot water and radiant floors to reduce energy use in the truck bay.
Clearwater Biological	Will be supplying its locally produced biodiesel to City Service Valcon.
Community Action Partnership	Received a grant to implement 20 pilot solar hot water heating projects.
Flathead County Landfill	Landfill Gas to Energy project built at the Flathead County Landfill has been generating power from methane gas (that was previously flared with no benefit) for between 900-1,500 households at a cost to Flathead Electric of roughly 5 cents per kilowatt-hour (kWh).
Flathead Electric Cooperative	Smart meter pilot project is underway and will provide data on how information and controls can improve energy demand and time of use decisions. Installed a geothermal heat pump on its premises, proving the viability of the technology for commercial/industrial facilities.
Flathead Electric Cooperative	Installed a geothermal heat pump on its headquarters, proving the viability of the technology for commercial/industrial facilities.
Glacier High School	Installed a biomass boiler that uses hog fuel – shredded and ground wood fibers – to heat the high school. It costs the school roughly $53,000 less than meeting heat demand with natural gas.
Huls Dairy	Provides all of its on-site power from methane produced in a digester.
Turnbull Hydroelectric	The Greenfields Irrigation District partnered with Northwestern Energy and the State to install 15 MW of generation in an existing irrigation canal.
Whistler Blackcomb	Installed a 7.9 MW turbine in the snowmaking water collection system.

Energy-Efficient Building Projects	
Apgar Transit Center	Uses passive design to minimize heating and lighting energy needs, native plants to minimize irrigation energy and water needs, and high performance building materials and systems. All strategies helped the building earn LEED certification.
Community Action Partnership	Administers a Weatherization program that provides free materials, labor, and technical assistance to help low income residents reduce home heating costs.
Flathead County	Completed major facility retrofits through a performance contract with Johnson Controls that will save $161,000 annual energy and operations costs.
Flathead County, and the Cities of Kalispell and Whitefish	Harnessed Energy Efficiency and Conservation Block Grant (EECBG) funding to implement facility upgrades saving taxpayer money on energy and operation costs.
Four hospitals in the state of Montana (in Missoula, Browning, & Fort Harrison)	Currently participating in the American Society for Healthcare Engineering's Energy Efficiency Commitment (E2C) challenge to health care facility managers to encourage them to measure, report, and reduce energy use through Energy Star certification.
Habitat for Humanity of Flathead Valley	Is in the early stages of pursuing Energy Star ratings on a new 16-unit development in Columbia Falls.
General Public	Many residents, through audit and incentive programs, have upgraded the efficiency of their homes, improving comfort and cost performance.
Kalispell Regional Medical Center	Adopted a Strategic Energy Management Plan that has led to a roughly 20% reduction in energy use and reduced costs from over $1.2 million to roughly $850,000 per year.
Montana Department of Natural Resources and Conservation (DNRC)	Earned LEED certification for its Kalispell office, making it the first State of Montana owned facility to do so. Many of the lighting and ventilation strategies used to save energy create a better space for occupants.
Plum Creek	Installed a voltage monitoring and optimization system that generates savings of roughly $150,000 per year.
Saddlehorn	Is an energy efficient subdivision built using design strategies intended primarily to enhance the character of the community.
State of Montana	Adoption of the 2009 International Energy Conservation Code is driving down energy costs (15-18% beyond previous energy code) in new buildings.
The Summit Medical Fitness Center	Is retrofitting electronics and lighting at a cost that will be recovered by energy savings within one year.
Whitefish Housing Authority	Provides energy efficient units for low-income residents.

Incentive Programs	
City of Missoula and Northwestern Energy	Collaborated to establish the Green Blocks program to audit and retrofit many homes in geographic proximity in order to harness economies of scale with the program.
Flathead Electric Cooperative	Energy Fix Home Audit program is providing free assistance to homeowners in identifying cost effective home improvements.
	Devised a new, tiered block rate structure to provide incentives for conservation and for fair allocation of fixed costs and marginal power supply costs.
Flathead Electric Cooperative and Northwestern Energy	Incentives offered by both FEC and Northwestern Energy have been enabling many residents to retrofit their homes and businesses and save energy costs.
Lewis & Clark County, MT and Northwestern Energy	Is starting a commercial audit and incentive program in conjunction with Northwestern Energy, using an EPA grant that will target small commercial facilities.
Infrastructure Improvements	
City of Kalispell	Has audited lift stations and identified energy and cost savings that will be achieved through upgrading and consolidating old stations.
City of Whitefish	The Fish Trails system has provided miles of trails to pedestrians and cyclists within the City of Whitefish. Plans are in place to expand the network to over 40 miles of trails.
Flathead County	Has been optimizing and downsizing its vehicle fleet in order to have appropriate vehicles for their intended use, yielding fuel cost savings to County taxpayers.
	Flathead County Trails Plan has laid a framework for a continuous and comprehensive trail network in the Flathead.
Flathead County, Glacier National Park, and MT DOT	Partnered to provide free shuttle services within Glacier National Park in order to reduce personal vehicle use, saving visitors costs, and reducing congestion and increasing safety in the park.
Flathead Electric Cooperative	Has already upgraded meters in its service territory to advanced meters that allow for automatic readings, thus saving energy and costs of reading meters.
Job Creation and Training	
Algae AquaCulture Technologies	Built a commercial scale greenhouse at Stoltze Land and Lumber to use wood waste and waste heat to grow algae and produce methane, electricity, and high quality organic fertilizer.
Blackfoot Community College	Installed a wind turbine on campus that reduces electricity costs by roughly 50% and provides onsite renewable energy training opportunities.
School District 5, Flathead Valley Community College, and Flathead Electric Cooperative	Student Built Homes Project is a collaboration between local high schools, FVCC, and Flathead Electric that is allowing students to get hands-on construction experience with energy efficient homes.
Zinc Air, Inc.	Local energy start-up has reached a payroll of roughly $2 million in its first year of operations. Just signed a letter of intent with Juhl Wind, Inc., of Woodstock, MN, for the installation of a 1-megawatt advanced energy storage system developed by Zinc Air.

Chapter 4: Energy Challenges

Introduction

The fundamental goal of Re-Powering the Flathead is to understand energy related challenges experienced in the Flathead as well as opportunities to address them while harnessing economic, social, and environmental benefits in the process.

Table 11 summarizes the challenges and opportunities identified by Re-Powering the Flathead that are addressed in detail in the following two chapters. Specific challenges and opportunities are grouped into categories to help make a connection between real world problems identified and potential solutions to address those problems. For example, for every facility manager that articulated that energy costs are of paramount concern, there were several more who described programs and projects they have used to lower their organization's energy budget.

Table 11 – Summary of Challenges and Opportunities

Chapter 4: Challenges	Chapter 5: Opportunities
Managing the cost of energy	Use conservation and efficiency to reduce energy costs
Addressing the risk of supply disruptions and price spikes	Develop local energy resources
Maintaining and updating existing infrastructure and facilities	Expand energy programs to maintain and update infrastructure and facilities
Obtaining good information	Develop, consolidate, and disseminate better information
Understanding and navigating the current regulatory framework	Understand and advocate for improvements to the regulatory framework
Overcoming organizational barriers and managing cultural expectations	Use organizational policies and communication strategies to shift cultural expectations

Challenges

Stakeholders identified numerous energy related challenges; however they were able to identify a far greater number of opportunities, many of which address specific local challenges.

One of the primary goals of Re-Powering the Flathead is to identify and understand energy related challenges experienced by valley residents and businesses. The better these challenges are understood, the more informed decision-makers will be to address them. Challenges are defined broadly to include any issues related to energy production and use, as well as barriers to the implementation of technologies and strategies that achieve benefits such as cost savings and energy independence.

Challenges were identified partly through research and the process of developing the current picture, as well as through focus groups and a series of interviews with stakeholders from diverse sectors.

Energy challenges identified by stakeholders in the Flathead can be categorized primarily as issues of:

4.1. Cost
4.2. Risk
4.3. Infrastructure
4.4. Information Limitations
4.5. Regulatory Framework
4.6. Organizational Barriers and Cultural Expectations

Each of the following sections explores local manifestations of the challenges identified by the Re-Powering the Flathead research and public engagement process.

4.1 Cost

Fundamental Challenge: Managing the cost of energy

By far the most commonly referenced challenge related to energy is cost. Stakeholders commonly stated that the primary goal of any energy management efforts is to minimize the amount spent on energy. Many stakeholders expressed concern over rising costs, the high up-front cost barrier to investment in alternatives or efficiency measures, and the cost of human resources required to implement energy projects. Table 12 provides details on the specific cost related challenges identified in the Flathead.

Table 12 - Cost Related Challenges	
4.1.1	*The cost of energy can be a significant percentage of annual operating budget.* Organizations and individuals cited spending anywhere from 5-15% of their annual budget on energy costs.
4.1.2	*Low energy costs do not incentivize long-term efficiency.* Historically low electricity and natural gas rates in the Flathead have prevented many building owners from thinking about the life cycle cost of their building. Many buildings were constructed to minimize up-front cost, leaving their owners with relatively high-energy use. These building owners are much more susceptible to extreme weather or energy price increases.
4.1.3	*Low energy costs do not incentivize investment in alternative sources.* Historically low electricity and natural gas rates have prevented utilities, businesses, or homeowners to develop alternative sources of energy supply. The result is that we have a homogenous energy supply portfolio.
4.1.4	*Up-front costs of energy retrofits prohibit investment.* The initial capital outlay required for building retrofits, premium energy efficiency features in new construction, or efficient appliances is often too expensive for individuals to cover out of pocket, even for projects with a good return on investment.
4.1.5	*Infrastructure improvements are not always factored into the cost of energy.* The initial cost of investment in infrastructure, for example building transmission lines, is factored into the cost of energy however the ongoing maintenance and eventual replacement of infrastructure is frequently not included in the price paid for energy.

Understanding these challenges is important not simply to acknowledge the difficulties experienced by residents and businesses; rather the identification of challenges allows for the articulation of areas of opportunity. Specific opportunities that will help address cost related challenges are explored in Section 5.1.

4.2 Risk

Fundamental Challenge: Addressing the risk of supply disruptions and price spikes

Many stakeholders commented on issues of risk surrounding energy supply and energy price. Most of our current energy sources are imported from out of the valley. As a result, very few stakeholders have control over the supply or cost of energy they use. Table 13 provides details on risk related challenges identified in the Flathead.

Table 13 – Risk Related Challenges	
4.2.1	*The price of many sources of energy is volatile and difficult to predict.* Petroleum and natural gas markets are especially known for exhibiting price volatility due to a number of factors including the global nature of these commodities, futures markets and speculation, the volatile nature of demand for these resources (e.g. weather variation), events that cause supply shortages (e.g. political instability in the middle east), and others. Residents who depend on these fuels for heating their homes or businesses and driving their vehicles have little guarantee that the price they pay for energy at the time of a given investment (e.g. a new house) will be the price they pay for energy over the life of that investment.
4.2.2	*The supply of imported energy sources is uncertain.* There are multiple factors contributing to supply uncertainty. The biggest factor is that neither Montana nor any local entities can guarantee the supply of energy imported from elsewhere. Entities like fossil fuel producers in Canada can choose to sell their products in other markets if they can secure higher prices. Bonneville Power Administration has begun implementing a cap on Tier 1 (lowest cost) hydropower resources that is the first sign of limited low cost electricity supply. Another cause of supply uncertainty is the finite nature of fossil fuel resources.
4.2.3	*There is uncertainty surrounding the price of firm contracts for power or natural gas offered to new large users of electricity or natural gas.* Stakeholders expressed concern that because of the Bonneville Power Administration (BPA) cap on Tier 1 (lowest cost) hydropower resources, there is significant uncertainty surrounding the price that would be offered to new direct service customers to BPA. Similarly, the Northwestern Energy natural gas transmission system is at capacity and new firm contracts for natural gas may be difficult or expensive to procure. Both of these concerns may prohibit large industrial or commercial businesses from relocating to the Flathead.

The identification of these challenges allows for the articulation of areas of opportunity. Specific opportunities that will help address risk related challenges are explored in Section 5.2.

4.3 Infrastructure

Fundamental Challenge: Maintaining and upgrading existing infrastructure and facilities

The age and constraints of existing facilities and infrastructure was a commonly referenced challenge. Specific challenges related to maintaining and upgrading facilities and infrastructure are outlined in Table 14.

Table 14 – Infrastructure Related Challenges	
4.3.1	*We inherit the challenges of buildings caused by poor initial design decisions.* Many buildings were constructed prior to the adoption of building energy codes. Also, many newer buildings were not built to comply with energy code in efforts to minimize first costs. Owners of inefficient facilities have higher energy costs than buildings that are well built (from an energy perspective) initially. Also, it is often very difficult to retrofit an existing building to be as energy efficient as a new, code-compliant building because of the design decisions made initially.
4.3.2	*Natural gas and electricity transmission infrastructure are aging and are at capacity.* Both the electric and natural gas transmission systems would need to be upgraded to accommodate significant new deliveries of energy into the Flathead. Moreover, aging infrastructure requires significant maintenance and upgrade costs regardless of demand growth.
4.3.3	*Many residents and businesses are served by two energy utilities (Flathead Electric Co-op and Northwestern Energy), making them ineligible for some incentive programs.* Home or business owners must rely on electricity for home heating in order to receive incentives from Flathead Electric for upgrades to building envelopes. Northwestern Energy does not extend all of its programs to customers who do not use electricity provided by Northwestern (i.e. residents and businesses in the Flathead, none of which purchase electricity from NWE) or who do not heat their homes with natural gas.
4.3.4	*Power supply in the northwest region is becoming capacity constrained rather than energy constrained.* The region used to be constrained by the amount of energy produced in the hydropower system, especially during low water years. However, in recent years, due to growing peak demand and a larger share of intermittent resources, the region is constrained by the maximum amount of power it can produce instantaneously, rather than total generation.
4.3.5	*Use of on-demand appliances and other equipment is not currently scheduled in relation to peak demand.* The use of electrical equipment in homes and businesses is not scheduled relative to the peak demand experienced by Flathead Electric. This can lead to much larger peak demand (and higher overall costs) than if electricity users were aware of when they are using energy, and how much more it costs the Co-op to procure when it is coincident with peak demand.
4.3.6	*There are limited viable transportation alternatives due to low density, long-driving distances, and lack of infrastructure.* The spread out geography and low population density of Flathead County makes the development of transportation alternatives (transit systems, trails, etc) more expensive than in higher density areas.

The identification of these challenges allows for the articulation of related areas of opportunity. Specific opportunities that will help address infrastructure and facilities related challenges are explored in Section 5.3.

4.4 Information Limitations

Fundamental Challenge: Obtaining good information

Many stakeholders felt that it was difficult to obtain good information about energy use or energy related decisions. Specific information related challenges mentioned are provided in Table 15.

Table 15 – Information Related Challenges	
4.4.1	*There is no single clearinghouse for information on energy.* Stakeholders do not know where to go first for information when attempting to make an energy-related decision.
4.4.2	*It is difficult to find a balanced, objective perspective on the pros/cons of various energy investment decisions.* Stakeholders believe there to be a lot of misinformation surrounding energy issues and that there is no clear authority when attempting to navigate the debate over a given issue.
4.4.3	*It is difficult to find and navigate appropriate grants and financing options.* There is no liaison or communication between entities working to find and obtain grants.
4.4.4	*Information on building energy performance is difficult to find and/or understand.* There are only a few mechanisms for obtaining information on facility energy performance currently in use locally (past bills, energy audits, benchmarking tools, building energy certifications like Energy Star, etc), and these are not used widely when owners are purchasing or constructing a building.
4.4.5	*There is a lack of knowledge of tools for understanding investment decisions: costs, payback, incentives, etc.* Few stakeholders knew of any tools or resources for understanding investment decisions: the costs of alternatives, calculating payback, the impact of incentives, etc.
4.4.6	*There is a lack of awareness about incentive and financing programs available, how to harness them, and the benefits of doing so.* One specific example mentioned by stakeholders is that energy efficient mortgages are rarely used, however they are an excellent tool for financing additional efficiency investments in homes.
4.4.7	*There is no source to find contractors and construction companies that reliably meet energy standards.* There are some resources for installers, such as those approved by Flathead Electric to install energy retrofits, however many stakeholders were unaware of that list. There is also no local source of information on the energy expertise of the building construction industry.
4.4.8	*There is a lack of consensus about long-term priorities for the community.* There has been no comprehensive community forum or process to determine priorities for our community in regards to energy use.

The identification of these challenges allows for the articulation of related areas of opportunity. Specific opportunities that will help address information related challenges are explored in Section 5.4.

4.5 Regulatory Framework

Fundamental Challenge: Understanding and navigating the current regulatory framework

Some of the challenges experienced in the Flathead are related to the current regulatory climate. Lack of consistency and understanding are the biggest issues related to energy policy issues.

Table 16 – Regulatory Framework Related Challenges	
4.5.1	*Only electricity and natural gas customers can access existing utility incentive programs.* Residents and businesses that use propane, wood, or other fuels to heat their homes do not benefit from the incentive programs that support investments in energy efficiency.
4.5.2	*Building energy code is poorly understood and therefore compliance is not always sought by building owners.* In unincorporated areas of the County there is no building code enforcement and builders are required to self certify. Without homeowners understanding the benefits of building to code, they are unlikely to require their contractors comply thoroughly with code.
4.5.3	*There are currently not strong enough incentives to invest in energy efficiency or penalties for excessive energy consumption or waste.* Some stakeholders expressed frustration that price signals are not always well aligned to encourage energy efficient building construction or appliance purchases. The new, tiered rate structure adopted by FEC was cited as a success at remedying the problem of price signals.
4.5.4	*There is a lack of consistency at a federal level.* Many of the incentives for energy efficiency and renewable energy expire every few years, creating boom and bust cycles for the businesses that invest in energy technologies.

The identification of these challenges allows for the articulation of related areas of opportunity. Specific opportunities that will help address regulation and policy related challenges are explored in Section 5.5.

4.6 Organizational Cultural Expectations

Fundamental Challenge: Overcoming organizational barriers and managing cultural expectations

Many of the challenges cited by stakeholders were not technical challenges but rather were issues of human behavior.

Table 17 – Organizational and Cultural Expectations Related Challenges	
4.6.1	*Apathy is a big problem.* Energy issues and energy costs are lower priorities for many individuals and organizations than other more visible, immediate concerns.
4.6.2	*There is no quick reward in investing in energy efficiency.* The benefits of investments in energy efficiency are manifested over time, and are not as visible or entertaining as many other household investments.
4.6.3	*People are likely to do what they have always done.* Habit and risk aversion create barriers to the adoption of new technologies and operational practices.
4.6.4	*Human resources are limited.* The amount of time it takes to research and apply for grants and incentives, or to follow up on the recommendations made in an energy audit is often prohibitive. Energy projects and programs are much lower on the list of priorities for many business owners and homeowners than other demands on their time. As one facility manager put it "you don't think about draining the swamp when you're busy fighting alligators."
4.6.5	*Energy issues are highly politicized.* Many opinions about energy issues are influenced by rhetoric and misinformation.
4.6.6	*There is a lack of trust in the Flathead that efforts underway in other communities are relevant here.* There is often skepticism about whether projects or programs that worked elsewhere are relevant here, and a prevailing attitude that "outsiders should not tell us what to do."
4.6.7	*There is little awareness or concern regarding the connection between material consumption and energy.* Few people make a connection between the food and goods they consume and the energy required to manufacture, grow, ship, and dispose of those goods.
4.6.8	*Biking on roads is not viewed as a safe alternative mode of transportation because of the negative and aggressive attitude of drivers towards cyclists.* Stakeholders cited being the target of aggressive behaviors such as crowding, honking, or cursing when biking on roads in the Flathead.

The identification of these challenges allows for the articulation of related areas of opportunity. Specific opportunities that will help address organizational and cultural challenges are explored in Section 5.6.

Chapter 5: Opportunities

The most important conclusion of the stakeholder outreach and research process conducted by Re-Powering the Flathead is that there are many meaningful opportunities to improve upon the current picture of energy use in the Flathead.

Introduction

One of the primary goals of Re-Powering the Flathead is to identify and understand energy related opportunities available to valley residents and businesses. Many different opportunities have been illustrated by the success stories popping up around the Flathead, State, and beyond.

The better these opportunities are understood, the more informed decision-makers will be to harness them. Opportunities are defined broadly to include many different opportunities related to energy production and use, as well as the implementation of technologies and strategies that achieve benefits such as cost savings, job creation, and energy independence.

Energy opportunities identified by stakeholders in the Flathead are to be found in many areas including:

5.1. Conservation and Efficiency
5.2. Local Energy Supply
5.3. Energy Programs
5.4. Information
5.5. Regulation, Financing, and Pricing
5.6. Organizational and Cultural Changes

Each of these opportunities is explained in detail in this chapter. Following the explanation is a table of possible strategies to harness each opportunity. Opportunities were identified partly through research and the process of developing the current picture, as well as through focus groups and a series of interviews with stakeholders

from diverse sectors. Opportunities are numbered strictly for ease in referencing specific opportunities; the numbers do not indicate priority or importance.

The most important conclusion of the stakeholder outreach and research process conducted by Re-Powering the Flathead is that there are many meaningful opportunities to improve upon the current picture of energy use in the Flathead. The next step is for decision makers to prioritize among these opportunities and proceed with implementation.

5.1 Conservation and Efficiency

> Fundamental Opportunity: Use conservation and efficiency to reduce energy costs.

There was overwhelming consensus by stakeholders that conservation and energy efficiency represent some of the most important energy related opportunities in the Flathead to harness local economic benefits, especially by reducing energy costs.

The potential for efficiency and conservation are exceedingly important given that so many stakeholders mentioned management of energy costs as the biggest energy related challenge they face. The opportunities in conservation and efficiency can help overcome the specific challenges identified in Section 4.1.

Industry data on the cost effectiveness of energy efficiency investments was supported by success story after success story in which building owners found significant savings through cost effective changes to operations and retrofits, or efficient new building construction (see Appendix B).

Moreover, there are already many programs and incentives in place to support energy efficiency and conservation that can be enhanced through greater leadership by local organizations.

Further adoption of conservation and efficiency practices will reduce the budget that businesses, organizations and individuals must spend on energy, freeing up more money to spend in the local economy on other goods and services. Moreover, many of the specific technologies to improve efficiency rely on local labor and (in some cases) materials.

The main opportunities available in conservation and efficiency are seen as:

- Improve efficiency in existing buildings and infrastructure
- Improve efficiency in new construction projects
- Improve efficiency of transportation
- Conserve energy that is not needed

Table 18 summarizes specific opportunities identified by the stakeholder outreach and research process that are possible strategies for organizations and individuals to harness the benefits of conservation and efficiency.

Table 18 – Opportunities to Promote Conservation and Efficiency

Opportunities in Conservation & Efficiency		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.1.1	Establish energy use baseline for buildings and develop energy efficiency targets.	**Public Sector, Private Sector** Utilize tools such as ENERGY STAR Portfolio Manager and Energy CAP to benchmark, monitor, and improve building energy performance. Set targets such as "reduce building energy intensity (BTU/sq ft) by 20% by 2020".	• Overview of EPA Portfolio Manager. http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager • Montana DEQ is providing free access to Energy CAP for public facilities: http://svcalt.mt.gov/deq/EnergyCAP/	*Costs*: • Staff time to track energy use annually relative to baseline and targets *Benefits*: • Greater likelihood of energy cost reductions if targets set and tracked
5.1.2	Audit existing buildings to quantify energy use and indentify opportunities for energy savings	**Public Sector, Private Sector, Residential** Efficiency retrofits in public facilities is a highly visible means of showing leadership in energy efficiency – especially if the City/County showcases efficiency measures in high-traffic buildings and demonstrates that efficiency retrofits are cost effective.	• Flathead Electric Co-op offers free audits to residential and non-residential customers that use electricity for space heating: http://www.flatheadelectric.com/ • Northwestern Energy offers free audits to residential and non-residential customers: http://www.northwesternenergy.com/display.aspx?Page=Commercial_Energy_Appraisal_MT	*Costs:* • Cost for conducting audits; provided free by utility companies *Benefits* • Audits help prioritize capital investments and identify cost-effective savings measures
5.1.3	Assess existing infrastructure for cost effective energy savings opportunities.	**Public Sector, Private Sector** Examples of infrastructure that may have cost effective savings opportunities include water and sewer infrastructure that has large pumping energy demand.	• The EPA's water infrastructure site provides resources and case studies on harnessing energy efficiency opportunities in water supply and treatment. http://water.epa.gov/infrastructure/sustain/waterefficiency.cfm • Milford, CT implemented lift station efficiency improvements that paid back in 5 years and save nearly $3,000 per year to the City. http://www1.eere.energy.gov/industry/bestpractices/case_study_lift_station.html	*Costs:* • Cost for conducting audits; provided free by utility companies *Benefits* • Audits help prioritize capital investments and identify cost-effective savings measures

Opportunities in Conservation & Efficiency		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.1.4	Develop retro-commissioning program for existing buildings	**Public Sector, Private Sector** Develop a plan to incorporate retro-commissioning into O&M procedures in facilities. Retro-commissioning is a process by which existing buildings are restored to optimal performance through low- or no-cost improvements.	• Definitions: http://www.green.ca.gov/CommissioningGuidelines/default.htm • The Building Commissioning Association has best practices for Commissioning in existing buildings: http://www.bcxa.org/ • Kalispell Regional Medical Center has achieved roughly 20% energy savings since 2004 using operational changes, retrofits, and retro-commissioning.	*Costs:* • Staff or consultant time to develop retro-commissioning program • Cost to perform retro-commissioning, typically $.10 to $1.00 per square foot.[50] *Benefits:* • Energy savings typically provide a one- to three-year payback • 5-20% energy savings
5.1.5	Develop commissioning standards for new buildings	**Public Sector, Private Sector** Develop commissioning requirements for all new buildings. If LEED certification is pursued, consider targeting the advanced commissioning credit.	• Montana DEQ provides commissioning resources include Best Practices in Commissioning in the State of Montana. http://deq.mt.gov/energy/buildings/default.mcpx#commissioning • The Building Commissioning Association is developing Best Practices for New Construction. http://www.bcxa.org/	*Costs:* • Cost to perform retro-commissioning, typically $.10 to $1.00 per square foot.[51] *Benefits:* • Energy savings typically provide a one- to three-year payback • 5-20% energy savings
5.1.6	Develop a multi-year implementation plan for capital intensive retrofits identified via audits	**Public Sector, Private Sector** Schedule the cost-effective measures identified via the audit program into a plan based on annual budget available for energy efficiency projects. This plan could be supported by a revolving fund as well as grant funds.	• California Energy Commission Handbook: How to Finance Public Sector Energy Efficiency Projects: http://www.energy.ca.gov/reports/efficiency_handbooks/400-00-001A.PDF	*Costs:* • Cost for making efficiency improvements; Investment cost typically $.40-$1.0/first year kWh savings.[52] *Benefits* • Cost savings from reduced energy consumption that meet or exceed initial investment over life of retrofits

[50] http://energyexperts.org/EnergySolutionsDatabase/ResourceDetail.aspx?id=2665

[51] http://energyexperts.org/EnergySolutionsDatabase/ResourceDetail.aspx?id=2665

[52] From data developed through the San Francisco Public Utilities Commission Integrated Resource Planning process.

Opportunities in Conservation & Efficiency		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.1.7	Develop an implementation plan for low/no-cost measures identified via audits	**Public Sector, Private Sector** Schedule an implementation for low/no-cost measures based on staff availability. Designate the appropriate staff responsible for implementation.	• KRMC adopted a Strategic Energy Management Plan that outlines operational changes that yield energy cost savings. http://www.betterbricks.com/healthcare/case-studies/17044/2	*Costs:* • Cost for making low-cost efficiency improvements; *Benefits* • Cost savings from reduced energy consumption that meet or exceed initial investment over life of retrofits
5.1.8	Work with local utilities to access technical assistance and financial incentives.	**Public Sector, Private Sector** Partner with Flathead Electric and Northwestern Energy to harness appropriate incentives in all existing facilities.	• Flathead Electric Co-op: http://www.flatheadelectric.com/ • Northwestern Energy: http://www.northwesternenergy.com/display.aspx?Page=Business_Service_MT&Item=103	*Costs:* • Staff time for coordination with utilities *Benefits* • Free energy audits, rebates to offset costs of other actions
5.1.9	Add an energy efficiency considerations to the capital project review process to ensure that energy efficiency is being adequately addressed in new construction projects	**Public Sector, Private Sector** Identify and meet with department staff most involved in capital improvements planning. Develop a process by which life cycle energy costs are weighed.	• Johnson Controls developed guidance for allocating organizational budget for energy efficiency: http://www.institutebe.com/clean-energy-finance/energy-efficiency-corporate-budgets.aspx	*Costs:* • Staff or consultant time to develop process for addressing energy efficiency • Higher up-front project costs *Benefits* • Life cycle energy cost savings that reduce utility budget; should offset higher project costs if the process is designed well
5.1.10	Develop a policy that requires the purchase of ENERGY STAR rated equipment (when available), unless there are operational reasons why this requirement should not apply.	**Public Sector, Private Sector** Develop purchasing guidance and train City Staff on requirements. Work with staff to review current purchasing policies, incentives, contacts, and resources available at utilities.	• Energy Star procurement guidelines and case studies: http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing • The University of Montana has a procurement policy that specifies that energy star equipment shall be purchased whenever possible. http://www.umt.edu/greeningum/Operations/Energy/Energy%20Star%20Policy.aspx	*Costs:* • Staff or consultant time to develop a procurement policy and educate purchasing staff • Higher up front cost of equipment (in some cases) *Benefits* • Lower energy costs to the organization
5.1.11	Develop facility energy efficiency information policies for building occupants that provide guidelines for best practices regarding energy management	**Public Sector, Private Sector** Integrate specific operational policy changes adopted into simple educational materials that can be shared via trainings, email, organizational websites, posters, or other media.	• HDR Inc, developed a "10 Steps to a Sustainable Office" poster that serves as an example of how to remind employees of their role in energy and resource conservation. www.ccrpc.org/sustainability/pdf/SustainableOfficePoster_hi-res.pdf	*Costs:* • Staff or consultant time to develop and disseminate information *Benefits* • Energy savings achieved at low cost due to behavioral changes such as shutting off equipment at night

Opportunities in Conservation & Efficiency		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.1.12	Reduce energy waste through use of timers, occupancy sensors, other controls, and facility staff and occupant education.	**Public Sector, Private Sector** Optimize energy use through operational procedures. Often this is the responsibility of facilities staff, however successful implementation of operational improvements requires occupant education.	• The KRMC Strategic Energy Management Plan outlines operational changes that yield energy cost savings. http://www.betterbricks.com/healthcare/case-studies/17044/2	*Costs:* • Staff or consultant time to identify and implement measures *Benefits:* • Recovery of currently wasted energy costs
5.1.13	Develop on-going training and other opportunities to keep the issue of energy use in the forefront of employees' minds.	**Public Sector, Private Sector** Create a culture of employee responsibility for meeting energy cost saving goals.	• Flex Your Power provides suggestions for how to use demonstration projects and peer-to-peer education programs to educate employees about energy management. http://www.fypower.org/bpg/module.html?b=institutional&m=Education	*Costs:* • Staff or consultant time to develop and disseminate information *Benefits* • Energy savings achieved at low cost due to behavioral changes
5.1.14	Encourage use of home energy displays.	**Residential** Home energy displays can be useful for helping adjust how much and when residents use energy. Use lessons learned from the Flathead Electric smart grid pilot to inform future expansion of this technology.	• Flathead Electric Co-op Peak Time pilot: http://www.flatheadelectric.com/energy/peak/ • Department of Energy, Office of Electricity Delivery and Reliability, Smart Grid: http://www.oe.energy.gov/smartgrid.htm • Brultech Research Inc. sells Energy Consumption Monitors: http://www.brultech.com/	*Costs:* • Display installation *Benefits:* • Recovery of currently wasted energy costs • Better scheduling of energy use relative to peak demand
5.1.15	Establish energy use baseline for buildings and develop energy efficiency targets, e.g. construct new buildings to be 20% better than the current energy code.	**Public Sector, Private Sector** Utilize tools such as ENERGY STAR Portfolio Manager to benchmark, monitor, and improve building energy performance.	• Overview of EPA Portfolio Manager. http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager	*Costs:* • Slight design cost premium to provide higher efficiency design and provide energy models; Construction costs may be neutral or slightly higher *Benefits*: • Energy reduction if no net facility expansion (total building stock doesn't grow)
5.1.16	Develop a long-term financing plan for implementing energy efficiency measures in buildings where higher cost measures can be shown to have lower log-term operating costs	**Public Sector, Private Sector** Establish local government financing mechanisms, including such strategies as a revolving loan fund or performance contracting. Consider multiple financing options.	• The DOE provides guidance to State and Local Governments interested in administering a revolving loan program. http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/revolvingloanfunds.html • The DOE provides guidance on the process of working with performance contractors. http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/espc.html	*Costs:* • Staff time to develop financing mechanisms *Benefits*: • Can be used to finance cost-effective improvements in new building efficiency

Opportunities in Conservation & Efficiency		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.1.17	Procure hybrid and alternative fuel vehicles for fleet where life-cycle cost effective	**Public Sector, Private Sector** Adopt efficient and alternative fuel vehicle purchasing policy for fleet modernization. Purchase appropriate vehicles for their intended use.	• Des Moines, IA has 10 hybrid vehicles in the Police Department, as well as several electric vehicles: http://www.greendm.org/NotableEfforts.aspx#7	*Costs:* • Staff time to develop procurement policy • Possible vehicle cost premium *Benefits:* • Life cycle cost savings
5.1.18	Minimize fleet fuel use via operational policy changes and staff education	**Public Sector, Private Sector** Optimize fleet schedules and routes to reduce vehicle miles traveled (VMT). Educate fleet operators on importance of fuel efficiency and reducing trips when possible.	• EERE Guidance for Federal Agencies on Fleet Management: http://www.fs.fed.us/sustainableoperations/documents/doe-guidance-fleet.pdf	*Costs:* • Staff time to develop policies *Benefits:* • Fuel and cost savings • Increased staff safety (less time on the road)
5.1.19	Use land use planning to reduce vehicle miles traveled (VMT)	**Public Sector** Identify land use patterns that reduce VMT through zoning, efficient sub-division, road & trail design, and other strategies to improve the efficiency of vehicle travel and support viable alternative modes like walking and biking.	• Flathead County Trails Plan http://flathead.mt.gov/parks_rec/FINAL%20Commission%20Approved%20and%20Adopted%20Trails%20Plan%20and%20Appendices.pdf • Montana Department of Transportation: Transportation and Land Use *Resources for Growing Communities* http://mdt.mt.gov/research/toolkit/ • Municipal Research Services Center of Washington *Transportation Efficient Land Use: Planning and Land Use Strategies that Reduce the Need to Drive* http://www.mrsc.org/Subjects/Transpo/efficientlanduse.aspx • Victoria Transport Policy Institute *Strategies to Achieve Specific Objectives in Transportation Demand Management* http://www.vtpi.org/tdm/index.php#strategies	*Costs:* • Time to identify and develop land use planning strategies *Benefits:* • Fuel and cost savings • Increased public safety and public health

Opportunities in Conservation & Efficiency		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.1.20	Improve traffic flow and reduce vehicle idling by means of synchronized signals, transit and emergency signal priority, and other traffic flow management techniques	**Public Sector, Private Sector** When developing intelligent transportation systems, the City should be cognizant of ensuring priority access to public safety officials. If successful, intelligent transportation systems will improve driving conditions (i.e. reduce travel time, reduce risk of accidents), which could ultimately encourage people to drive. The City should be aware of this when designing intelligent transportation systems, and make efforts keep VMT down even if driving conditions improve.	• Intelligent Transportation Systems (ITS), US Department of Transportation. www.its.dot.gov and www.itsoverview.its.dot.gov • Clinton Climate Initiative reports that the City of Portland, Oregon invested $533,000 in its traffic signal optimization program. It is estimated that drivers save approximately $4.13 million per year in fuel savings. Source: Clinton Climate Initiative: http://www.c40cities.org/bestpractices/transport/portland_traffic.jsp • Improved Methods For Assessing Social, Cultural, And Economic Effects Of Transportation Projects http://www.statewideplanning.org/_resources/234_NCHRP-8-36-66.pdf • The Broader Connection between Public Transportation, Energy Conservation, and Greenhouse Gas Reduction. ICF International. www.apta.com/research/info/online/documents/land_use.pdf	*Costs:* • Synchronization program • Consultant on traffic flow management *Benefits* • Reduction in fuel use associated with idling
5.1.21	Develop and implement a bicycle master plan	In order to increase travel on bikes, the Cities and County will have to address safety concerns beyond the trail network, such as through the creation of bike lanes in Cities.	• Montana Department of Transportation, Pedestrian and Bicycle Facilities and Trails (Multimodal Transportation Infrastructure). http://www.mdt.mt.gov/research/toolkit/m1/ptools/ds/pbf.shtml • Rails-to-Trails and Bikes Belong. *Active Transportation for America: a Case for Increased Federal Investment in Bicycling and Walking.* www.railstotrails.org/afta. The Pedestrian and Bicycle Information Center (PBIC). PBIC's websites include • www.walkinginfo.org • www.bicyclinginfo.org • www.pedbikeinfo.org • www.pedbikeimages.org • www.saferoutesinfo.org	*Costs*: • Bicycle Master Plan • Costs to implement plan -design bike land and bike facilities -pursue grants -marketing, outreach and education (create bike maps of the City, maintain and expanded bike programs, etc.) -Design and construction cost of bike lanes and bike facilities including secure bike parking maintaining bike facilities *Benefits*: • Fuel reduction • Air quality improvement • Public health benefits

Opportunities in Conservation & Efficiency		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.1.22	Improve facilities for bike users including route signage and bike racks.	Employers can also help make commuting by bike more viable for employees by offering on-site storage and shower facilities.	• The San Francisco Bike Coalition provides guidance for employers and building owners interested in providing bicycle storage: http://www.sfbike.org/?parking	*Costs*: • Costs of bike racks *Benefits*: • Fuel reduction • Air quality improvement • Public health benefits

5.2 Local Energy Supply

Fundamental Opportunity: Develop local energy resources

Stakeholders see the development of local energy resources as another major opportunity for the Flathead. Local energy supply may help reduce energy costs, especially over the long term because it can reduce price volatility and supply disruptions.

Strategies to harness local energy resources may help overcome the specific challenges related to price and supply risk outlined in Section 4.2, while also providing local economic benefits through investments in local labor and materials.

Re-powering explored many different energy sources to confirm local viability and the results are clear: we have many viable local sources of energy including:

- Algae
- Biofuels (oilseeds and woody biomass)
- Geothermal
- Hydropower
- Solar (thermal and photovoltaic)
- Wind

Many of the success stories compiled by Re-Powering the Flathead (Appendix B) illustrate cost and other benefits experienced by organizations and individuals via investment in local energy supply. The main challenge in developing them in the near term is their current inability to compete with the lower costs of traditional sources.

As a result, most opportunities related to local energy supply are focused on the gradual implementation of local sources in recognition of the fact that diversifying our supply portfolio will not happen overnight. Thoughtful design and planning, as well as valuing risk mitigation and local economic benefits will allow the Flathead to harness the benefits of local energy resources.

Table 19 summarizes specific opportunities identified by the stakeholder outreach and research process that are possible strategies for organizations and individuals to harness the benefits of local energy supply.

Table 19 – Opportunities to Harness Local Energy Supply

Opportunities in Local Energy Supply		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.2.1	Develop a campaign to educate residents and businesses about local energy resources.	**Public Sector, Private Sector** Work with contractors that have experience with various systems to develop a curriculum to educate homeowners and business owners about system options.	• Montana Green Power provides technical information on local energy resources in Montana: http://www.montanagreenpower.com/ • The Alliance for a Sustainable Colorado offered workshops called "Renewable Energy for Homeowners and Businesses" http://sustainablecolorado.org/	*Costs*: • Staff or consultant time to develop curriculum and outreach materials *Benefits*: • Greater public awareness and investment in local energy companies
5.2.2	Host an educational workshop for building systems contractors in the Valley to educate them about systems that use local resources.	**Public Sector, Private Sector** Work with contractors that have experience with various systems to develop a curriculum to educate contractors about system options.	• Trainings like "Houses That Work" provide contractors with more information about building technologies. http://www.eeba.org/housesthatwork/workshops/2011-05-06-kalispell.htm • The Heatspring Institute is an education company focused on providing clean energy training to building professionals that provides trainings as well as advice on developing your own curriculum. http://blog.heatspring.com/create-a-renewable-energy-workshop-and-have-the-customers-come-to-you/	*Costs*: • Staff or consultant time to develop curriculum and outreach materials *Benefits*: • Greater public awareness and investment in local energy companies
5.2.3	Install demonstration projects in high visibility facilities.	**Public Sector, Private Sector** Couple demonstration projects with displays educating visitors about the benefits of local energy systems.	• Flathead County Landfill gas to energy project http://www.flatheadelectric.com/landfill/ • The Bozeman Library has a solar PV system http://www.montanagreenpower.com/solar/projects/bozeman-public-library.php • Missoula Federal Credit Union's solar project saves them an expected $20,000 per year. http://www.montanagreenpower.com/solar/projects/missoula-fed-credit-union.php	*Costs*: • Project design and installation *Benefits*: • Reduced energy costs • Energy reliability • Education
5.2.4	Develop a policy that on-site energy production is considered during the design of any new building.	**Public Sector, Private Sector** Require that on-site power or heat production (from geothermal, micro-hydro, solar, wind, etc) be considered in design alternatives.	• The EPA's Local Government Climate and Energy Strategy Series provides guidance for pursuing on-site energy generation on existing and new facilities. http://www.epa.gov/statelocalclimate/resources/strategy-guides.html#renewable	*Costs*: • Cost to develop design alternative *Benefits*: • Ability to weigh the life cycle benefits of on-site energy generation

Opportunities in Local Energy Supply		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.2.5	Develop a policy that new buildings are built with the potential for future on-site systems in mind.	**Public Sector, Private Sector** For example, locate and orient buildings for optimal solar access; ensure structural and electrical components can be easily updated to support installation of systems in the future.	• The National Renewable Energy Laboratory's (NREL) Solar Ready Buildings Planning Guide provides suggestions for ensuring that buildings are not built in a manner that prohibits future onsite solar energy system installation. http://www.nrel.gov/docs/fy10osti/46078.pdf	*Costs*: • Cost to develop policy or recommended building practices *Benefits*: • Lower the cost of future on-site generation project installation
5.2.6	Develop a policy that allows the organization to pay a premium for local energy supply in recognition of price and supply risk mitigation and local economic benefits.	**Public Sector, Private Sector** Develop an organizational policy that allows some percentage of energy use to come from local resources, even if they are more expensive.	• The EPA's Local Government Climate and Energy Strategy Series provides guidance for procuring renewable energy sources, including through RECs and through power purchases http://www.epa.gov/statelocalclimate/resources/strategy-guides.html#renewable	*Costs*: • Cost premium over non-local energy sources *Benefits*: • Hedge financial risk • Stimulate local economy
5.2.7	Survey properties to determine their potential for on-site energy production.	**Public Sector, Private Sector** Estimate energy production potential as well as costs and benefits of developing on-site energy systems.	• Certified Site Assessor: http://www.mreacsa.org/index.php?option=com_content&task=view&id=32&assessor=87 • Boston has used GIS technology to evaluate and map the potential for PV systems throughout the City: http://www.epa.gov/slclimat/local/local-examples/case-studies.html#ma • Ann Arbor, MI is undertaking a solar survey of residential facilities using aerial photography: http://www.a2gov.org/government/publicservices/systems_planning/energy/Pages/Solar.aspx	*Costs*: • Consultant or staff costs to conducts site assessments *Benefits*: • Better information about the cost of on-site energy resources • Lower long-term energy costs

Opportunities in Local Energy Supply		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.2.8	Support utilities and local energy interest groups to provide public information through community facilities, public libraries, permit counters, etc. about local energy technologies and rebate programs.	**Public Sector, Private Sector** Coordinate with utilities and city staff to develop and disseminate appropriate materials.	• Harvesting Clean Energy Montana http://harvestcleanenergy.org/ • Madison Gas and Electric Company partners with public libraries to provide energy information and resources: https://www.mge.com/Images/PDF/Brochures/Community/PublicLibraryEnergyInfo.pdf • Sedona, AZ hosted a renewable energy day at the public library: http://www.sedona.biz/renewable-energy-awareness-day0108.htm	*Costs*: • Staff time for outreach to community *Benefits*: • Potential increased adoption of renewable energy systems
5.2.9	Explore appropriately scaled biomass energy projects.	**Public Sector, Private Sector** When building a new facility or renovating existing equipment, consider the use of biomass boilers or other fuels. If appropriately scaled, biomass projects can utilize wood wastes and reduce slash burning and disposal costs for the timber industry.	• Glacier High School Biomass http://www.fuelsforschools.info/boiler_room.html • The MT DEQ The Montana Bioenergy Guidebook was produced to provide project developers, government officials, professionals, and others with a brief description of the technologies used in developing bioenergy projects and the permitting process involved with those projects. http://deq.mt.gov/Energy/bioenergy/pdf/BioEnergyGuidebook2010.pdf • U.S. DOE Bioenergy Knowledge Discovery Framework has a library of documents, a map of biomass energy data, and online forums for various bioenergy subjects. https://bioenergykdf.net/	*Costs*: • Staff or consultant time to develop feasibility studies *Benefits*: • Lower fuel costs • Fire fuel and wood waste reduction

Opportunities in Local Energy Supply		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.2.10	Develop biofuel projects through partnerships with local farmers.	**Public Sector, Private Sector** Organizations in the Flathead Valley can incorporate locally produced biofuels into their fleet fuel use in order to support the nascent biofuel industry, including growers and refiners.	• Clearwater Biological is producing biodiesel locally from locally grown oilseed crops. • The MSU Northern Biofuels Research Center is researching biodiesels produced from Montana produced vegetable oils. http://bioenergytestingcenter.com/ • The Oilseeds for the Future Project is a collaboration that aims to support Montana farmers in participating in new bio-fuels markets. http://www.ncat.org/special/oilseeds.php	*Costs*: • Program development *Benefits*: • Potentially lower fuel costs • Support of local fuel crop industry
5.2.11	Expand use of micro-hydro projects.	**Public Sector, Private Sector** Use small hydro systems to provide hydropower from rivers, irrigation canals, or city water infrastructure.	• The Turnbull Hydroelectric Project involved the installation of two turbines with a combined capacity of 15 MW on an irrigation canal outside of Fairfield, Montana. http://www.krtv.com/news/governor-schweitzer-helps-usher-in-fairfield-hydroelectric-project/ • The City of Whitefish is retooling an old hydroelectric facility on the city reservoir to provide power to Flathead Electric to offset the City's electricity use. http://www.dailyinterlake.com/news/local_montana/article_d2aa4070-b256-11e0-9ab2-001cc4c03286.html	*Costs*: • System design and installation *Benefits*: • Cost savings • Reliable, local power
5.2.12	Investigate expanded energy production potential from the wastewater treatment process.	**Public Sector** Review processes and technologies to increase energy production on-site at wastewater treatment facilities.	• City of Helena has saved ~$100,000 per year through improvements at two water/wastewater treatment facilities. http://helenair.com/news/article_00c51ebe-9261-11e0-b598-001cc4c002e0.html • The EPA provides technology fact sheets on several wastewater energy conversion technologies: http://water.epa.gov/scitech/wastetech/mtbfact.cfm	*Costs*: • System design and installation *Benefits*: • Cost savings • Reliable, local power

5.3 Energy Programs

Fundamental Opportunity: Expand energy programs to update and maintain infrastructure and facilities

Many different strategies are needed in order to realize the potential cost savings from energy efficiency and local energy supply. There are already many different strategies being employed in the Flathead to support maintenance and upgrades to facilities and infrastructure that increase the efficiency with which we use energy.

Stakeholders reiterated that supporting and expanding existing energy programs is a critical opportunity for leveraging efforts underway into greater savings for residents and businesses and overcoming the challenges related to aging infrastructure and facilities outlined in Section 4.3.

Table 20 summarizes specific opportunities identified by the stakeholder outreach and research process that are possible strategies for organizations and individuals to harness the benefits of energy programs.

Table 20 – Opportunities to Expand Energy Programs

Opportunities to Expand Energy Programs		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.3.1	Expand and promote existing weatherization programs.	**Public Sector, Private Sector** Community Action Partnership provides weatherization to Low Income Energy Assistance Program (LIEAP) participants.	• CAP Weatherization Program http://nmhr-dist10.org/weatherization.htm • AERO Neighborhood Conservation Clubs http://www.aeromt.org/energy/energy-projects/neighborhood-conservation-clubs/	*Costs*: • Technical assistance and measure costs *Benefits*: • Reduced energy costs for low income residents
5.3.2	Expand and promote existing utility incentive programs.	**Public Sector, Private Sector** Flathead Electric Co-op and Northwestern Energy have extensive efficiency incentive programs that could have higher participation rates.	• Flathead Electric Co-op rebates and programs http://www.flatheadelectric.com/energy/Rebates.html • Northwestern Energy programs and rebates http://www.northwesternenergy.com/display.aspx?Page=Residential_Service_MT&Item=102	*Costs*: • Marketing costs *Benefits*: • Higher participation in existing, cost-effective programs
5.3.3	Work with the propane industry to establish incentive programs for propane customers.	**Public Sector, Private Sector** Develop incentives for propane customers to improve the efficiency of home heating. Promote existing incentives (State, Federal) available to propane customers.	• DSIRE has a list of State and Federal incentives that can be harnessed by propane users. http://www.dsireusa.org/	*Costs*: • Staff time to coordinate with propane suppliers • Developing and implementing any new incentive structures *Benefits*: • Reduced energy costs to residents and businesses
5.3.4	Support and expand existing transit programs.	**Public Sector, Private Sector** Broaden opportunities for residents to avoid trips by personal vehicle and increase the efficiency of transportation overall.	• Eagle Transit http://flathead.mt.gov/eagle/ • Whitefish SNOW Bus http://skiwhitefish.com/snowbus.php	*Costs*: • Marketing costs • Transit program administration costs *Benefits*: • Reduced fuel costs • Improved air quality and human health
5.3.5	Establish a car-sharing program.	**Public Sector, Private Sector** Partner with an existing commercial car share company or create an organizational car-share to help reduce the costs of car-ownership.	• An international list of cities with car sharing programs is available at http://www.carsharing.net/where.html	*Costs*: • Program set up costs or contract with commercial car-share *Benefits*: • Reduced fuel and car maintenance costs to car-share users

Opportunities to Expand Energy Programs		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.3.6	Provide coordinated utility support for customers of both utilities.	**Public Sector, Private Sector** Provide technical assistance to utility customers that educates them about programs and rebates available through both utilities. Identify and remove barriers to customers of both utilities from participating.	• Flathead Electric Co-op rebates and programs http://www.flatheadelectric.com/energy/Rebates.html • Northwestern Energy programs and rebates http://www.northwesternenergy.com/display.aspx?Page=Residential_Service_MT&Item=102	*Costs*: • Marketing costs *Benefits*: • Higher participation in existing, cost-effective programs
5.3.7	Establish a community energy task force to identify and implement strategies to enhance program success.	**Public Sector, Private Sector** Form a citizen advisory board to work with local governments and utilities on the identification and implementation of new energy programs and projects.	• Bozeman Mayor's Community Climate Task Force http://www.bozeman.net/Departments-%281%29/Administration/Commission/Citizen-Advisory-Boards/Mayors--Community-Climate-Task-Force • Missoula Greenhouse Gas Energy Conservation Team http://www.ci.missoula.mt.us/index.aspx?NID=492 • Helena Citizens Council http://www.helenacitizenscouncil.com/projects/helena-climate-change-report.html	*Costs*: • Time to identify and coordinate appropriate team members *Benefits*: • Public outreach, education, and mobilizing community resources to assist with implementation
5.3.8	Start a campaign to encourage individual households to reduce energy use.	**Public Sector, Private Sector** There are many forms of residential energy conservation campaigns. Use existing utility incentives and education materials combined with community organizing strategies to increase awareness of energy efficiency and local energy supply.	• Missoula Green Blocks Program used a community framework to distribute technical assistance and incentives to several hundred homeowners. http://www.ci.missoula.mt.us/index.aspx?NID=977 • OPOWER developed an education campaign for utilities that uses normative letter comparisons sent to residents to encourage behavioral changes. http://opower.com/ • Re-Power Bainbridge is a community wide education and assistance program aimed at reducing energy costs for residents http://positiveenergybi.org/repowerbainbridge	*Costs:* • Staff time to develop and coordinate campaign • Media and printing costs *Benefits*: • May increase impact of utility DSM programs

Opportunities to Expand Energy Programs		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.3.9	Work with neighborhood and environmental groups, the Chamber of Commerce and other business groups to get information on the benefits of energy efficiency out to their members.	**Public Sector, Private Sector** Coordinate with various groups to develop and disseminate appropriate materials and programs.	• Austin's Chamber of Commerce highlights business opportunities and model projects for efficiency and renewables: http://www.austinchamber.com/DoBusiness/TheAustinAdvantage/Energy.html	*Costs:* • Staff time for outreach efforts *Benefits*: • Increased public interest in energy efficiency measures and practices
5.3.10	Publicize and give energy efficiency awards to successful energy efficiency and local energy projects.	**Public Sector, Private Sector** Develop strategy - via TV, website, print media, or other mechanisms – to promote successful projects. Design criteria for awarding recognition, if any, beyond that awarded by utilities.	• Local Builders Bridgewater Innovative Builders were awarded the DOE 2010 Silver EnergyValue Housing Award (EVHA) http://www.nahbrc.com/evha/win_recent.aspx • Montana Pollution Prevention Program *EcoStar Awards* http://www.mtp2.org/ecostar.html • Anchorage, Alaska's Green Star Program http://www.greenstarinc.org/	*Costs:* • Staff time to publicize competition • Awards sponsorship cost *Benefits* • Encourage private sector investment in energy efficiency
5.3.11	Collaborate with local businesses to encourage residents to purchase energy efficient products, such as ENERGY STAR products.	**Public Sector, Private Sector** Encourage businesses to promote efficient appliances and/or lighting products.	• Rapid Deployment Energy Efficiency (RDEE) Toolkit, 2009, http://www.epa.gov/RDEE/documents/rdee_toolkit.pdf	*Costs:* • Staff time for outreach efforts *Benefits:* • Typical savings range from 0.5-3 MMBtu/yr per participant

5.4 Information

Fundamental Opportunity: Develop, consolidate, and disseminate better information

According to stakeholders, one of the biggest barriers to harnessing benefits from energy investments is a lack of good information.

The Re-Powering project has attempted to fill some of the gaps in information and consolidate existing information in the hopes of building the foundation of a one-stop-shop for energy resources. However, there were many specific energy information and education related opportunities identified by stakeholders that can be implemented in many sectors to improve energy use in the Flathead and harness local benefits.

The implementation of information related opportunities would help overcome the challenges summarized in Section 4.4.

Table 21 summarizes specific opportunities identified by the stakeholder outreach and research process that are possible strategies for organizations and individuals to improve energy information.

Table 21 – Opportunities to Improve Information

Opportunities to Improve Information		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.4.1	Provide a clearinghouse of information.	**Public Sector, Private Sector** The Re-Powering the Flathead report and website attempt to be a central clearinghouse of energy related information.	• Re-Powering the Flathead www.repoweringtheflathead.org • Re-Power Bainbridge is a community wide education and assistance program aimed at reducing energy costs for residents http://positiveenergybi.org/repowerbainbridge • The Alliance to Save Energy publishes energy News You Can Use http://ase.org/ • Keystone Help is a third party non-profit that provides information to Pennsylvania residents on energy programs: http://www.keystonehelp.com/index.php • The Energy Trust of Oregon is a third party non-profit that provides information to Oregon residents and businesses on energy programs: http://energytrust.org/	*Costs*: • Staff and volunteer time to consolidate resources *Benefits*: • Create one place for stakeholders to go to in order to find information on energy issues
5.4.2	Increase awareness of the link between energy and the local economy.	**Public Sector** Employ a variety of strategies to increase understanding in the community of the connection between energy and the local economy.	• Headwaters Economics, *Energy* http://headwaterseconomics.org/energy • Pew Center for the States, *Clean Energy* http://www.pewcenteronthestates.org/trends_detail.aspx?id=53588 • Brookings Mountain West, *Centers of Innovation: Leveraging the Mountain West Innovation Complex for Energy System Innovation* http://www.brookings.edu/topics/intermountain-west.aspx	*Costs*: • Staff and volunteer time to develop curriculum or organize forums *Benefits*: • More informed decision making in the community
5.4.3	Provide educational opportunities and forums for elected officials on energy issues.	**Public Sector** Host panels or dialogues on various energy topics that are specifically designed for local government decision-makers.	• The EPA has best practices, case studies, and other guidance for local governments related to energy efficiency http://www.energystar.gov/index.cfm?c=government.bus_government_local	*Costs*: • Staff and volunteer time to develop curriculum or organize forums *Benefits*: • More informed decision making • Connect local governments with local energy expertise

Opportunities to Improve Information		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.4.4	Provide educational opportunities and forums for the general public on energy issues.	**Public Sector, Private Sector** Host panels or dialogues on various energy topics that are open to the public and advertised broadly.	• The Re-Powering the Flathead Community Dialogue did this in the Flathead.	*Costs*: • Staff and volunteer time to develop curriculum or organize forums *Benefits*: • Greater public awareness of energy issues
5.4.5	Provide educational resources for homebuyers to understand home energy performance.	**Public Sector, Private Sector** Develop educational materials, or curriculum for homebuyers that explain energy efficient mortgages, utility incentives, energy code, how to find a contractor, and other aspects of the home buying process related to energy.	• The Community Action Partnership's First Time Homebuyer's Class incorporated an element on energy considerations. http://www.nmhr-dist10.org/Frist%20Time%20Home%20Buyer.htm	*Costs*: • Staff and volunteer time to develop curriculum or materials *Benefits*: • Greater awareness of building energy programs • Greater participation in EEMs, code compliance and voluntary certifications, etc.
5.4.6	Provide education for retirees and near-retirees about the importance of getting monthly costs down.	**Public Sector, Private Sector** Help older homeowners understand the value in reducing monthly energy costs through targeted marketing or education.	• Green Building Association has provided research on hedging cost risk through reducing energy demand: http://www.greenbuildingadvisor.com/blogs/dept/guest-blogs/home-energy-efficiency-pays-steady-dividends	*Costs*: • Staff and volunteer time to develop curriculum or materials *Benefits*: • Greater awareness of and participation in energy programs • Lower energy costs for residents
5.4.7	Expand K through 12 energy education opportunities.	**Public Sector, Private Sector** Encourage partnership between the school district, utilities, local contractors, and other partners to provide energy related curriculum for K-12.	• The Sun4Schools project uses demonstration projects to educate students about renewable energy: http://www.montanagreenpower.com/solar/sun4schools.php	*Costs*: • Staff time to develop curriculum • Pilot project installation and other educational materials *Benefits*: • Greater student and teacher awareness of energy issues

Opportunities to Improve Information		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.4.8	Expand education and training opportunities at FVCC.	**Public Sector** Provide further offerings in energy sources, energy technologies, and energy policy. Consider a certification or degree program.	• FVCC already offers courses like "Introduction to Photovoltaic Systems" and "Principles of Energy Management", and a certificate of Applied Science in HVAC. http://www.fvcc.edu/academics/college-catalog/ • University of Montana Energy Technology Program: http://ace.cte.umt.edu/nrg/ • Miles Community College Energy Technology Program: http://www.milescc.edu/DegreesPrograms/BiofuelsEnergy/energytech.htm	*Costs*: • Curriculum development and faculty *Benefits*: • Skilled local workforce
5.4.9	Identify and promote use of energy tracking software and other tools.	**Public Sector, Private Sector** Individuals and organizations will be better able to manage energy use if they understand it. Promote existing free and paid tools to help benchmark energy use.	• Overview of EPA Portfolio Manager. http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager • Lawrence Berkeley National Lab's Home Energy Saver http://hes.lbl.gov/consumer/ • Energy CAP provides software to monitor utility spending; provided free to public entities by MT DEQ http://svcalt.mt.gov/deq/EnergyCAP/	*Costs*: • Free *Benefits*: • Better information about energy use and opportunities to reduce costs
5.4.10	Showcase success stories and demonstration projects with tours and media coverage.	**Public Sector, Private Sector** Conduct an energy success stories tour or develop case studies on the energy success stories going on around the valley to ensure they are highly visible.	• Re-Powering the Flathead organized a Green Homes Tour in 2009 as part of the initial conference.	*Costs*: • Staff time to organize trip • Promotional costs *Benefits*: • Higher awareness of energy successes

Opportunities to Improve Information		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.4.11	Promote home energy ratings, appliance ratings, and other energy related certification programs.	**Public Sector, Private Sector** There are multiple certifications – LEED for Homes, HERS ratings, Energy Star – that can be used to guarantee better lifecycle energy cost performance.	• HERS Ratings http://www.resnet.us/home-energy-ratings • Energy Star Homes http://www.energystar.gov/index.cfm?c=new_homes.hm_index • LEED for Homes http://www.usgbc.org/DisplayPage.aspx?CMSPageID=147	*Costs*: • Staff time and educational materials *Benefits*: • Better educated consumers • Greater demand for energy efficient homes and retrofit/auditing services
5.4.12	Encourage influential community organizations to develop outreach and education materials related to energy in the Flathead.	**Public Sector, Private Sector** Example implementers include schools, churches, large employers, and utilities	• Kansas Interfaith Power and Light http://kansasipl.org/	*Costs*: • Staff time *Benefits*: • Greater collaboration and awareness on energy issues
5.4.13	Host a Bike to Work Day to highlight resources for bike commuters in the Flathead.	**Public Sector, Private Sector** Pick one day to encourage bike commuting in the Flathead. Couple it with education on trails and safety, local bike business, prizes, and other things to compel greater understanding of biking as a viable transportation option.	• League of American Bicyclists offers guidance on planning a Bike to Work Day http://www.bikeleague.org/index.php	*Costs*: • Staff time to plan event • Volunteer time to facilitate • Outreach materials *Benefits*: • Greater awareness of biking infrastructure • Reduced transportation fuel costs
5.4.14	Develop a carpool campaign to reduce single occupant vehicle trips.	**Public Sector, Private Sector** Encourage employees to reduce trips taken in a single occupancy vehicle. Can facilitate the development of a carpool by using a map with desired carpool origin points marked by employees with pins, or with other incentive programs.	• The Clean Air Campaign provides online resources about starting a carpool http://www.cleanaircampaign.org/Your-Commute/Improve-Your-Commute/Carpooling • Missoula Ravalli Transportation Management Association http://www.mrtma.org/ • Missoula in Motion http://www.missoulainmotion.com/	*Costs*: • Staff time to develop campaign or incentives *Benefits*: • Reduced transportation fuel costs

5.5 Regulation, Financing, & Pricing

Fundamental Opportunity: Understand and advocate for improvements to the regulatory framework

Providing residents and businesses with tools to understand the current regulatory and financial framework in which energy decisions are made is seen as a major opportunity in the Flathead. There are also additional financial and regulatory tools that are seen as good opportunities to support residents and businesses through investments in energy projects.

It is especially important to understand the existing regulatory framework related to energy in order to understand how to advocate and create improvements to the regulatory framework. The opportunities related to the regulatory framework and pricing can help overcome the specific challenges identified in Section 4.5.

Table 22 summarizes specific opportunities identified by the stakeholder outreach and research process that are possible strategies to improve regulation, financing, and pricing.

Table 22 – Opportunities to Improve Regulation, Financing, and Pricing

Opportunities to Improve Regulation, Financing, and Pricing		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.5.1	Develop a revolving loan fund for energy efficiency improvements.	**Public Sector, Private Sector** Establish a self-sustaining fund to finance efficiency or energy supply projects. Can be used for internal projects (such as within City departments) or for the community at large.	• Bozeman established a revolving loan fund (Big Sky Energy Revolving Loan Fund) http://www.nrmrcd.org/energy_fund.htm • City of Elgin, IL Revolving Loan Fund http://www.cityofelgin.org/index.aspx?NID=1067 • MT DEQ Alternative Energy Loan Program http://deq.mt.gov/energy/renewable/altenergyloan.mcpx	*Costs*: • Program design and start-up costs *Benefits*: • Energy savings to residents and businesses • Lower energy demand for utilities
5.5.2	Explore expanded demand pricing and time of use rates to encourage electricity users to manage peak demand.	**Public Sector, Private Sector** Montana utilities and cooperatives currently do not charge different rates based on the time of day when energy is used. High peak demand costs all utility customers however, as the utilities must pay more for energy supply at the margin. Charging higher rates during peak hours and lower rates during off peak hours encourages customers to shift usage throughout the day, decreasing the total cost to supply energy.	• MEIC developed an overview of how information coupled with time-of-use rates can improve energy use and reduce costs. http://meic.org/energy/global_warming_pollution/information-is-power	*Costs*: • Higher costs to utility customers during peak periods *Benefits*: • Lower total cost to provide power to all co-op members

Opportunities to Improve Regulation, Financing, and Pricing		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.5.3	Pursue on-bill or other financing programs for energy efficiency investments.	**Public Sector, Private Sector** Develop a mechanism for homeowners to finance efficiency improvements. Ideally the loan payment will be less than the energy savings to the homeowner.	• San Diego Gas and Electric on-bill financing program: http://www.sdge.com/business/rebatesincentives/programs/onbillfinancing.shtml • The 2011 Senate Energy Bill, Energy Savings & Industrial Competitiveness Act of 2011 (ESICA, S. 1000), includes credit guarantees to reduce risk to financiers. http://ase.org/resources/energy-savings-and-industrial-competitiveness-act-2011-section-section-summary	*Costs*: • Program design and start-up costs *Benefits*: • Energy savings to residents and businesses • Lower energy demand for utilities
5.5.4	Expand participation in energy efficient mortgages through education and continued support for this program.	**Public Sector, Private Sector** Increase understanding of the EEM program for bankers and real estate professionals.	• HUD's Energy Efficient Mortgage Program site: http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/energy-r • HUD EEM Homeowner's Guide: http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/eemhog96	*Costs*: • Educational materials and outreach *Benefits*: • Lower home energy costs and increase homeowner buying power
5.5.5	Identify and remove current policies, such as in the planning, building or zoning codes, which present barriers to the installation of on-site energy systems on existing residential and commercial buildings.	**Public Sector, Private Sector** Review and update zoning and land use controls that interfere with local energy development.	• American Planning Association resources for Planning and Zoning for Renewable Energy: http://www.planning.org/pas/infopackets/subscribers/pdf/EIP-18.pdf • Pioneer Valley Planning Commission Guide to Zoning and Land Use for Renewable Energy: http://www.islandplan.org/doc.php/PVPC%20renewables%20guide.pdf?id=878	*Costs*: • Staff or consultant time to review codes *Benefits*: • Increased energy independence and potentially lower energy costs
5.5.6	Work with homeowners' associations throughout the County to develop uniform guidelines citywide for on-site energy installations.	**Public Sector, Private Sector** Encourage connection of on-site energy installations to the electric grid without compromising safety or system reliability.	• EPA overview of interconnection standards: http://www.epa.gov/slclimat/documents/pdf/guide_action_chap5_s4.pdf	*Costs*: • Staff or consultant time to develop guidelines *Benefits*: • Increased energy independence and potentially lower energy costs

Opportunities to Improve Regulation, Financing, and Pricing		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.5.7	Amend subdivision regulations to encourage energy efficient designs.	**Public Sector** Identify and include strategies to increase the efficiency of new developments in the Flathead.	• Saddlehorn http://www.saddlehorn.com/ • LEED for Neighborhood Development http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148 • National Resources Defense Council (NRDC), *A Citizen's Guide to LEED for Neighborhood Development*, http://www.nrdc.org/cities/smartgrowth/leed.asp • Developers like Meritage are starting to build net zero energy homes: http://www.meritagehomes.com/netzero/index.html	*Costs*: • Staff or consultant time to develop amendments *Benefits*: • Lower energy costs for residents
5.5.8	Advocate for consistency at the federal and state policy level.	**Public Sector, Private Sector** Encourage elected officials to maintain a consistent environment for investments in efficiency and local energy supply.	• N/A	*Costs*: • Time to communicate with elected officials *Benefits*: • Reduced risk for businesses in the efficiency or energy supply businesses

5.6 Organizational and Cultural Changes

Fundamental Opportunity: Use organizational policies and communication strategies to shift cultural expectations

Many of the opportunities seen by stakeholders were related to organizational or cultural changes that influence or adjust human behavior.

The potential for organizational policies and communication strategies are important given that stakeholders cited many behavioral challenges that result from operational policies, tradition, habit, or cultural expectations. The opportunities in policy change and communication can help overcome the specific challenges identified in Section 4.6.

Table 23 summarizes specific opportunities identified by the stakeholder outreach and research process that are possible strategies to improve organizational policies and cultural expectations.

Table 23 – Opportunities to Create Organizational and Cultural Change

Opportunities		Implementation (Relevant sectors in bold)	Model Programs & References	Costs & Benefits
5.6.1	Establish a City/County/Public energy task force focused on energy savings in the Flathead.	**Public Sector, Private Sector** Form a citizen advisory board to work with local governments and utilities on the identification and implementation of new energy programs and projects.	• Bozeman Mayor's Community Climate Task Force http://www.bozeman.net/Departments-%281%29/Administration/Commission/Citizen-Advisory-Boards/Mayors--Community-Climate-Task-ForceMissoula Greenhouse Gas Energy Conservation Team http://www.ci.missoula.mt.us/index.aspx?NID=492 • Helena Citizens Council http://www.helenacitizenscouncil.com/projects/helena-climate-change-report.html	*Costs*: • Time to identify and coordinate appropriate team members *Benefits*: • Public outreach, education, and mobilizing community resources to assist with implementation
5.6.2	Establish consensus on what the goals of energy management should be.	**Public Sector, Private Sector** Individual organizations, as well as any community task forces, should establish consensus about the goals of energy management initiatives. This will enable much better prioritization of efforts and build support for implementation.	• Same as 5.6.1	*Costs*: • Staff and volunteer time for coordination and facilitation *Benefits*: • Better direction for energy management initiatives
5.6.3	Demonstrate leadership in energy management.	**Public Sector, Private Sector** Create top-down support within your organization for more strategic energy management. If business and government leaders support and promote the success stories going on around the Valley, other organizations are more likely to pursue cost saving opportunities of their own.	• Mike Pence, of Flathead County, was awarded 2011 Citizen of the Year Award by Citizens for a Better Flathead for his leadership in energy management. • Local Builders Bridgewater Innovative Builders were awarded the DOE 2010 Silver EnergyValue Housing Award (EVHA) http://www.nahbrc.com/evha/win_recent.aspx	*Costs*: • None *Benefits*: • Leadership and increased awareness

5.6.4	Develop on-going training and other opportunities to keep the issue of energy use in the forefront of employees' minds.	**Public Sector, Private Sector** Create training and educational materials to introduce and encourage employee behavior changes.	• Bozeman Climate Action Plan, PBE-5 http://www.bozeman.net/Departments-%281%29/Finance/Sustainability/Climate-Protection/Climate-Action-%281%29 • HDR developed a "10 Steps to a Sustainable Office" poster that has been distributed throughout the company to remind employees of their role in energy and resource conservation. http://www.hdrinc.com/Assets/documents/sustainability/SustainableOfficePoster.pdf	*Costs*: • Staff time to develop training curriculum and materials *Benefits*: • Energy cost savings
5.6.5	Introduce an energy accounting and tracking program and ensure that full information on departmental energy use and trend information for all accounts is made available to appropriate operations personnel.	**Public Sector, Private Sector** Utilize existing programs offered by local utilities and online benchmarking tools. Develop or implement user interface so departmental managers have better access to utility data.	• Overview of EPA Portfolio Manager. http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager • Adoption of Energy Star and Portfolio Manager by Cities and States: http://www.energystar.gov/ia/business/government/State_Local_Govts_Leveraging_ES.pdf • Energy CAP provides software to monitor utility spending; provided free to public entities by MT DEQ http://svcalt.mt.gov/deq/EnergyCAP/	*Costs:* • Staff time set up and administer • Purchase of utility tracking software *Benefits:* • Closer tracking of spikes in usage can expose operational problems that are wasting energy
5.6.6	Generate a market for energy services and technologies.	**Public Sector, Private Sector** Use media and communication strategies to inform residents and businesses about the benefits of local energy investments.	• Re-Power Bainbridge is a community wide education and assistance program aimed at reducing energy costs for residents http://positiveenergybi.org/repowerbainbridge	*Costs*: • Marketing and outreach *Benefits*: • Cost savings for residents and businesses • Greater demand for local energy services
5.6.7	Generate public support for long-term price management.	**Public Sector, Private Sector** Use media and communication strategies to inform residents and businesses about diversifying the energy supply portfolio and investing in efficiency to reduce costs over the long-term.	• Rifle, CO Village Energy Plan http://www.rifleco.org/index.aspx?NID=150 • Sonoma County Energy Independence Program http://www.sonomacountyenergy.org/	*Costs*: • Marketing and outreach *Benefits*: • Long term cost savings for residents and businesses • Greater demand for local energy services

5.6.8	Encourage life cycle cost based decision making, and allow for a longer-term payback on efficiency investments.	**Public Sector, Private Sector** Include both the upfront cost as well as the energy cost of an investment over its lifetime when investing in equipment or facilities.	• Energy Star provides appliance purchasing tools such as the refrigerator replacement tool that incorporate life cycle costs: http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator • The National Institute of Building Sciences provides a list of LCA tools for buildings http://www.wbdg.org/tools/tools_cat.php?c=3	*Costs*: • Upfront cost premium *Benefits*: • Overall cost savings
5.6.9	Use public/private partnerships to implement energy projects and programs.	**Public Sector, Private Sector** Build collaborations between local governments and utilities to leverage funding and capacity and expand the impact of programs beyond what one entity can do alone.	• Missoula Green Blocks Program used a community framework to distribute technical assistance and incentives to several hundred homeowners. http://www.ci.missoula.mt.us/index.aspx?NID=977 • Louis and Clark County is leading a Tri-County Small Business Efficiency Program that is a collaboration with the EPA and Northwestern Energy to provides audits and incentives to a goal of 180 businesses http://www.epa.gov/statelocalclimate/local/showcase/lewisandclark.html	*Costs*: • Program design and implementation *Benefits*: • More efficient delivery of energy efficiency programs • Cost savings
5.6.10	Consider a four-day workweek to reduce commuting and facility energy use.	**Public Sector, Private Sector** Reduce facility and transportation energy use by shifting to a four day work week.	• Spanish Fork City, UT implemented a four day work week http://news.byu.edu/archive08-jun-4ten.aspx	*Costs*: • Operational policy changes *Benefits*: • Energy cost savings • Increased employee productivity and happiness
5.6.11	Promote lower energy recreation.	**Public Sector, Private Sector** Encourage the many non-motorized, fossil fuel based forms of recreation available in the Flathead.	• Crown of the Continent http://www.crownofthecontinent.net/ • Rails to Trails http://www.railstotrailsofnwmt.com/ • Foys to Blacktail http://www.foystoblacktailtrails.org/	*Costs*: • Marketing and outreach *Benefits*: • Cost savings for residents and businesses • Human and environmental health benefits

Chapter 6: Conclusion

The original conference, community dialogue series, stakeholder outreach process, focus groups, and research conducted by the Steering Committee have revealed myriad opportunities for energy efficiency and local energy resources to achieve greater regional energy independence and sustain a healthy economy and environment in the Flathead Valley for current and future generations.

The most important conclusions of the stakeholder outreach and research process conducted by Re-Powering the Flathead are:

- That there is a clear link between energy and the local economy;
- There are many meaningful opportunities to improve upon the current picture of energy use in the Flathead;
- Reducing energy costs for residents and businesses through conservation and efficiency and investing in local energy supply could create substantial benefits for the local economy;
- Success stories demonstrate the potential for many diverse actions that can be taken to harness cost savings, energy independence, reliability, and other benefits;
- The efforts highlighted in the success stories have just scratched the surface of the potential for better energy management opportunities in the Flathead.
- Leadership is critical in identifying and acting upon opportunities.

The Re-Powering the Flathead report supports the conclusions above with research, data, resources, and best practices.

Unlike many community energy plans which focus narrowly on local government operations, the Re-Powering the Flathead report explores opportunities available for local governments, the private sector, and individuals. The result is a document that will support decision-makers throughout the community in the implementation of diverse

energy projects and programs intended to improve upon energy use and the local economy.

Another benefit of this report is that it provides live links to hundreds of examples of ideas to help address challenges and harness opportunities explored within the report.

The Re-Powering the Flathead project has strived for the past three years to illuminate energy challenges and opportunities in the Flathead. The true value of these opportunities, however, exists only to the extent to which decision makers choose to act upon them. The author and members of the Steering Committee hope that the hundreds of individuals involved with Re-Powering, as well as those who encounter the project for the first time, find the resources, analysis, and best practices assembled in this document to be of use as they endeavor to implement various energy programs and projects within their respective organizations.

For project updates, contact information, or a digital copy of this report visit: www.repoweringtheflathead.org.

Appendix A – Glossary of Terms

B20 – A blended fuel comprised of 80% diesel, 20% biodiesel

B100 – Pure biodiesel fuel.

Barrel – A volumetric unit of measure for crude oil and petroleum products equivalent to 42 U.S. gallons.

BPA – Bonneville Power Administration – a Federal agency based in the northwest that was created by legislation in order to market power generated by federal hydroelectric projects in the Columbia River Basin.

Btu – British thermal unit – A standard unit of energy equal to the quantity of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit.

Capacity – The amount of electric power that a generator, turbine, transformer, transmission circuit, station, or system is capable of producing or delivering.

Cogeneration – A process that sequentially produces useful energy (thermal or mechanical) and electricity from the same energy sources.

Conservation (energy) – Refers to efforts to reduce energy use by avoiding services that require energy, e.g. turning lights off when not needed, turning the thermostat down in the winter. Compare with energy efficiency.

Criteria pollutants – Six commonly found air pollutants that are regulated by the Clean Air Act: particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead.

Distribution - The process of using relatively small, low-voltage wires for delivering power from the transmission system to local electric substations and to electric consumers. Compare with **Transmission**.

Dkt – Decatherm - One million Btu of natural gas. One decatherm of gas is roughly equivalent in volume to 1 million cubic feet (Mcf).

E10 – A blended fuel comprised of 90% gasoline, 10% ethanol.

End-use energy – see "point of use."

Energy consumption – Use of energy.

Energy demand - The rate at which electric energy is delivered to a system or piece of equipment at a given instant or during a designated period of time (see **Load**).

Energy efficiency – Refers to efforts to reduce the amount of energy required to provide a given service, e.g. installing efficient lamps to use less energy when the lights are on, installing an efficient furnace that uses less energy to keep a home at 65 degrees. Compare to conservation.

Energy intensity – A measure of efficiency. Can refer to economic efficiency which is measured in energy inputs per dollar of output, or building efficiency which is measured in energy per unit are (also referred to as energy use intensity).

Energy supply – The delivery of fuels or transformed fuels to the point of consumption.

FEC – Flathead Electric Cooperative – A member owned electric cooperative that provides electric service to residential, commercial, and industrial members.

First cost bias – Decision makers' tendency to prioritize the up front cost of an investment rather than factor in the cost of an investment over its lifetime.

Fossil fuel – Any naturally occurring fuel of an organic nature, such as coal, crude oil, and natural gas.

Fuel - Any substance that, for the purpose of producing energy, can be burned, otherwise chemically combined, or split or fused in a nuclear reaction.

Generation (electric) – The production of electric energy from other forms of energy; also, the amount of electric energy produced, expressed in kilowatt-hours.

Heat content – Refers to energy content (in Btu) and can be used to compare volumes various fuels based on the heat content per unit, e.g. 1 kilowatt hour of electricity is 3412 Btu of energy and 1 cubic foot of natural gas is between 950-1150 Btu (depending on fuel characteristics).

IOU – Investor Owned Utility – A utility that is managed as a private enterprise.

kW – Kilowatt – One thousand watts. The kW is the basic unit of measurement of electric power.

kWh – Kilowatt-hour – One thousand watt-hours. The kWh is the basic unit of

measurement of electric energy and is equivalent to 3,412 Btu.

Load (electric) – The amount of electric power required by equipment in use at a given time at any specific point or points on a system.

MMBtu – Million Btu – One million British thermal units.

MW – Megawatt – One million watts.

MWh – Megawatt-hour – One million watt-hours.

Member owned cooperative – A business organization owned and operated by the people who use its services.

MT DEQ – Montana Department of Environmental Quality

MT DOT – Montana Department of Transportation

NWE – Northwestern Energy – Is an investor owned utility that provides electricity and natural gas to customers in Montana, Nebraska, and South Dakota.

Point of use – Refers to the point at which fuels are measured as sold to and used by the end user, e.g. the electricity meter at a house.

Reliability – The characteristic of a system of being able to provide full, uninterrupted service despite the failure of one or more component parts.

Renewable energy – Energy obtained from sources that are essentially sustainable (unlike, for example, the fossil fuels, of which there is a finite supply). Renewable sources of energy include wood, waste, solar radiation, falling water, wind, and geothermal heat.

Therm – A unit of heat energy equivalent to 100,000 Btu that is used to measure the energy sold to consumers in a given volume of gas.

Transmission – The process of using high-voltage electric wires for bulk movement of large volumes of power across relatively long distances. Compare with **Distribution**, which is composed of relatively smaller, lower voltage wires used for delivering power from the transmission system to local electric substations and to electric consumers.

Watt - The electrical unit of power or rate of doing work. A watt is the rate of energy transfer equivalent to 1 ampere flowing under pressure of 1 volt at unity power factor (volt and ampere in phase). It is analogous to horsepower or footpound-per-minute of mechanical power. One horsepower is equivalent to approximately 746 watts.

Appendix B – Success Stories

Pilot Projects

Calm Animal Care installed a photovoltaic system that reduces power costs and provides needed reliability for equipment and operations during outages. The system is net metered, which allows it to supply power back to the grid when generation exceeds on-site use; the vet is credited this excess generation on her bill from Flathead Electric. The system also has battery back up that can provide power to the clinic for 2 days in the event of an outage.

Photo of Calm Animal Care's solar system by: Lido Vizzutti, Flathead Beacon

The City of Boise, Idaho built a district heat system that supplies heat and hot water to over 55 businesses in downtown Boise.[53]

The City of Boulder, CO incorporated eight hydroelectric generators into the city's municipal water system that, with a combined capacity of over 20 MW, provide enough electricity to support 18% of City residential electricity needs (about 60 million kWh per year).[54] The project involved installing turbines at points where pressure relief valves were needed, using excess pressure in the system to generate electric power.

The **City of Kalispell** is utilizing methane generated by the wastewater treatment process as a heat source that displaces roughly $30,000 of natural gas use annually. The City is also exploring cost savings through efficiency upgrades at lift stations. An audit of lift stations revealed energy and cost savings potential that can be achieved by updating and consolidating old stations.

The **City of Kalispell** installed roundabouts at several intersections around Kalispell, which are saving traffic signal energy and operation costs, while increasing safety.

Photo of Hwy 93 bypass roundabout by: Lauren Casey

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[53] City of Boise, 2011. http://www.cityofboise.org/Departments/Public_Works/Services/Geothermal/index.aspx

[54] Cowdrey, 2004. Boulder's Municipal Hydroelectric System. http://www.energyincolorado.org/pages/hydroelectric_analysis

The **City of Midland, South Dakota** installed geothermal heating systems in Midland Elementary and High Schools over 30 years ago. These systems have helped the school district keep their annual bill for phone, light, and electricity down to about $10,000. Superintendent Denise Fox said, "I tell people that we heat this way [with geothermal] and again it's a funding issue right now. It's been discussed during legislation how are we going to afford to heat the schools. So I say hey, come to Midland. We have a nice way to heat."[55]

The **City of Whitefish** is refurbishing an old hydroelectric facility in conjunction with Flathead Electric. Part of the project cost will be financed through a power purchase agreement with FEC in which the City provides power to Flathead Electric in order to payback the upfront contribution from FEC. After payback, the project will provide a revenue of roughly $50,000-80,000 through offset power costs.

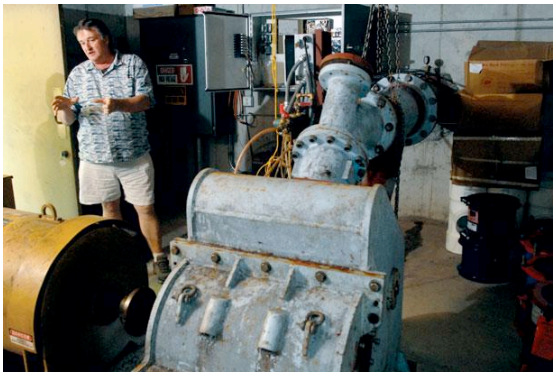

Photo of Whitefish hydroelectric facility by: Lido Vizzutti, Flathead Beacon

The **City of Whitefish** built the new Police and Fire Building to utilize solar hot water and radiant floors to reduce energy use in the truck bay. **Clearwater Biologicals** will be supplying biodiesel to City Service Valcon that was produced in a local production facility using locally grown oilseed crops.

Photo of Whitefish Emergency Services Building from City of Whitefish

Community Action Partnership in Kalispell has received a grant of nearly $100,000 through the Sustainable Energy Resources for Consumers program to implement 20 pilot solar hot water heating projects.

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[55] Keloland TV, 2006. "Geothermal Water Keeps School Warm." http://keloland.com/NewsDetail6162.cfm?Id=25,46454

The Landfill Gas to Energy project built at the **Flathead County** landfill has been generating power from methane gas (that was previously flared with no benefit) for between 900-1,500 households at a cost to Flathead Electric of roughly 5 cents per kilowatt-hour (kWh). This is cost competitive with imported electricity.

Screenshot from: Virtual Tour of the Landfill Gas to Energy Project, Flathead Electric Co-op

Flathead Electric Cooperative's (FEC) smart meter pilot project is underway and will provide data on how information and controls can improve energy demand and time of use decisions.

Image source: Flathead Electric

Flathead Electric Cooperative (FEC) installed an 80-ton geothermal heat pump system to provide space heating and ventilation at FEC's main warehouse, fleet vehicle garage, and testing facilities. The project was supported in part by an ARRA grant and was intended to demonstrate low temperature heat pump design for commercial/industrial applications. The expected payback for the system is 16 years.[56]

Huls Dairy in Corvallis, MT is providing all of its on-site power from methane produced in a digester. Dairy manure is processed in two 30,000 gallon tanks in which bacteria produce enough methane gas to fuel a 50 kW generator. Power from the project supplies the needs of the dairy, but it is grid connected, allowing it to power local homes when output exceeds demand at the dairy.[57]

Photo of Huls Dairy Digester from: Huls Dairy.

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[56] Talley, C. 2010. Flathead Electric Cooperative Facility Geothermal Heat Pump System Upgrade. Presentation to the EERE Geothermal Technologies Program.

[57] Hulls Dairy, 2011. http://www.hulsdairy.com/Digester3.htm

The **Turnbull Hydroelectric Project** involved the installation of two turbines on an irrigation canal outside of Fairfield, Montana. The turbines combined capacity of 15 MW will supply enough electricity for roughly 13,000 of Northwestern Energy's customers.[58] Because the turbines will be installed in a manmade structure, the impact on the environment will be negligible. Several factors are likely to have driven the success of the project: the Greenfields Irrigation District worked to ensure that generation would not interfere with irrigation water supply, the District partnered with the State Energy Promotion and Development Department to get assistance with permitting, incentives, and financing, and Northwestern Energy was involved from the beginning to ensure there was a buyer for the power.

Whistler Blackcomb resort in British Columbia installed a 7.9 MW hydroelectric turbine integrated into the water collection system used for snowmaking at the resort. Power generated by the run-of-river project is more than enough to supply the resorts winter and summer electricity needs. [59]

Energy Efficient Buildings

The **Apgar Transit Center** in West Glacier uses passive design to minimize heating and lighting energy needs, native plants to minimize irrigation energy and water needs, and high performance building materials and systems. All strategies helped the building earn LEED certification.

Photo of Apgar Transit Center by: David Restivo, National Park Service

Community Action Partnership administers a Weatherization program that provides free materials, labor, and technical assistance to help low income residents reduce home heating costs. The program received $2.65 million in ARRA funding allowing them to expand the number of homes served and increase spending per home to $6,500. The average energy cost savings of weatherization efforts in Montana is 19%.[60]

Flathead County completed major facility retrofits through a performance contract with Johnson Controls that will save more than 14% in utility bills and $161,000 annual energy and operations costs. The retrofits were paid for by savings through a 20 year

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[58] KRTV, 2010. "Governor Schweitzer helps usher in Fairfield hydroelectric project." http://www.krtv.com/news/governor-schweitzer-helps-usher-in-fairfield-hydroelectric-project/

[59] http://ww1.whistlerblackcomb.com/media/environment/projects.asp

[60] Flathead Beacon, 2009. http://www.flatheadbeacon.com/articles/article/weatherization_program_helps_stave_off_winter_chill/12958/

county lease and included a wide variety of equipment including lighting, HVAC, vending machines, elevators, and information technology power management.

Flathead County, and the Cities of Kalispell and Whitefish harnessed Energy Efficiency and Conservation Block Grant (EECBG) funding to implement facility upgrades saving taxpayer money on energy and operation costs. For example, the County is replacing windows in the historic courthouse with energy efficient windows that will also meet historic design requirements. The City of Kalispell used EECBG funding to retrofit several facilities including the public safety building.

Photo of Flathead County Courthouse by: Mayre Flowers

Four hospitals in the state (in Missoula, Browning, & Fort Harrison) are participating in the American Society for Healthcare Engineering's Energy Efficiency Commitment (E2C) challenge to health care facility managers to encourage them to measure, report, and reduce energy use through Energy Star certification.

Habitat for Humanity is in the early stages of pursuing Energy Star ratings on a new 16-unit development in Columbia Falls.

Kalispell Regional Medical Center adopted a Strategic Energy Management Plan that has led to a roughly 20% reduction in energy use and reduced costs from over $1.2 million to roughly $850,000 per year. Savings were achieved through operational improvements, commissioning of systems, retrofits, and cultural and behavioral changes.[61]

Photo of KRMC HVAC equipment from: Flathead Electric, Light Reading

Many residents, through audit and incentive programs, have upgraded the efficiency of their homes, improving comfort and cost performance. Several of these success stories have been profiled in Flathead Electric Co-op's *Light Reading.*

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[61] KRMC, 2011. Interview with Marcello Pierrottet and Mark Chitwood.

Montana Department of Natural Resources (DNRC) earned LEED certification for its Kalispell office, making it the first State of Montana owned facility to do so. Many of the lighting and ventilation strategies used to save energy create a better space for occupants.

Photo of the Kalispell DNRC Building by Lauren Casey

Adoption of the 2009 International Energy Conservation Code by the **State of Montana** is driving lower energy costs (15-18% beyond previous energy code) in new buildings.

In 2006, **Plum Creek** worked with Bonneville Power Administration and Flathead Electric to install a voltage monitoring and optimization system that generates savings of roughly $150,000 per year. The project was funded in part with roughly $337,000 from BPA's efficiency programs.

Photo of the Plum Creak voltage optimization system from: Flathead Electric *Light Reading*

Saddlehorn is an energy efficient subdivision built using design strategies intended primarily to enhance the character of the community. Built to LEED Platinum; but green wasn't the goal – rather to preserve the character of the area. The development includes sod roofs, electric community vehicles, solar panels, and recycled and local materials. "Saddlehorn has made the strongest commitment to sustainability for a rural community that I have ever seen" – Dr. Kath Williams.[62]

SADDLEHORN
BIGFORK • MONTANA

The **Summit Medical Fitness Center** is retrofitting electronics and lighting at a cost that will be recovered by energy savings within one year.

[62] The Flathead Beacon, 2008. http://www.flatheadbeacon.com/articles/article/the_accidental_green_developer/2544/

Whitefish Housing Authority provides energy efficient units for low-income residents.

Incentive Programs

Missoula, MT, in partnership with **Northwestern Energy**, implemented a pilot project called Green Blocks during the summer of 2008. The project was designed to demonstrate home energy savings to residents of Missoula and use a community framework to distribute technical assistance. The pilot provided 300 homeowners with free audits and low cost efficiency measures. The audits identified further opportunities for homeowners to save money in their homes. The community nature of the program was expected to encourage participation and reduce costs (through geographic efficiency). Participants were receiving an average of $1,500 of improvements and saving as much as $1,300 a year in energy costs.[63]

Green Blocks logo source: City of Missoula

Flathead Electric Cooperative's Energy Fix Home Audit program is providing free assistance to homeowners with electric space heating to identify cost effective home improvements.

FEC devised a new, tiered block rate structure to provide incentives for conservation and for fair allocation of fixed costs and marginal power supply costs.

Energy Fix logo and photo source: Flathead Electric Co-op

Incentives offered by both **FEC** and **Northwestern Energy** have been enabling many residents to retrofit their homes and businesses and save energy costs.

[63] http://missoulian.com/news/local/article_58b7a4bc-9dec-11df-9317-001cc4c002e0.html

Lewis & Clark County is starting a commercial audit and incentive program in conjunction with **Northwestern Energy**, using an **EPA** grant that will target small commercial facilities. The grant is part of the EPA's Climate Showcase Communities program. The budget of roughly $655,000 will be used to provide free audits and retrofit incentives up to $2,000. The goal for the program is to assist 180 businesses.

Climate Showcase Communities
Local Climate and Energy Program

Image source: Environmental Protection Agency

Infrastructure Improvements

The **City of Kalispell** has audited lift stations and identified energy and cost savings that will be achieved through upgrading and consolidating old stations.

The **City of Whitefish's** Fish Trails system has provided miles of trails to pedestrians and cyclists within the City of Whitefish. Plans are in place to expand the network to over 40 miles of trails.

Flathead County has been optimizing and downsizing its vehicle fleet in order to have appropriate vehicles for their intended use, yielding fuel cost savings to County taxpayers.

The **Flathead County Trails Plan** has laid a framework for a continuous and comprehensive trail network in the Flathead. At the time the Trail Plan was adopted, there were only 33 miles of trails in the County outside of the municipalities and these were poorly connected. The plan includes many miles of new trails to be constructed over the next 20 years in order to connect arterial commuter and recreational trails and increase safety and recreational opportunities.

Flathead Electric has already upgraded meters in their service territory to advanced meters that allow for automatic readings, saving energy and costs of reading meters.

Job Creation and Training

Algae AquaCulture Technologies is building a commercial scale greenhouse at Stoltze Land and Lumber to use wood waste and waste heat to grow algae and produce methane, electricity, and high quality organic fertilizer. The greenhouse was funded by a $300,000 grant from the Montana Department of Environmental Quality and is expected to employ 9 people in the first phase of operation.[64]

Blackfoot Community College installed a wind turbine on campus that reduces electricity costs by roughly 50% and provides onsite renewable energy training opportunities.

Photo of AACT's bioreactor by: Lauren Casey

The Student Built Homes project is a collaboration between **School District 5, Flathead Valley Community College,** and **Flathead Electric** that is allowing students to get hands on construction experience with energy efficient homes.

Local energy start-up **Zinc Air, Inc.** has reached a payroll of roughly $2 million in its first year of operations. Zinc Air signed a letter of intent with Juhl Wind, Inc., of Woodstock, MN, for the installation of a 1-megawatt advanced energy storage system.[65]

[64] AACT, 2011.

[65] Zinc Air, Inc. 2011.

Appendix C – Resources

The following table provides resources identified by Re-Powering the Flathead related to local challenges and opportunities. Most of these resources are cross-referenced within the tables on opportunities contained in Chapter 5, however some general resources that apply broadly to energy issues are listed only here.

Education	
Sector	**Resource**
All	Alliance to Save Energy, News You Can Use. http://ase.org/
Residential, Non-residential	Alliance for a Sustainable Colorado ,"Renewable Energy Workshops for Homeowners and Businesses." http://sustainablecolorado.org/
Non-residential	Anchorage, Alaska's Green Star Program http://www.greenstarinc.org/
Non-residential	Austin Chamber of Commerce, Energy Opportunities. http://www.austinchamber.com/DoBusiness/TheAustinAdvantage/Energy.html
All	Bozeman Mayor's Community Climate Task Force http://www.bozeman.net/Departments-%281%29/Administration/Commission/Citizen-Advisory-Boards/Mayors--Community-Climate-Task-Force
Transportation	Clean Air Campaign, Carpooling. http://www.cleanaircampaign.org/Your-Commute/Improve-Your-Commute/Carpooling
Residential	Flathead Building Association, "Houses That Work" http://www.eeba.org/housesthatwork/workshops/2011-05-06-kalispell.htm
Non-residential	Flex Your Power, Best Practice Guide for Employee Education. http://www.fypower.org/bpg/module.html?b=institutional&m=Education
Non-residential	HDR, Inc. *10 Steps to a Sustainable Office*. www.ccrpc.org/sustainability/pdf/SustainableOfficePoster_hi-res.pdf
All	Helena Citizens Council http://www.helenacitizenscouncil.com/projects/helena-climate-change-report.html
All	Kansas Interfaith Power and Light, http://kansasipl.org/
Transportation	League of American Bicyclists, http://www.bikeleague.org/index.php
Public	Madison Gas and Electric, Public Library partnership. https://www.mge.com/Images/PDF/Brochures/Community/PublicLibraryEnergyInfo.pdf
Residential, Non-residential	Montana Environmental Information Center (MEIC), Information is Power. http://meic.org/energy/global_warming_pollution/information-is-power
All	Missoula Greenhouse Gas Energy Conservation Team http://www.ci.missoula.mt.us/index.aspx?NID=492
Transportation	Missoula in Motion http://www.missoulainmotion.com/
Transportation	Missoula Ravalli Transportation Management Association http://www.mrtma.org/
Residential	Montana DEQ, Residential Energy Savings Tips, http://deq.mt.gov/energy/warmhomes/tips.mcpx
All	Montana Pollution Prevention Program *EcoStar Awards* http://www.mtp2.org/ecostar.html
Residential	National Association of Home Builders, EVHA Awards, http://www.nahbrc.com/evha/win_recent.aspx
Residential	OPOWER, http://opower.com/
All	Re-Power Bainbridge, http://positiveenergybi.org/repowerbainbridge
Public	Sedona, AZ, Energy Day at the Library. http://www.sedona.biz/renewable-energy-awareness-day0108.htm
All	Sustainability Education & Economic Development (SEED Center), http://www.theseedcenter.org/default.aspx

Economic Development	
Sector	**Resource**
All	Brookings Mountain West, *Centers of Innovation: Leveraging the Mountain West Innovation Complex for Energy System Innovation* http://www.brookings.edu/topics/intermountain-west.aspx
All	Headwaters Economics, *Energy* http://headwaterseconomics.org/energy
All	Montana DEQ, Main Street Montana, http://dli.mt.gov/pub/msthome.asp
All	Montana West Economic Development, http://dobusinessinmontana.com/
All	Pew Center for the States, *Clean Energy* http://www.pewcenteronthestates.org/trends_detail.aspx?id=53588
All	Yellow Wood Associates, Wealth Creation in Rural Communities, http://www.yellowwood.org/wealthcreation.aspx
Energy Efficiency and Conservation	
Sector	**Resource**
Residential	AERO Neighborhood Conservation Clubs http://www.aeromt.org/energy/energy-projects/neighborhood-conservation-clubs/
All	American Council for an Energy Efficient Economy (ACEEE), State Energy Efficiency Policy Database: Montana, http://www.aceee.org/sector/state-policy/montana
Public	American Planning Association, Planning and Zoning for Renewable Energy. http://www.planning.org/pas/infopackets/subscribers/pdf/EIP-18.pdf
Non-residential	Better Bricks, Kalispell Regional Medical Center SEM Plan. http://www.betterbricks.com/healthcare/case-studies/17044/2
Non-residential	Building Commissioning Association , Best Practices. http://www.bcxa.org/
Transportation	Carsharing around the world, http://www.carsharing.net/where.html
Residential	Community Action Partnership, Weatherization Program. http://nmhr-dist10.org/weatherization.htm
All	Crown of the Continent http://www.crownofthecontinent.net/
Transportation	Flathead County, Eagle Transit http://flathead.mt.gov/eagle/
Transportation	Foys to Blacktail http://www.foystoblacktailtrails.org/
Residential, Non-residential	Montana Department of Environmental Quality, Energy Savers Guidebook: http://deq.mt.gov/energy/default.mcpx
Non-residential	Montana DEQ, Commissioning in the State of Montana. http://deq.mt.gov/energy/buildings/default.mcpx#commissioning
Residential, Non-residential	Northwest Energy Efficiency Alliance: http://neea.org/
Residential, Non-residential	Northwest Power and Conservation Council, 6th Power Plan, http://www.nwcouncil.org/energy/powerplan/6/default.htm
Transportation	Rails to Trails http://www.railstotrailsofnwmt.com/
Non-residential	State of California, Commissioning Definitions. http://www.green.ca.gov/CommissioningGuidelines/default.htm
Non-residential	University of Montana, Procurement Policy. http://www.umt.edu/greeningum/Operations/Energy/Energy%20Star%20Policy.aspx
Residential, Non-residential	U.S. Department of Energy (DOE), Building Energy Codes Program: Montana http://www.energycodes.gov/states/state_info.php?stateAB=MT
Residential, Non-residential	U.S. DOE, Energy Savers Guide: http://www.energysavers.gov/
Residential, Non-residential	U.S. DOE, Energy Efficiency and Renewable Energy (EERE), Building Technologies Program: http://www1.eere.energy.gov/buildings/
Industrial	U.S. DOE, EERE, Industrial Technologies Program, Best Practices. http://www1.eere.energy.gov/industry/bestpractices/index.html

Energy Efficiency and Conservation (cont.)	
Transportation	U.S. DOE, EERE, *Guidance for Federal Agencies on Fleet Management*. http://www.fs.fed.us/sustainableoperations/documents/doe-guidance-fleet.pdf
Residential, Non-residential	U.S. DOE, Office of Electricity Delivery and Reliability, Smart Grid. http://www.oe.energy.gov/smartgrid.htm
Public, Industrial	U.S. EPA, Water Infrastructure http://water.epa.gov/infrastructure/sustain/waterefficiency.cfm
Residential, Non-residential	U.S. EPA, Energy Star, Procurement Guidelines. http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing
Residential, Non-residential	EPA, Rapid Deployment Energy Efficiency (RDEE) Toolkit. http://www.epa.gov/RDEE/documents/rdee_toolkit.pdf
Transportation	Whitefish SNOW Bus http://skiwhitefish.com/snowbus.php
Energy Planning	
Sector	**Resource**
Transportation	American Association of State Highway and Transportation Officials (AASHTO), *Improved Methods For Assessing Social, Cultural, And Economic Effects Of Transportation Projects.* http://www.statewideplanning.org/_resources/234_NCHRP-8-36-66.pdf
Public	California Energy Commission, Energy Aware Planning Guide, http://www.energy.ca.gov/energy_aware_guide/
All	Clark Fork Coalition, Climate Action in the Clark Fork, http://www.clarkfork.org/climate-action-in-the-clark-fork/climate-action-in-the-clark-fork.html
Transportation	Flathead County Trails Plan http://flathead.mt.gov/parks_rec/FINAL%20Commission%20Approved%20and%20Adopted%20Trails%20Plan%20and%20Appendices.pdf
Public	Local Government Coalition (LGC), Energy, http://www.lgc.org/issues/energy.html
Public	Local Governments for Sustainability, ICLEI USA http://www.iclei.org/
Transportation	Montana Department of Transportation, Pedestrian and Bicycle Facilities and Trails (Multimodal Transportation Infrastructure). http://www.mdt.mt.gov/research/toolkit/m1/pptools/ds/pbf.shtml
Public	Montana Department of Transportation: Transportation and Land Use *Resources for Growing Communities* http://mdt.mt.gov/research/toolkit/
Public	Municipal Research Services Center of Washington *Transportation Efficient Land Use: Planning and Land Use Strategies that Reduce the Need to Drive* http://www.mrsc.org/Subjects/Transpo/efficientlanduse.aspx
Residential	National Resources Defense Council (NRDC), *A Citizen's Guide to LEED for Neighborhood Development*, http://www.nrdc.org/cities/smartgrowth/leed.asp
Residential, Non-residential	Northwest Power and Conservation Council, http://www.nwcouncil.org/
Transportation	Pedestrian and Bicycle Information Center, http://www.walkinginfo.org/
Public	Pioneer Valley Planning Commission, Guide to Zoning and Land Use for Renewable Energy. http://www.islandplan.org/doc.php/PVPC%20renewables%20guide.pdf?id=878
All	Playbook for Green Buildings and Neighborhoods, http://www.greenplaybook.org/
Transportation	Rails-to-Trails and Bikes Belong. *Active Transportation for America: a Case for Increased Federal Investment in Bicycling and Walking.* www.railstotrails.org/afta.
All	Rifle, CO Village Energy Plan, http://www.rifleco.org/index.aspx?NID=150
All	Rocky Mountain Institute, Community Energy Opportunity Finder, http://www.rmi.org/rmi/
Residential	Saddlehorn, http://www.saddlehorn.com/
Transportation	U.S. Department of Transportation, Intelligent Transportation Systems (ITS). www.its.dot.gov.

Energy Planning (cont.)	
Public	U.S. EPA, Local Government Climate and Energy Strategy Series. http://www.epa.gov/statelocalclimate/resources/strategy-guides.html
Public	U.S. Mayors Climate Protection Agreement, http://usmayors.org/climateprotection/agreement.htm
Residential	USGBC, LEED for Neighborhood Development. http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148
Transportation	Victoria Transport Policy Institute *Strategies to Achieve Specific Objectives in Transportation Demand Management* http://www.vtpi.org/tdm/index.php#strategies
Financing Programs	
Sector	**Resource**
Non-residential	Bozeman, Big Sky Energy Revolving Loan Fund. http://www.nrmrcd.org/energy_fund.htm
Public	California Energy Commission, *How to Finance Public Sector Energy Efficiency Projects.* http://www.energy.ca.gov/reports/efficiency_handbooks/400-00-001A.PDF
Residential	City of Elgin, IL Revolving Loan Fund. http://www.cityofelgin.org/index.aspx?NID=1067
Residential	Clean Energy Works Oregon, http://www.cleanenergyworksoregon.org/
Non-residential	Johnson Controls, *Allocating Capital for Energy Efficiency in Corporate Budgets.* http://www.institutebe.com/clean-energy-finance/energy-efficiency-corporate-budgets.aspx
Residential	Keystone Home Energy Loan Program (Pennsylvania), http://www.keystonehelp.com/index.php
Residential, Commercial, Public	MT DEQ Alternative Energy Loan Program http://deq.mt.gov/energy/renewable/altenergyloan.mcpx
Public	New Rules Project, Municipal Financing for Renewables and Efficiency, http://www.newrules.org/energy/rules/municipal-financing-renewables-and-efficiency
All	San Diego Gas and Electric, On-bill financing program. http://www.sdge.com/business/rebatesincentives/programs/onbillfinancing.shtml
Residential	Sonoma County Energy Independence Program, http://www.sonomacountyenergy.org/
All	U.S. DOE, State and Municipal Revolving Loan Funds. http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/revolvingloanfunds.html
Non-residential	U.S. DOE, Energy Savings Performance Contracting. http://www1.eere.energy.gov/wip/solutioncenter/financialproducts/espc.html
Residential	U.S. Office of Housing and Urban Development (HUD), Energy Efficient Mortgage Program. http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/sfh/eem/energy-r
All	U.S. Senate, 2011 Senate Energy Bill, Energy Savings & Industrial Competitiveness Act of 2011 (ESICA, S. 1000), Summary. http://ase.org/resources/energy-savings-and-industrial-competitiveness-act-2011-section-section-summary
Grants and Incentives	
Sector	**Resource**
All	Database of State Incentives for Renewable Energy (DSIRE), http://www.dsireusa.org/
Residential	Montana DEQ, Low Income Energy Assistance, http://www.dphhs.mt.gov/programsservices/energyassistance/index.shtml
All	Montana DEQ, Montana Incentives for Renewable Energy, http://deq.mt.gov/Energy/renewable/taxincentrenew.mcpx
Public	U.S. EPA, Climate Showcase Communities Grant

Commercial, Agricultural	U.S. Department of Agriculture, Rural Energy for America Program http://www.rurdev.usda.gov/rbs/busp/9006loan.htm
Local Energy Resources	
Sector	**Resource**
All	Alternative Energy Resources Organization, AERO http://www.aeromt.org/
Public	Boston, MA, On-site Renewable Energy Generation. http://www.epa.gov/slclimat/local/local-examples/case-studies.html#ma
Public	Glacier High School Biomass, http://www.fuelsforschools.info/boiler_room.html
All	Harvesting Clean Energy Montana, http://harvestcleanenergy.org/
Education	Miles Community College, Energy Technology Program. http://www.milescc.edu/DegreesPrograms/BiofuelsEnergy/energytech.htm
All	Montana DEQ, *Bioenergy Guidebook*. http://deq.mt.gov/Energy/bioenergy/pdf/BioEnergyGuidebook2010.pdf
All	Montana Geothermal Website: http://deq.mt.gov/energy/geothermal/default.mcpx
All	Montana Green Power, http://www.montanagreenpower.com/
Transportation, Agriculture	Montana State University Northern Biofuels Research Center http://bioenergytestingcenter.com/
Agriculture	National Center for Appropriate Technology (NCAT), Farm Energy Success Stories, http://www.ncat.org/farm_energy_success.php
Transportation, Agriculture	NCAT, Oilseeds for the Future. http://www.ncat.org/special/oilseeds.php
All	National Renewable Energy Laboratory (NREL), 2010. Learning about Renewable Energy. http://www.nrel.gov/learning/
All	National Renewable Energy Laboratory (NREL), *Solar Ready Buildings Planning Guide*. http://www.nrel.gov/docs/fy10osti/46078.pdf
All	Northwest Sustainable Energy for Economic Development (SEED), http://www.nwseed.org/
Schools	Suns4Schools Project, http://www.montanagreenpower.com/solar/sun4schools.php
All	University of Montana, Energy Technology Program. http://ace.cte.umt.edu/nrg/
All	U.S. DOE, Bioenergy Knowledge Discovery Framework, https://bioenergykdf.net/
All	U.S. DOE, EERE. Renewable Energy. http://www.eere.energy.gov/topics/renewable_energy.html
All	U.S. EPA, Overview of interconnection standards. http://www.epa.gov/slclimat/documents/pdf/guide_action_chap5_s4.pdf
Tools	
Sector	**Resource**
All	Energy Saavy, Energy Savings Calculator and Contractor Search, http://www.energysavvy.com/
Residential	Lawrence Berkeley National Laboratory, Home Energy Saver. http://hes.lbl.gov/consumer/
All	Montana DEQ, Energy CAP. http://svcalt.mt.gov/deq/EnergyCAP/
All	National Institute of Building Sciences, List of Life Cycle Assessment tools for buildings. http://www.wbdg.org/tools/tools_cat.php?c=3
Residential	RESNET, HERS Ratings. http://www.resnet.us/home-energy-ratings
Industrial	U.S. DOE, Industrial Technologies Program, Software Tools. http://www1.eere.energy.gov/industry/bestpractices/software.html
Residential	U.S. EPA, Energy Star Homes. http://www.energystar.gov/index.cfm?c=new_homes.hm_index
All	U.S. EPA, Energy Star, Refrigerator Replacement Tool. http://www.energystar.gov/index.cfm?fuseaction=refrig.calculator

All	U.S. EPA, Portfolio Manager. http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager
Residential	USGBC, LEED for Homes. http://www.usgbc.org/DisplayPage.aspx?CMSPageID=147
Workforce Development	
Sector	**Resource**
Residential	U.S. DOE, Weatherization & Intergovernmental Program, Guidelines for Home Energy Upgrades Professionals, http://www1.eere.energy.gov/wip/retrofit_guidelines.html
All	U.S. EPA, State and Local Climate and Energy Program, Workforce Development, http://www.epa.gov/statelocalclimate/local/topics/workforce.html#p2
General Energy Information	
Sector	**Resource**
All	Flathead Electric Co-op http://www.flatheadelectric.com/
All	Montana DEQ, Energy http://deq.mt.gov/Energy/default.mcpx
All	Montana Public Service Commission, http://psc.mt.gov/
All	Northwest Energy Coalition, http://www.nwenergy.org/
All	Northwestern Energy, http://www.northwesternenergy.com/
All	U.S. Department of Energy, http://energy.gov/
All	U.S. DOE, Office of Energy Efficiency and Renewable Energy, http://www.eere.energy.gov/
All	U.S. Energy Information Administration, http://www.eia.gov/

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During 2009-2010 a monthly roundtable was held to bring together those working on energy opportunities in the Flathead. This group of organizations and individuals served as a networking opportunity for participants and as a sounding board for helping to frame this report. Many of these participants also stepped up to help sponsor and promote the community dialogue series:

Flathead Electric Cooperative, Flathead Valley Community College Green Team, F.H. Stoltze Land and Lumber Company, AirWorks, FBA Green, FUEL, Citizens for a Better Flathead, Ford Construction, Glacier National Park Green Team, The Sustainability Fund, City of Whitefish, Community Action Partnership of Northwest Montana, Mother's Power, Algae Aqua-Culture Technologies, BioGeoPerm, AERO, FischWorks Building Center, The Policy Institute, Bridgewater Innovative Builders, SunWorks Architecture, Wood Wrights Building, Phoenix Rising Inc., and RD Enterprises.

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Re-Powering the Flathead has found:

- That there is a clear link between energy and the local economy;
- There are many meaningful opportunities to improve upon the current picture of energy use in the Flathead;
- Reducing energy costs for residents and businesses through conservation and efficiency and investing in local energy supply could create substantial benefits for the local economy;
- Success stories demonstrate the potential for many diverse actions that can be taken to harness cost savings, energy independence, reliability, and other benefits;
- The efforts highlighted in the success stories have just scratched the surface of the potential for better energy management opportunities in the Flathead;
- Leadership is critical in identifying and acting upon opportunities.

The Re-Powering the Flathead report supports the conclusions above with research, data, resources, and best practices. Another benefit of this report is that it provides live links to hundreds of examples of ideas to help address challenges and harness opportunities explored within the report.

For project updates, contact information, or a digital copy of this report visit: www.repoweringtheflathead.org

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