



Missoula's 100% Clean Electricity Options Report, v2

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The following report is Missoula's first-ever "options report" on why and how Missoula can transition to 100% clean electricity. Here we include:

- Our Target – a transition to 100% clean electricity community-wide by 2035 or sooner
- Information about our collective electricity use, jurisdiction and boundary
- Recommendations and a menu of eight possible options to move us forward
- Next steps
- List of Appendices and Resources that accompany this report.

This report, accompanying Appendices, and an online comment form to assist in updating this draft will be linked at missoulaclimate.org. Each update to this report will have a date stamp.

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Acknowledgements:

We thank Mayor John Engen, Missoula County Commissioners, and Missoula City Council members for their leadership and encouragement. Many individuals helped us to understand the electricity landscape, refine our thinking, and provided review. We especially thank Montana Environmental Information Center's Brian Fadie for his assistance.

Dedication. This entire 100% Initiative is dedicated to the memory of Tom Platt, who not only conducted much of the research that informs these Options and Appendix I, II and III, but also catalyzed this effort and prodded us to make it happen and take action. Tom was "all in". He passed away on October 3, 2018. He is greatly missed.

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Missoula's 100% Clean Electricity Initiative

Overview

Welcome to Missoula's first-ever 100% Clean Electricity Initiative and "options report" which describes why and how Missoula can best transition to 100% clean electricity, given where we are today. A city and community commitment to 100% clean electricity is a mandate for planning and action. This report begins with the recommended target and suggested date and includes background information about our geographic scope, our electricity use, and a suggested definition of 100% clean electricity. We then provide a menu of options and strategies that would move us toward achieving our target. We conclude with a short list of next steps to accelerate this effort. Additional Appendices that take a "deep dive" into Missoula's electrification history, regulatory environment, and how other communities and states are meeting these goals are available as supplements to this primary report. The laws and regulations around electricity production and sales are complicated, and these Appendices are intended to help stakeholders and community members better understand the options we have put forward.

As we describe in this report, Missoula is poised to jump start our clean electricity and energy transition, and in doing so we join other cities from around the region, country and world. In fact, our initiative and this report are informed by cities and communities around the U.S. who have committed to this energy transition, and the leadership, strategies, and plans from these sister cities have been and will continue to be instrumental to our efforts (see Appendices I and IV).

We hope this report helps Missoulians better understand our clean electricity options, and how they intersect with our broader goals to be carbon-neutral, sustainable, and climate-ready. Clean electricity is just one component of reducing our fossil fuel energy use and greenhouse gas emissions. Using the information contained in this report as the starting point, we aim to solidify our commitment to transition to renewable energy and develop a robust plan with the help of a variety of community stakeholders. This effort is not our sole foray into climate change related work. We put this effort forward as we concurrently work collaboratively to create a Climate Resiliency plan for Missoula City and County, strengthening our abilities to adapt to climate change with intentional regard for vulnerable community members and issues of social equity.

Missoula's Target

Simply put, we have no choice but **100% carbon free energy**, here in Missoula and across the globe. For this initiative we focus specifically on "clean electricity." We are starting with *electricity* not all *energy*, and this distinction is important. In the Missoula community, electricity accounts for ~23% of our total energy consumption (2014 data, see below). Most of the remaining 77% is petroleum for transportation and natural gas for heating, cooking and some commercial and industrial activities.

Clean electricity is most simply defined as electricity not derived from fossil fuels, which therefore does not emit greenhouse gases. Clean electricity sources include solar, wind, hydro, geothermal, nuclear, and biomass. Some of these sources have other environmental and social impacts, and ultimately we may narrow the list of sources that we count toward our 100% clean electricity target due to these considerations. In addition, new advancements or technologies may add other sources to this list. At present we do not see carbon capture and sequestration associated with fossil fuels as providing clean energy because such systems are cost prohibitive, unproven and associated with other sources of

pollution. As a community we will need to continually reassess what is considered “on” and “off” our list of clean electricity options.

We also acknowledge that building a zero-carbon electricity system across the state and country will require components not elaborated upon here, for example transmission and grid upgrades, energy and battery storage, and broader energy market coordination.

Finally, our recommended target date for 100% clean electricity is 2035 or sooner. We acknowledge that this is ambitious, but think this date allows sufficient time for new technologies, more funding, and state, regional and federal market transformation and expansion. It is also right around the corner and obliges us to get started today. Other cities and communities around the U.S. are making similar bold commitments, some with even more accelerated timelines. We continually review goals and targets set by other U.S. Cities (see Appendix I and associated Database) and 2035 is right in the middle—other cities are more ambitious and others less so. We offer 2035 as a starting place for discussion within our community and remain open to shifting this date.

“Ready for 100”

As mentioned, Missoula’s 100% Clean Electricity Initiative draws heavily on recommendations and best practices from other communities around the country. For reference, The Sierra Club’s [Ready for 100% Commitment Guidelines](#) recommends any adopted plan and goal includes the following elements:

- Community-wide Electricity Use: A full transition of the electricity sector to clean, renewable energy;
- By 2035: A target year for when this commitment will be achieved no later than 2035 for electricity and 2050 for all energy sectors;
- Ensure Justice, Equity, Affordability, and Access: A commitment should include measures that prioritize equity affordability, and access for all members of the community, prioritizing low income communities, environmental justice communities and communities burdened by the fossil fuel industry.
- Clean and Renewable Resources Only: This includes carbon and pollution free energy sustainably collected from renewable sources including wind, solar, tidal, and geothermal. Low-impact, small hydro and some forms of biomass may be included after being evaluated for sustainability and environmental justice implications. Nuclear, natural gas, coal, oil based, or any other forms of carbon-based energy production are not included as clean or renewable sources of energy.
- A Transparent and Inclusive Planning and Implementation Process ensuring that the community members and local businesses have an opportunity to participate.

We are making our own plan and guidelines; this guidance can inform our work as we move forward.

Why this effort and why now?

The impacts of climate change drive our world’s urgent need to reduce greenhouse gas emissions and decarbonize our energy systems. The October 8, 2018 [Conclusions Report](#) from lead scientists with the Intergovernmental Panel on Climate Change (IPCC) implores the world to rapidly decarbonize.

According to the IPCC’s [October 8 Press Release](#):

The report finds that limiting global warming to 1.5°C would require “rapid and far-reaching” transitions in land, energy, industry, buildings, transport, and cities. Global net human-caused

emissions of carbon dioxide (CO₂) would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050.

The press release continues:

"Limiting warming to 1.5°C is possible within the laws of chemistry and physics but doing so would require unprecedented changes," said Jim Skea, Co-Chair of IPCC Working Group III.

This latest scientific projections and calls for rapid change cannot be ignored; they drive our initiative.

Studies suggest cities are responsible for 70% of energy-related carbon dioxide emissions that drive global warming (see C40.org). The right energy revolution will help create a clean, resilient, and affordable electricity system that produces far less pollution and climate-altering CO₂, eventually becoming carbon-free. "Clean up the grid and electrify everything" is the current mantra! This means that 1) the grid will be increasingly powered by clean, renewable energy (with storage and smart grid efficiencies added), and 2) more and more activities and sectors will shift from thermal energy to electricity (e.g., transportation, appliances, heating systems, etc.).

A transition to 100% clean electricity for Missoula is essential if we are to meet our recent climate commitments and achieve our City and Community carbon emissions reduction goals. It is an important component of specific climate and energy goals. The City of Missoula has a goal of carbon neutrality by 2025 for municipal operations ([Conservation and Climate Action Plan](#); passed Council in 2013, Resolution 7753); the community-wide goal as set forth in the 2015 [Community Climate Smart Action plan](#) is carbon neutrality by 2050 (see below). The county is also currently developing a carbon neutrality goal for county government operations.

Reaching 100% clean electricity means producing or procuring enough clean electricity to cover a city's needs. Investing in renewable energy makes increasing economic sense. First, the price of renewable energy, especially wind and solar, has seen a pronounced and steady decline in the past decade. Second, as renewable electricity is produced or installed locally, more jobs are sustained and dollars are spent locally, fostering local economic growth. Additionally, climate and energy experts and scholars increasingly argue for a "price on carbon" in which there is a specific financial price attached to fossil fuels to reflect the very real economic costs of climate change and the carbon pollution that contributes to it. California and a coalition of states in the Northeast have carbon markets that impose a cost on carbon pollution. Although there is no guarantee when this will occur on a nationwide or worldwide basis and the structure of such pricing schemes will vary, clean electricity and carbon-free energy are our future.

In short, reducing fossil fuel use strengthens local economies, buffers us from potential increasing costs of polluting energy, and builds community resiliency. We are building the city and community of the future.

Missoula's Geographic and Jurisdictional Scope

Geographic scope

This report takes a Missoula community-wide approach, which includes the City of Missoula and the surrounding urban development area. This is the boundary that has been utilized by Climate Smart Missoula for the [Community Climate Smart Action Plan](#) (2015) and for the [Community Greenhouse Gas Inventory](#) (released 2017). This allows electricity and emissions data from the community inventory to inform our energy reduction efforts from the outset. Updated greenhouse gas inventories will provide data for this initiative moving forward.

In sum, our goal is to account for 100% clean electricity consumed within the defined boundary (Figure 1, right) in perpetuity.

On-site and local clean energy development will be an important component of this effort; however, considerations such as land availability and wind energy resources will likely lead us to look outside this boundary for a portion of our new clean electricity production.

The strength of this clean electricity transformation will be best realized by working with other Montana communities in order to share resources and strategies and bring proposals forward to the investor owned utilities, Montana's Public Service Commission, rural electric co-operatives, and/or our state legislature.

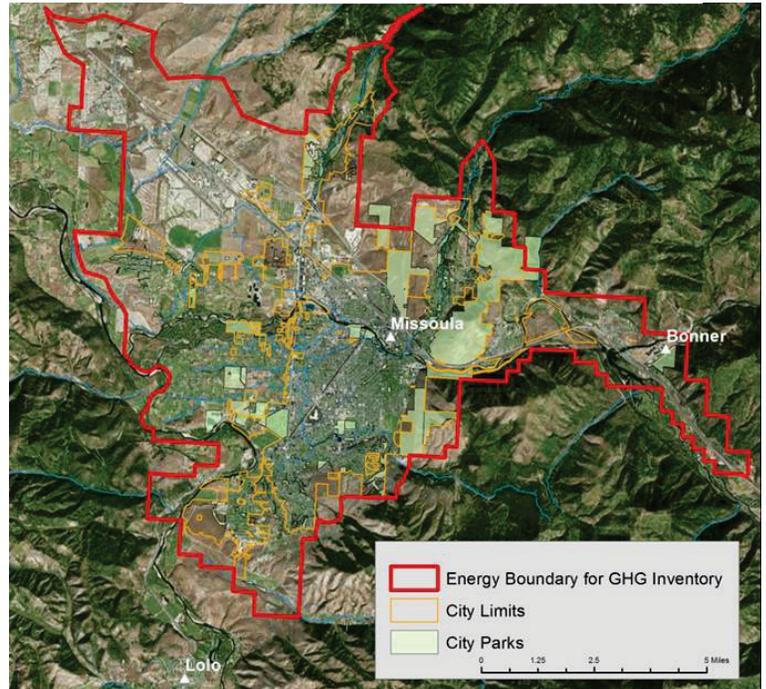


Figure 1. Geographic Boundary for Community Greenhouse Gas Inventory and 100% Clean Electricity Initiative

Jurisdictional Scope and Supporting Plans

As mentioned, this 100% transition initiative stems from commitments made by and plans crafted by local government and associated entities. Most recently, in the wake of a U.S. federal government's pull-back from commitments designed to meet obligations under the 2015 Paris Climate Accord, many cities, together with some states and many businesses, have stepped up to declare their commitment to accelerating efforts to reduce greenhouse gas emissions and meet the goals of the international treaty (see Appendix I for list of cities, states, and countries and specific commitments made). In December 2017, under the leadership of Mayor John Engen, the City of Missoula signed on to the [Chicago Climate Charter](#) at the North American Climate Summit. In addition Mayor Engen supports a community-wide transition to 100% clean, renewable energy and has pledged his support by signing on, in 2018, to [Mayors For 100% Clean Energy](#).

Several existing plans also align with and support this 100% transition. The City of Missoula's [Conservation & Climate Action Plan](#) (passed City Council by unanimous resolution in 2013) guides municipal operations and also directs the city to engage at the community scale, which includes residents, businesses, and industry. The City's plan calls for a reduction in greenhouse gas emissions with a goal of carbon neutrality by 2025 for municipal operations from all energy sources (electricity, natural gas, and transportation). This City plan laid the foundation for Missoula's [Community Climate](#)

[Smart Action Plan](#) (2015) which calls for increased renewable energy and a carbon neutral community by 2050. The Mayor endorsed this plan, though it has not been officially brought before City Council.

This 100% clean electricity initiative is in alignment with other critical City plans, including the [Our Missoula Growth Policy](#) (updated 2015). This planning document includes goals related to addressing climate change, reducing reliance on carbon-based fuels, promoting energy efficiency, and increasing the percentage of renewable energy in Missoula's energy budget (see Goals EQ1-4; v).

Missoula County's [2016 Growth Policy](#) includes a goal to reduce the county's contribution to climate change (Goal 4, p. 14). The county recently conducted a [greenhouse gas inventory of county government operations](#), and is presently developing a climate action plan with specific goals and timelines. In December 2017 the County hired its first-ever Energy Conservation and Sustainability Coordinator to assist in climate mitigation and adaptation efforts, and reducing fossil fuel energy use is a significant piece of this effort.

In addition, the University of Montana (UM) in Missoula is a 2007 charter signatory of the American College and University Presidents' Climate Commitment (ACUPCC). UM has interim emissions reduction goals leading up to its 2020 carbon neutrality target. More can be found via the [UM Sustainability Office](#), with more details provided within [Operations](#).

Missoula's Electricity Profile

The city and community of Missoula, including the University of Montana, are serviced primarily by one investor owned utility, NorthWestern Energy (NWE). Electricity is supplied to select areas outside of NWE's service area by Missoula Electric Cooperative (MEC).

What types of energy supply the electricity used in Missoula?

To transition to 100% clean electricity we need to understand the energy mix of the electricity consumed at the community-wide scale. According to [NorthWestern Energy](#), approximately 60% of the electricity it sells to its customers is generated by wind, water, and solar with the remaining ~ 40% powered by a combination of coal and natural gas (Figure 2). It is important to note that Figure 2 includes only electricity generated at facilities owned by NorthWestern Energy or purchased through long-term contracts. NorthWestern purchases significant amounts of electricity on the short-term open "spot" market and does not disclose their fuel sources, so we are unable to consider that portion of our electrical supply in this analysis.

Missoula Electric Cooperative provides ~ 5% of our community's electricity load. MEC's current portfolio consists primarily of hydroelectricity, and they report that their portfolio is about 95% carbon-free. They purchase power from the Bonneville Power Administration whose fuel mix is [reported here](#).

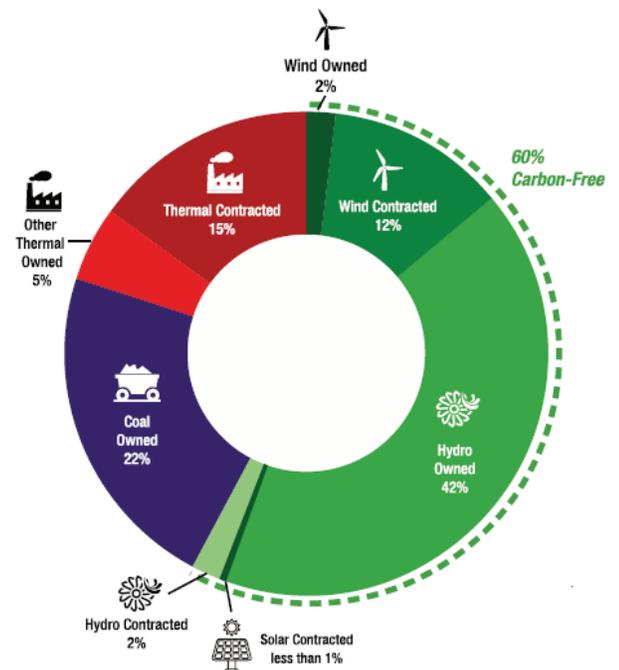


Figure 2. NorthWestern Energy's 2017 electric supply mix in Montana, based on megawatt-hours delivered

We also include an estimate, based on public reporting, of the recent additional electricity load from Bonner Industrial Park via the HyperBlock (formerly Project Spokane) cryptocurrency mining operation. According to NorthWestern Energy's list of [Designated Loads and Resources](#), HyperBlock has a contract to purchase 20 MW of power from Energy Keepers Inc., owner of the Seli's Ksanka Qlispe' hydroelectric dam near Polson.

The Missoula area does boast a growing number of rooftop solar arrays, both residential and commercial. Such locally produced clean electricity reduces our overall demand for electricity from the utility that is only partially clean. According to data provided to Climate Smart Missoula from NorthWestern Energy, as of June 2018, the community has 1.97 MW of installed solar net metered systems in place.

We acknowledge that there is no way to track the source of the actual electrons that feed the Missoula grid. Rather, our goal is to offset the portion of NWE's and MEC's electricity generation portfolio that is composed of fossil energy sources by deploying, either here in Missoula or elsewhere in the state, additional clean electricity generation and/or electricity conservation. In other words, our goal is to replace the fossil fuel based electricity supply that powers Missoula with new clean, renewable energy or with electricity savings.

Comparative Electricity Costs

Clean energy technologies are dramatically declining in cost. As Figure 3 shows, the costs of utility-scale solar and wind have dropped nearly 90% and 70%, respectively, in the last decade, and are now lower than the costs of electricity produced from coal and natural gas.¹ It is important to note that these cost figures do not include subsidies. Data are from Lazard's Levelized Cost of Energy Analysis.² The Lazard analysis identifies decreasing supply chain costs, improving technologies, and increased competition among the factors that have led to these steep declines in utility-scale renewable energy costs.

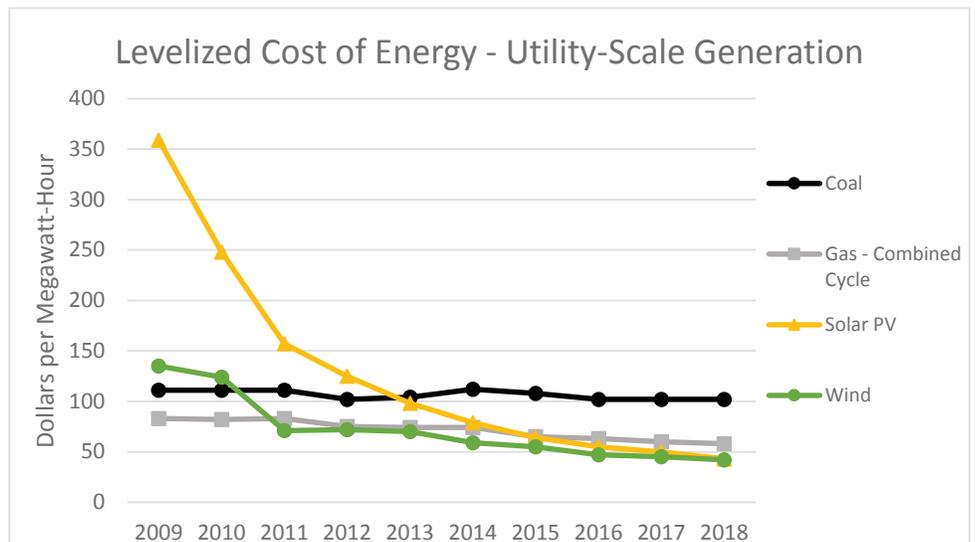


Figure 3. Unsubsidized levelized cost of energy for utility-scale generation from 2010 through 2018. From Lazard's Levelized Cost of Energy Analysis, Version 12.0.

Though some existing coal and natural gas plants will likely be a part of NorthWestern Energy's fuel mix for several years to come, coal plants in particular are finding it increasingly hard to compete with low-

¹ Levelized cost, a common metric for comparing costs consistently across technologies, is a measure of the average total cost to build and operate the generator over its lifetime, divided by its total electricity output over its lifetime.

² <https://www.lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2018/>

cost renewable energy.³ 2016-17 data for NorthWestern Energy shows that the supply price of coal-powered electricity from the Colstrip coal-fired power plant is more expensive than that produced by both wind farms and hydroelectric dams (Figure 4).⁴

Community of Missoula's current electricity consumption

Because the City of Missoula and Climate Smart Missoula have conducted greenhouse gas emissions inventories, we have data on our electricity usage, albeit not current (Table 1). The community-wide numbers are circa 2014 and a new accounting is warranted, especially as industry and commercial businesses have

grown. Within our community boundary we now have HyperBlock cryptocurrency, new and expanded breweries, and other commercial businesses and residential growth. We intend to work with NorthWestern Energy and Missoula Electric Cooperative to collect 2018 data in 2019.

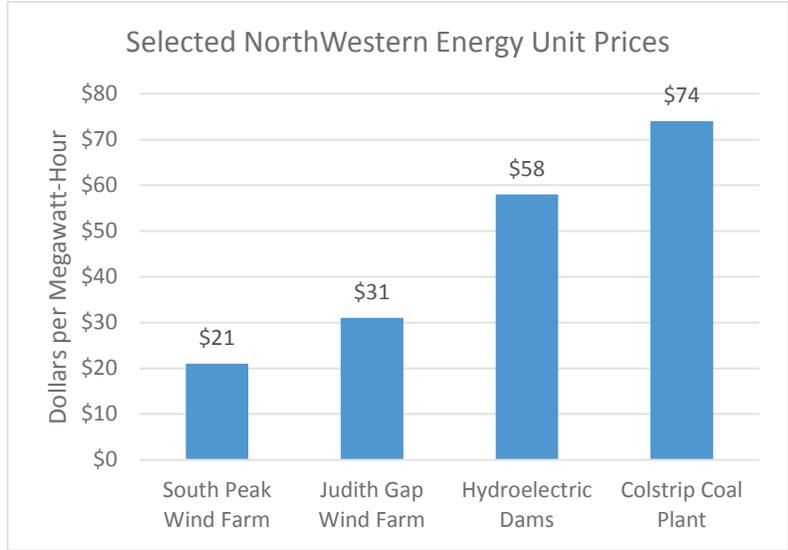


Figure 4. Selected NorthWestern Energy Electricity Unit Prices. Data for 2016-17 with the exception of South Peak Wind Farm, which is projected to come online in late 2019.

Table 1. Estimate of Missoula's electricity consumption

SCOPE	~ Annual electricity use (MWh)	Date of inventory
Community of Missoula	769,346	2014
<i>Subset of Community:</i>		
<i>UM-Missoula</i>	<i>32,400</i>	<i>2009</i>
<i>City of Missoula operations</i>	<i>12,878</i>	<i>2015</i>
<i>Missoula County - operations</i>	<i>7,972</i>	<i>2016</i>

We estimate that the HyperBlock cryptocurrency mining operation has increased the community's total electricity consumption by about 20%, and we expect this increase to be reflected in the 2018 inventory. HyperBlock representatives have stated publicly that they intend to triple the size (and electricity consumption) of the facility in Bonner.⁵

³ <https://www.bloomberg.com/news/articles/2018-03-28/fossil-fuels-squeezed-by-plunge-in-cost-of-renewables-bnef-says>

⁴ Figure 3 data from Montana Consumer Council (<https://leg.mt.gov/content/Committees/Administration/Consumer%20Counsel/Reports/NWERateGraphs.pdf>) and NorthWestern Energy (<http://www.northwesternenergy.com/our-company/media-center/current/news-article/2018/03/22/NorthWestern-Energy-Low-cost-qualifying-facility-to-add-80-megawatts-of-wind-to-Montana-portfolio>).

⁵ https://missoulian.com/news/local/bonner-bitcoin-mining-riding-out-cratering-market/article_bd285a25-a979-52da-bf67-95188e1072b4.html

Our 2014 community emissions inventory includes the following electricity usage, divided out by sector (Table 2).

Table 2. Missoula Community Electricity Use by Sector (2014 data)

Sector	Usage (MWh)
Industrial	41,669
Residential	285,869
Commercial	441,807
Total	769,346

How much new clean electricity is needed to replace the fossil fuel portion of our electricity mix?

- NorthWestern Energy. Estimated 95% of community energy consumption = 730,879 x 40% fossil fuel based = 292,351 MWh.
- Missoula Electric Cooperative. Estimated 5% of total energy consumption = 38,467 x 5% fossil fuel based =1,923 MWh.

TOTAL: 292,566 – rounded to 300,000 MWh

How could Missoula replace this ~300,000 MWh of electricity?

The objective is to replace the 40% of NWE’s and 5% of MEC’s electricity supplies serving the Missoula community with new renewable energy plus energy efficiency.

Hypothetical resource to replace all fossil fuel-based electricity with clean sources	Percentage	MWh needed	MW needed
solar farm(s), 15% capacity factor	45%	135,000	103
wind farm(s), 35% capacity factor	25%	75,000	24
energy efficiency (in average megawatts - aMW)	15%	45,000	5
distributed energy - new systems, 15% capacity factor	15%	24,000	34
TOTAL - rounded	100%	300,000	166

Clearly this is a starting point and the amount of additional clean electricity needed for Missoula’s footprint will depend on, in addition to population growth and increased (or decreased) demand, the portfolio of our electricity providers. The faster NWE and MEC move away from fossil fuel based electricity, the less we have to add in order to displace this fossil fuel based electricity.

We also note that there is a real push in cities and countries across the world toward electrification of buildings and transportation, since carbon-free electricity is typically easier and more cost-effective to produce than carbon-free liquid or gaseous fuels. In Missoula, a shift away from natural gas, gasoline, and diesel in favor of electricity to heat buildings and run buses, trucks and cars would result in an increase in total electricity consumption. This will increase the need for new renewable energy development beyond the 300,000 MWh estimated here.

Recommendations for Collaboration

Our effort to understand Missoula's electricity use and develop plans for a comprehensive clean energy transition relies on working collaboratively with our utilities, rural electric cooperatives, regulatory agencies, elected officials, local government, non-profit organizations, and community members. As is clear in this Options Report, to move to clean electricity we need to have collated and current energy data. We will look to the energy providers to improve aggregated data tracking and sharing to allow us to monitor progress toward our goal. Official agreements or data-sharing Memoranda Of Understandings (MOUs) to receive necessary electricity data and usage with NorthWestern Energy, Missoula Electric Cooperative, large commercial or industrial electricity consumers, and the City of Missoula will be critical in order to gauge our progress and drive success.

Options

Options for supplying the Missoula community with 100% clean electricity can be distilled into eight main possibilities or choices. At this juncture, we believe that this will primarily come from verifiable renewable energy, primarily solar within or near Missoula and wind, ideally from within Montana. Wind development is unlikely in the Missoula area since central and eastern Montana enjoy a much stronger wind energy resource than western Montana. Increasing energy efficiency and conservation (see Option 3) will shrink the overall size of our electricity demand, thereby also reducing the amount of clean electricity needed.

These are in no way the only options or the final list. We encourage all those interested to go to this website: missoulaclimate.org/100-percent where you can find this report, updated frequently, plus the four Appendices and a comment form. Please offer your input, ideas and questions.

Option 1 – Expand Use of Existing Tools

There are several tools available under existing laws and regulations that allow Missoula to increase its renewable electricity supply mix, though these options could shift depending on actions of the utility, co-op, Public Service Commission, and legislature. Some may be relatively limited in scope at present, requiring policy change, new financing options, or additional staff to expand them to a scale sufficient to contribute meaningfully to our 100% goal.

Net Metering. Missoula residents, businesses and local governments can utilize the existing net metering tariff to install a significant capacity of independently financed solar energy on private and public property.⁶ State law caps the size of net metered systems at 50 kilowatts,⁷ limiting the amount that any single customer can add to the energy mix, but adding solar PV arrays on many buildings may yield a significant amount of new solar energy for Missoula. Creative ownership models like third party finance can increase the financial viability of solar net metered systems on nonprofit and low income

⁶ Net metering is authorized by state law (MCA 69-8-601 et seq.). The net metering law requires investor-owned utilities to allow their customers to install small solar, wind, or micro-hydropower systems and to connect those systems to the electric grid. When net metered systems produce more electricity than needed, the excess flows onto the grid and the net metered system owner receives a credit on their electric bill. Credits can be rolled over from month to month but are zeroed out once a year.

⁷ MCA 69-8-103. The net metering statute does not apply to electric cooperatives; however, Missoula Electric Cooperative allows its members to install net metered systems up to 10 kilowatts in size, and systems between 10 and 50 kilowatts may be permitted on a case-by-case basis.

properties, but there is not a clear regulatory framework for this (discussed further in Option 7). Battery storage can add to the benefit of solar net metering, although at present the upfront cost of this technology is a barrier to widespread residential deployment. Net metered systems are typically installed by small, local solar businesses that subcontract with other local businesses such as electricians, roofers and engineers. As such, growth in net metering has great potential to create local economic benefits and stimulate local jobs and investment.

Shared Solar. These are also described as “community solar,” “solar gardens,” or “virtual net metering” installations. Shared solar is typically a single large installation tied to the grid. Electricity customers can “subscribe” to a portion of the installation by leasing or purchasing any number of panels from the total available, often matching their purchase with their total energy needs. The energy produced is sent to the grid while a credit corresponding to the energy generated by each subscriber’s portion of the system is applied to that subscriber’s utility bill. Since 2015 Missoula Electric Cooperative has developed three 50 kilowatt community solar facilities, with shares sold to their members. In Montana, there isn’t a clear regulatory framework for investor owned utilities to offer a shared solar option to their customers – this not a tool available in NorthWestern Energy’s service territory.

Shared solar installations can be composed of ground-mounted solar farms or rooftop solar installations on private or community buildings. Shared solar can augment net metering by utilizing larger building sites and serving larger customer loads. Creative use of the shared solar model could add hundreds of small to medium solar electric systems in Missoula.

Larger systems. Medium and large commercial and industrial facilities have the option of developing renewable energy systems larger than 50 kilowatts as long as those systems are “non-exporting,” meaning that all energy generated is consumed on-site and none is exported to the grid. Non-exporting systems are limited in size by the customer’s load, and in all cases may not exceed 10 megawatts per NorthWestern Energy’s Small Generator Interconnection Standards (details [here](#)).

There are many commercial and industrial sites in our community where on-site non-exporting generation could be installed. Additional financing options would help businesses take advantage of this opportunity. Financing options could be developed with interested individual investors (or a consortium of investors) or directly with financial institutions interested in driving the clean energy market.

Interestingly, Missoula actually has an existing municipal electric utility which was created in 1999 and never utilized (see Appendix III for details). Reviving this authority could allow the city to connect local producers with consumers seeking on-site, behind-the-meter electricity. The authority and legality for this utility need to be explored.

Finally, to enable larger systems the City of Missoula and Missoula County could, through their government relations teams, advocate for new legislation to expand opportunities for Qualifying Facilities (QFs, see Appendix III) and Community Renewable Energy Projects (CREPs) and, likewise, oppose bills that would limit these larger clean electricity projects.

Other customer purchasing options. In Montana, state law requires regulated utilities to offer individual customers a way to support renewable energy (MCA 69-8-210(2)). The current option for NorthWestern Energy customers, called the E+ Green Program, allows customers to purchase Renewable Energy Credits (RECs) that are generated at renewable energy facilities. The RECs for E+ Green Program participants are purchased from the [Bonneville Environmental Foundation](#). Since the

Bonneville Environmental Foundation does not purchase RECs from any Montana-based projects, E+ Green participation does not support in-state renewable electricity development. The E+ Green Program is not widely used. Customers across the state have expressed interest in an improved green tariff program which would better meet the goals of increasing renewable energy on the grid while also supporting Montana-based projects (see Option 2).

Option 2 – Green Tariffs

An exciting option for greening Missoula's electricity mix is to pursue creation of new renewable electricity tariffs. Green tariff models in Washington, Colorado, Minnesota, California, and other states⁸ demonstrate how to add cost-effective large local renewable electricity installations to an investor-owned utility's supply portfolio, available for purchase at competitive rates by willing local customers. Green tariffs may be proposed by any stakeholder but they are analyzed by the affected utility and PSC before authorization, so working with NorthWestern Energy and the PSC to prepare one or more green tariffs would be the most expedient path. One advantage of green tariff models is that they are effectively a natural extension of utilities' current energy supply business model. The statutory requirement that NorthWestern Energy must "offer its customers the option of purchasing a product composed of or supporting power from certified environmentally preferred resources" (MCA 69-8-210(2)) may provide the authority necessary to implement a new green tariff.

Green tariffs are authorized rate structures (electricity prices) designed to allow an identified customer class to purchase up to 100% of their electricity demand from clean energy sources, offered via specialized contracts. In regulated utility markets tariffs can be proposed by legislatures, utilities or customers, and reviewed and authorized by public utility commissions based on a comprehensive analysis of costs and benefits to

Two Types of Green Tariffs

There are two main types of green tariff programs. The first allows a negotiated, one-off arrangement between a utility and an individual large commercial or industrial customer for access to utility-brokered power purchase agreements (PPA) delivering power via existing utility transmission services. This type of tariff appears as a rider on the customer's bill and accounts for the actual cost of the green energy under contract, reduced by the cost of fossil fuel energy no longer consumed by the customer. If the renewable energy power price is lower than the fossil energy price this agreement may yield lower power bills, although in general the net price impact to the consumer is negligible or positive. This type of green tariff is designed to appeal to very large corporate and industrial customers with high demand facilities that might otherwise seek to leave a utility and purchase power directly in regional wholesale utility markets.

The second type of green tariff is a utility subscriber program. Subscriber programs are designed to allow smaller commercial and industrial customers to pool their renewable energy demand by subscribing to a portion of the production from a large renewable energy project owned or contracted by the utility. Again, the customer pays the full cost of the renewable energy generated by the project, offset by a credit for their unused demand for fossil fuel energy from the utility's standard portfolio power mix. This is the type of program geared to local governments, businesses, and retail consumers, and is well suited for communities seeking to achieve climate and energy goals (more [here](#)).

⁸ New green tariff programs are developing rapidly. The World Resources Institute has up-to-date information available on their website, including individual reports of the 17 US states that have enabled green tariffs: [Emerging Green Tariffs in U.S. Regulated Electricity Markets](#).

stakeholders. Green tariffs do not include green marketing programs like NorthWestern Energy's E+ Green.

Green tariffs are designed for utility customers seeking delivery of a significant quantity of renewable energy in their power supply mix, especially from newly constructed renewable energy generation in relatively close proximity to customer demand. Since the first green tariff was adopted in 2013 over 23 green tariff programs have been proposed or approved in 17 states. In each case the green tariff includes standard cost-of-service charges, such as payment for transmission, distribution, capacity, and ancillary services, but substitutes the actual price from a specific renewable energy project as a charge that is offset by a credit for unused fuel costs from fossil fuel generation assets in the standard energy portfolio. Successful green tariffs enable customers to receive the economic and environmental values of renewable energy while ensuring that they still pay their fair share of grid costs, administration, delivery and system balancing expenses.

A carefully designed green subscriber tariff could supply Missoula with a significant amount of renewable energy from regional wind farms or new community-sited solar projects that do not require expensive transmission and provide clean power, an expanded tax base, and local employment opportunities.

We can look to these programs for examples of green tariff program details such as pricing and contract length.

- Xcel Minnesota Renewable*Connect; for [residential](#) and [business](#)
- [Xcel Colorado Renewable Connect](#)
- [Puget Sound Energy Green Power program](#)
- Pacific Power (PacifiCorp) ["Blue Sky Select" Large Customer Program](#)

Other Montana communities have also expressed interest in exploring green tariff opportunities, and there is potential to develop a program applicable to the state as a whole. This is by no means a Missoula only option.

Option 3 – Energy Efficiency and Conservation

Saving electricity is often referred to as the “cheapest electricity” available. No new power plants or transmission lines are necessary, although some new or upgraded products or even systems may be necessary to increase efficiency. A change in personal conservation habits is something accessible to all. There are a variety of means by which communities can encourage or mandate efficiencies that result in less electricity used, and although some are already utilized in Missoula, myriad additional tools and programs could be developed and supported. Options range from “stretch building codes” (in which incentives are provided for going beyond the standard codes), to additional rebates for energy efficient lighting or appliances, to fully supported programs that help homeowners or businesses make substantive efficiency upgrades by providing energy audits, connecting homeowners to contractors, and providing information about financing options. See Option 7 for further details about a few funding and financing options for both energy efficiency and renewable energy.

Robust programs that encourage the conservation of electricity by helping individuals, whether at home or work, take steps to reduce their use are also needed. Funding support is needed to effectively

develop, coordinate and implement high-impact programs. [Appendix IV](#) discusses best practices, options and lessons learned from other communities and appropriate options for Missoula. In this Appendix and in addition to discussing the need to benchmark and track electricity reductions, we detail these energy efficiency strategies and program elements:

- Policy/regulatory strategies
- Behavior-focused programs and voluntary
- Partner with our utility and/or electric co-op to expand energy-efficiency programs and funding
- Develop new and expand existing funding for energy efficiency

In addition to suggested priority strategies for Missoula, in Appendix IV we highlight two communities that have prioritized and funded energy efficiency efforts. Fort Collins, CO has an impressive “Energy Works” program which offers lessons for Missoula and Burlington, VT has a number of successful energy efficiency initiatives. Our *Other Cities Database* also includes information about energy efficiency and conservation programs and goals that other communities are pursuing. See missoulaclimate.org/100-percent.html.

So much electrical savings potential exists that although one might consider this an “existing tool” (Option 1), we believe it mandates its own Option. Significantly accelerating these efforts can reduce the community’s total electricity usage; we can shrink “size of our electricity pie”. To move this beyond current tools, new energy efficiency financing options and investments need to be developed at the local and state level and within the utilities and ultimately more funds need to be dedicated to these efforts.

Option 4 – New Franchise Agreements

Missoula could consider creating a municipal electric utility franchise agreement. Montana municipalities are authorized to regulate the private use of public rights-of-way within their boundaries by establishing required business practices and levying fees on utilities under “franchise agreements.” Franchise agreements charge fees from the utility provider as “rent” for the use of public infrastructure and are presently used in Missoula with telecommunications (see Appendix III for details on how these are structured). An electric utility franchise agreement could be structured similar to the agreement established by Minneapolis, MN under its Climate Action Plan (which levies utility fees to finance conservation, encourage renewable energy, and advance equity) or Ann Arbor, MI (which mandates renewable energy targets). Other franchise options include program cost sharing and information sharing provisions such as those utilized by Billings, including fees to defray municipal oversight of activities authorized under the franchise agreement, access to planning and engineering documents, and access to facility location maps and records in GIS and paper format. Additional information the city might consider requiring NorthWestern Energy to share are details related to the operating cost, service history, and location of all street lighting in Missoula. Access to electrical usage data that informs municipal planning under the Conservation and Climate Action Plan could be required under the franchise agreement, with data confidentiality established in the agreement. Finally, the city may seek to create a separate electric vehicle charging franchise agreement to incentivize private companies to establish a new network of charging stations.

Option 5 – Community Choice Aggregation

In other states, Community Choice Aggregation (CCA) is an option open to municipalities and local government entities interested in expanding consumer clean energy options. CCA is a regulatory framework that requires authorization in state law. Once authorized, CCA allows local governments to create nonprofit public agencies to procure power on behalf of local residents and businesses from an alternative energy provider, while still using the local utility provider for transmission and distribution (see Appendix III). Participation in a CCA is voluntary on the part of residents and businesses. CCA provides more local control over electricity sources, and has often been used by communities that wish to increase their use of renewable electricity. To be an option for Missoula, CCA would need to be authorized by the Montana legislature, which would likely require Missoula City and County to work collaboratively with other local governments to make the case at the state level. Once enabled, CCA can result in significant legal and financial startup costs, as well as “exit fees” to compensate the regulated utility for its past investments in power plants that will no longer be utilized by CCA participants. However, if successfully enabled, CCA would offer Missoula greatly enhanced control over the sources of our electricity, facilitating our pursuit of 100% clean electricity.

Option 6 – Expanded Renewable Energy Standard

A renewable energy standard (also called renewable portfolio standard or RPS) is a requirement that a certain fraction of the electricity provided by utilities to their customers come from renewable sources. Montana's Renewable Energy Standard, passed by the state legislature in 2005, required investor-owned utilities to supply 15% of their power from renewable sources by 2015.⁹ While many renewable energy sources qualify for the Renewable Energy Standard,¹⁰ in practice only wind power was used to meet it. During the 2005 legislative debate over the Renewable Energy Standard, some utilities took the position that it was not technically feasible and would be financially burdensome to add a significant amount of renewable energy to the grid; however, these fears proved to be incorrect. In 2014, the Montana Consumer Counsel, the entity charged with advocating on behalf of consumers of regulated utilities, found that “The RPS and accompanying CREP [Community Renewable Energy Project] legislation in Montana has had relatively minimal rate impact on NorthWestern Energy's customers.”¹¹ In addition, new utility data management and grid control systems combined with rapidly falling renewable energy generation prices have made it possible to balance large amounts of grid-connected renewable energy in a reliable and cost-effective manner. Increasing the Renewable Energy Standard to 50% or more would drive new clean energy into the utility supply portfolio across the state, thus offering health and economic benefits to all Montanans. Such an increase would require legislation or a statewide voter initiative.

⁹ MCA 69-3-2001 et seq.

¹⁰ It's important to note that existing hydroelectric power plants do not count toward the Renewable Energy Standard. Hydropower already accounts for more than 40% of NorthWestern Energy's power supplies, so counting it toward the 15% standard would have made the standard meaningless.

¹¹ <https://leg.mt.gov/content/Committees/Interim/2013-2014/Energy-and-Telecommunications/Legislation/RPSFinal.pdf>

Option 7 – Expanded Funding and Financing Options

Developing a clear regulatory framework for third party leasing of on-site electricity generation would expand opportunities for on-site renewable energy development. Other financing and funding options that could propel additional clean electricity and energy efficiency include:

- **Property Assessed Clean Energy (PACE).** PACE programs enable homeowners and/or business owner to install energy efficiency improvements and/or on-site renewable energy systems, and to pay for them over time through an assessment on their property taxes. PACE programs are established by local governments and can be funded through private lenders or municipal bonds. In Montana, state legislation is recommended to readily enable local governments to establish PACE programs. C-PACE is a program specifically designed for commercial businesses and more can be found at <https://www.mtpace.com/>.
- **On-Bill Energy Efficiency.** On-bill programs allow utility customers to pay off the cost of energy efficiency improvements on their utility bills. There are several variations on this type of program: on-bill financing, in which the utility is the lender; on-bill repayment, in which a third party is the lender; and tariffed on-bill, in which the energy efficiency improvements are financed not through a loan but rather through a new additional tariff on the customer's bill.
- **Revolving Loan Funds.** Revolving loan funds are pools of capital from which loans are made for clean energy projects. As loans are paid back, the capital is loaned for other projects, and this process can be repeated indefinitely as long as the default rate is low. The State of Montana operates the Alternative Energy Revolving Loan Program, a low-interest loan program open to individuals, small businesses, local governments and nonprofits. Local governments can also set up revolving loan funds; for example, in 2015 the city of Helena created a zero-interest loan program for alternative energy projects.
- **Energy Performance Contracts and Energy Service Agreements.** The Montana Department of Environmental Quality provides support to state agencies, local governments, schools, and universities that wish to enter into Energy Performance Contracts to finance energy efficiency improvements in their own buildings and facilities. An Energy Performance Contract is an agreement with an energy services company in which the company installs energy efficiency measures and guarantees that a certain level of energy savings will be achieved. An Energy Service Agreement is a step beyond an Energy Performance Contract in which a service provider delivers energy savings to a business or institution using equipment that it owns and operates itself. Energy Service Agreements are typically used for large businesses and institutions, but at least one firm in New York State is providing this service to homeowners.

We will continue to explore new and creative financing tools that other cities and states are advancing. We intend to work with local financial institutions to better understand what is available and to develop additional options. Montana's Department of Environmental Quality is also in the process of exploring and sharing options and best practices.

Option 8 – Municipalization

Municipalization involves forming a locally owned utility in order to have control over the sources of electrical generation. This is the option that Boulder, Colorado is pursuing (see <https://bouldercolorado.gov/local-power>), and we are tracking their efforts and successes. According to the American Public Power Association,¹² community-owned, not-for-profit public power utilities serve homes and businesses in 2,000 communities across 49 states. Although most public power utilities have fewer than 4,000 customers, some serve large cities and collectively these utilities serve 1 in 7 electricity customers across the U.S.

It is likely that legislation would be required to allow Missoula to pursue this option. This is listed as the last option for a reason—this route would be fraught with challenges. Nonetheless, this could be an option worth pursuing in years to come and depending on the success of other options described above. We do note that the City of Missoula established a municipal electric and gas utility in 1999 (Ordinance 3101, Title 12.28 of the Missoula Code; see Appendix III). The origin of this municipal ordinance corresponds with statewide deregulation legislation (1997). The Missoula ordinance empowers the City to provide competitive utility services then state legislation in 2007 re-regulated utility operations and restricts competing local utilities from offering retail electric choice to small customers served by regulated utilities. The City has never provided such services and has never acted as a municipal utility.

What's Next?

Missoula has the momentum and ability to step forward and lead. We look forward to solidifying these target goals and timelines, partner commitments, and next steps. Next steps which we plan to accomplish in 2018 and 2019 include:

- Receive comments and feedback via the online comment form [here](#)
- Meet with interested parties to discuss and receive feedback on this report and options.
- Create and support an Ad Hoc working group to strengthen report and grow outreach efforts
- Bring resolution to Missoula City Council and Board of County Commissioners
- Continue to get buy-in from the community, including Climate Commitments for those Missoula-based entities wishing to sign on
- Work with other Montana communities to establish 100% goals and time commitments
- Receive and incorporate updated electricity use data (early in 2019, data for 2018 calendar year)
- Seek additional funding to move the effort and the new electricity initiatives forward
- Implement with easy “quick wins” and make progress on the more challenging pieces
- Keep the community abreast of progress and challenges.

¹² <https://www.publicpower.org/public-power>

Accompanying Appendices

These are all available here: <https://www.missoulaclimate.org/100-percent.html>

- Appendix I – 100% Plans from Other Cities and What We Can Learn.
 - Cities around the Country - database
- Appendix II – Electricity Regulatory Environment in Montana
- Appendix III – FREQUENTLY ASKED QUESTIONS about Missoula Electricity Landscape and Montana laws and regulations
- Appendix IV – Energy Efficiency in Missoula and lessons from other Cities.