Options for Montana's Energy Future

Creating jobs and delivering clean air in a changing economy

This report was prepared by the
Montana Department of Environmental Quality
It is for discussion purposes only.

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Executive Summary

In June 2014, the Environmental Protection Agency issued a draft rule to regulate carbon pollution from existing power plants, as part of an action plan to address climate change.

The rule is limited to existing power plants and does not address other sources of carbon pollution such as cars or industrial facilities. It is often referred to in short hand as the "111d rule," because the agency used the authority found in Section 111d of the Clean Air Act to issue the regulation.

The EPA gave each state a target of carbon reduction to reach at power plants by 2030, based on its assessment of each state's unique characteristics. The average carbon reduction nationwide is 30% by 2030. Montana's proposed target is a carbon emission rate reduction of 21%.

The draft rule gives the states significant amounts of flexibility in how to meet the newly proposed standards for clean air. If the final rule by EPA provides the flexibility promised in the draft, Montana will have significant latitude to implement measures that are rooted in the state's unique economic characteristics.

This DEQ paper presents hypothetical scenarios that could emerge depending on how the state decides to respond to the rule the EPA eventually releases. This document only seeks to illustrate some of the measures that the state could undertake as part of its plan to meet the proposed reduction targets in the draft rule. There are, of course, a number of other pathways to meeting the proposed standard, but we hope to start a discussion through this paper that will lead to even more innovations. In addition, this paper does not address the options or challenges that other states may have in meeting their respective proposed reductions, which could have impacts on Montana.

As can be seen in the discussion that follows, each scenario has its potential benefits, costs, and uncertainties. Importantly, none of the scenarios call for plant closures. All five scenarios evaluated in this paper not only keep the jobs that we currently have and meet the reduction target in the proposed rule, but strongly suggest that it would be possible to create new jobs and additional tax revenue, and to further strengthen the economy through the development of new renewable electricity generating capacity and increased investment in cost-effective energy efficiency.

Background & Context

On June 2, 2014, the Environmental Protection Agency (EPA) issued draft emission guidelines for the regulation of greenhouse gas emissions – specifically carbon dioxide (CO_2) – from existing electric generating units (referred to as power plants in this paper), relying on its regulatory authority under section 111(d) of the Clean Air Act.

For all pollutants regulated under section 111, EPA is required to identify a "best system of emission reduction" and set targets for carbon reduction based on that system of controls. In the draft rule, EPA used four "building blocks" to determine the best system of emission reduction. They are based on the most likely sources of carbon pollution reductions.

Section 111(d) provides significant flexibility to states to decide how to meet the established standards of performance. Consequently, the EPA's building blocks would not require states to follow them in order to comply with the rule.

The four building blocks the EPA used are:

1) Efficiency improvements at all coal-fired power plants;

2) A shift in total electricity generation from coal-fired power plants to existing natural gas combined cycle power plants;

3) Increased generation from low- and no-carbon renewable and nuclear energy options; and

4) Increased investment in energy efficiency.

EPA applied this system of controls to each state to determine proposed targets for each state.

Montana's target is expressed in pounds of carbon emitted per megawatt hour (a rate-based standard) -- 1,771 lbs CO_2/MWh by 2030, a reduction of approximately 21% from the 2012 emissions level of 2,246 lbs CO_2/MWh. To meet the standards for clean air created by the new rule, the state has the option to convert the rate-based standard into a mass-based standard, which is an overall reduction of tons of carbon emitted annually.

EPA uses the following specific data inputs for each building block to arrive at Montana's target.

- In Building Block 1, EPA assumes a 6% efficiency improvement at all nine affected coal-fired units.
- EPA assumes Montana's potential under Building Block 2 to be zero because Montana does not currently have any natural gas combined cycle power plants.
- In Building Block 3, EPA assumes that Montana will be able to increase renewable energy generation from its current 5% of total state generation to approximately 10% by 2030.
- In Building Block 4, EPA assumes that Montana will be able to increase the electricity energy savings from demand-side management programs beginning in 2017, ultimately more

than doubling current energy efficiency in the state. The net result would be a reduction of the state's retail sales of electricity by 11.3% cumulatively by 2030, compared to what Montana would consume without energy efficiency programs.

Although EPA used the above-described building blocks to set targets, section 111(d) and the draft emission guidelines afford states the opportunity to use any mix of controls, including methods not considered by EPA, to meet those targets. That is, Montana does not have to use the building blocks EPA used if it can find a different path to meeting the overall proposed carbon reduction target.

After the final rule is released in June 2016, Montana must develop a state plan (individual or multi-state) in accordance with section 111(d) to implement and comply with the rule.[1] Although the methods in the plan may differ from those described above, Montana's plan must meet or exceed the final carbon reduction target calculated by EPA.

Purpose of this Analysis

This paper analyzes five scenarios that, if implemented, would meet the EPA's proposed target reduction in carbon emission intensity. These scenarios are similar in that they all achieve EPA's proposed target, but differ in the extent to which they rely on each of EPA's proposed building blocks to meet or surpass the target.

The scenarios are presented here to demonstrate the relative interplay and effectiveness of some of the options available to Montana for complying with the proposed emission guidelines. The following five scenarios are discussed in more detail throughout this paper:

- Scenario 1 – Existing Energy Generation plus Heavy Energy Efficiency
- Scenario 2 – Existing Energy Generation plus Lewis & Clark Plant Co-Fire
- Scenario 3 – Existing Energy Generation plus Moderate Energy Efficiency and Heat Rate Improvement
- Scenario 4 – Existing Energy Generation plus Heavy Renewable Energy
- Scenario 5 – Existing Energy Generation plus CO_2 Sequestration

Summary of Scenario Inputs and Results

The five scenarios were modeled using a tool developed by the Montana Department of Environmental Quality. Each scenario results in compliance with EPA's proposed rate-based emission target as well as Montana's estimated mass-based target. The following table shows the extent to which each building block contributes to each of the five scenarios.

[1] This paper only considers opportunities and challenges for reducing carbon emissions through actions taken within the state's boundaries and does not consider a multi-state or regional approach.

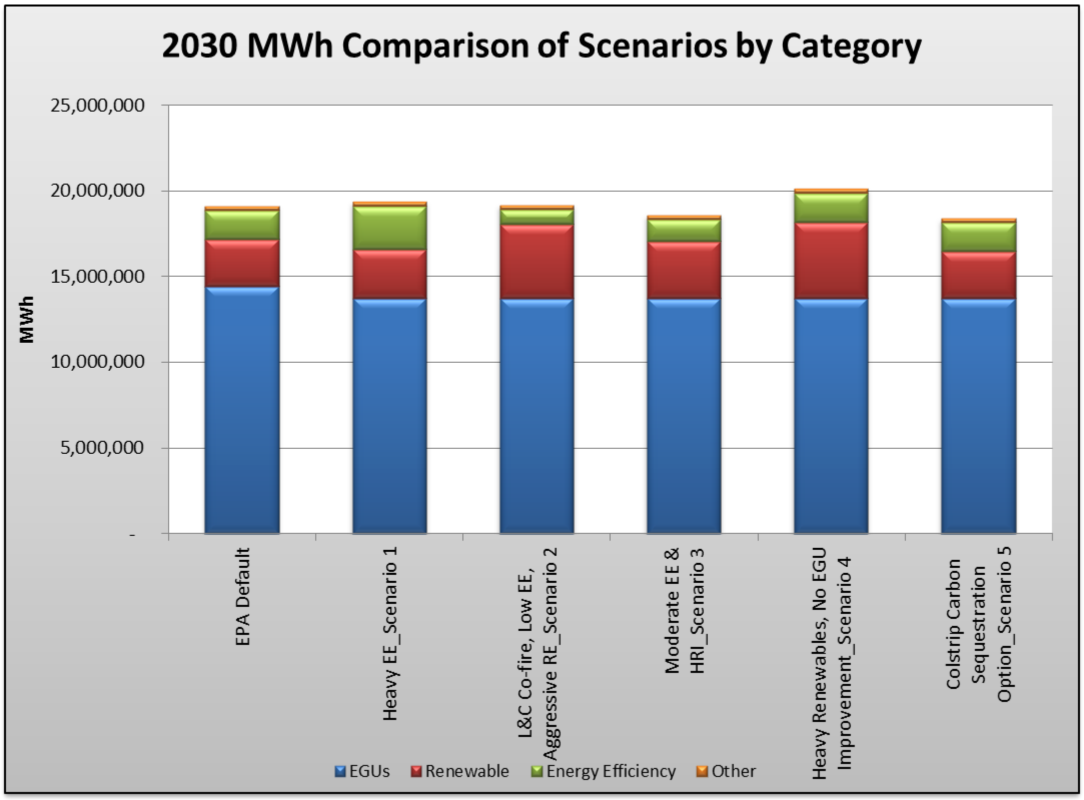
Scenario Name	EGU Emission Rate Improvement *Building Block 1*	2030 Renewable Generation *Building Block 3*	2030 Energy Efficiency Savings *Building Block 4*	Export Reduction *MWh*	2030 Rate Result *lbs/MWh*
1 - Heavy Energy Efficiency	0%	2,859 GWh	2,532 GWh	NA	1,761
2 - L&C Co-fire	8% L&C with Co-Fire 3% Others	4,349 GWh	844 GWh	NA	1725
3 - Moderate EE & HRI	4%	3,328 GWh	1,266 GWh	150,000	1,765
4 - Heavy RE	0%	4,458 GWh	1,688 GWh	NA	1,695
5 - CO_2 Sequester	20% at Colstrip 0% Others	2,722 GWh	1,688 GWh	NA	1,611
EPA Calculated Goal	6%	2,722 GWh	1,688 GWh	NA	1,771

As is evident in the table above, each scenario would result in an emission rate below EPA's proposed 2030 target of 1,771 lbs CO_2/MWh.[2] Of particular note, Scenarios 1 and 4 would not rely on any efficiency improvement at the existing affected power plants. Scenarios 2 and 4 both would rely heavily on increasing renewable energy generation, while Scenario 1 illustrates the effects of aggressive energy efficiency efforts alongside moderate renewables growth to provide the necessary CO_2 reductions. Scenario 3 would use improvements across Building Blocks 1, 3, and 4 and largely follows EPA's assumptions. Scenario 2 would provide some carbon emission intensity improvements due to co-firing natural gas at the existing Montana-Dakota Utilities Lewis & Clark coal-fired facility. Scenario 5 matches the EPA targets in the areas of energy efficiency and renewable energy but is unique in that it would use partial carbon sequestration at Colstrip to exceed the EPA emission reductions expected from efficiency improvements at the power plants.

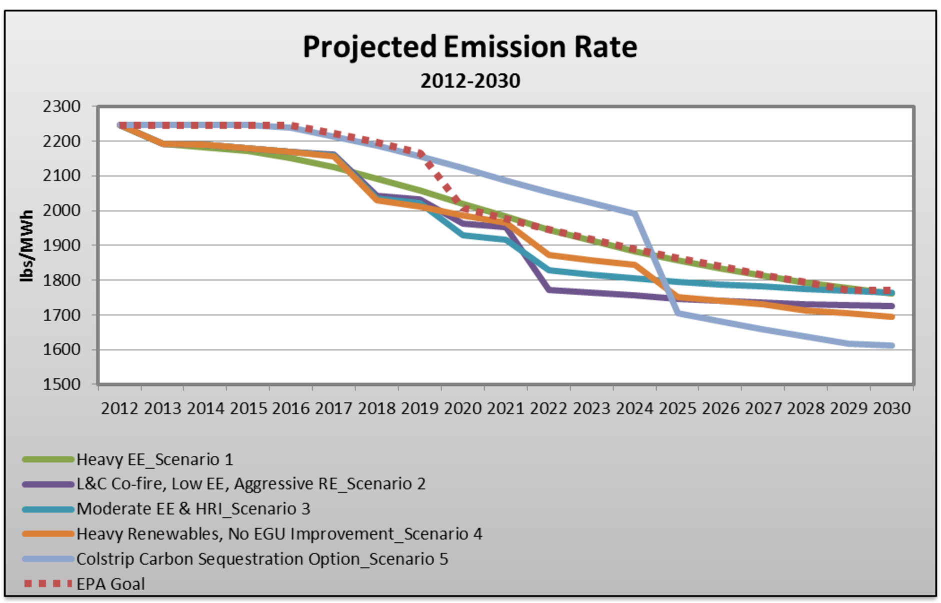
The following graph shows the mix of electrical generation (in MWh) in 2030 under the five scenarios (and proposed EPA target).[3] Every scenario, including the EPA target, would continue to rely on coal-fired electricity generation to power Montana's electricity needs and export obligations, while using renewables, energy efficiency, or a combination of both to augment or replace efficiency improvements at power plants and ultimately comply with EPA's proposed target.

[2] The mass-based result is not shown here, as the electricity growth assumptions can vary between scenarios. However, the mass-based results from each scenario would achieve Montana's proposed mass-based conversion of EPA's target rate.

[3] Including the "megawatts" from energy efficiency, which are more accurately described as avoided generation, or electricity that does not have to be consumed.



As discussed above, each of the five scenarios meets or exceeds EPA's proposed standard of performance. The graph below shows the projected emission rate (lbs CO_2/MWh) achieved by each scenario compared to the EPA target.



Building Block Costs and Benefits

Because each scenario takes a different approach to meeting the EPA target, they differ in the scale of possible associated benefits and costs. The following table estimates and compares some of these potential costs and benefits, including pounds of avoided CO_2 emissions, energy efficiency savings, total job creation, and ratepayer costs.

Scenario Name	Lbs of Avoided CO_2 Emissions Annually by 2030	Potential EE Program Savings on Montana Utility Bills (2017-2030)[1,2]	Potential Cost of EE Programs (2017-2030)[3]	Net Benefit of EE Programs (2017-2030)[2]	Net Jobs Per Year from EE Development[4]	Net Jobs Due to Spending from lower Energy Bills[4]	Temporary Construction Jobs Due to New RE Development[5]	Permanent Jobs Due to New RE Development[5]
Scenario 1 - Heavy Energy Efficiency	7.0 Billion	$1.71 Billion	$0.85 Billion	$0.85Billion	130	530	685	34
Scenario 2 - L&C Co-fire	7.5 Billion	$0.57 Billion	$0.28 Billion	$0.29 Billion	7	-40	1,505	75
Scenario 3 - Moderate EE & HRI	6.8 Billion	$0.85 Billion	$0.43 Billion	$0.43 Billion	38	105	945	47
Scenario 4 - Heavy RE	8.8 Billion	$1.14 Billion	$0.57 Billion	$0.57 Billion	68	245	1,645	82
Scenario 5 - CO_2 Sequester	13.4 Billion	$1.14 Billion	$0.57 Billion	$0.57 Billion	68	245	600	30
EPA Goal	6.8 Billion	$1.14 Billion	$0.57 Billion	$0.57 Billion	68	245	600	30

[1] Assumes an average retail electricity price of $83 per MWh saved

[2] However, this does not reflect the compensation for lost revenues that utilities will receive for operating their energy efficiency programs, which will reduce the utility bill savings for Montana ratepayers.

[3] Assumes an energy efficiency program cost of $230 per MWh of first-year electricity savings

[4] Represents the net change in jobs sustained by each scenario's energy efficiency spending and utility savings when compared to existing energy efficiency jobs sustained

[5] Based on Department of Commerce employment figures for existing Montana wind farms.

Sources: Montana Department of Environmental Quality, Montana Department of Revenue, U.S. Energy Information Administration, ACEEE

Common Scenario Assumptions[4]

Some general assumptions were made when estimating these costs and benefits, which are common to several, or all, scenarios. Rather than repeating the general assumptions within each scenario, they are discussed in more detail below.

Improvements at Power Plants

At this time, DEQ is unable to estimate the costs of potential efficiency improvements at power plants, but does not agree with EPA's assumption that Montana's power plants would be able to achieve a 6% efficiency improvement. For example, the Colstrip generating facility has already made a number of efficiency improvements over the last decade, and only an additional 1-2% efficiency gain is viable at this time. We assume that advances in technology over the next decade or so will make additional gains of 1-2% possible.

[4] The scenarios examined in this paper are limited to Montana's carbon intensity rate, and do not reflect or consider the options that may exist in other states. The pathways chosen by other states to achieve compliance with the rule could very likely have effects on Montana, including jobs in the coal industry and electricity rates paid by Montanans through either the cost of purchased power or electricity from owned generation. A more complete consideration of costs and benefits to Montana from the proposed rule would necessarily include these concerns, but is beyond the scope of this paper. The full range of costs and benefits associated with meeting the proposed rule would be directly at issue in a compliance strategy should Montana choose to engage in a regional approach.

The five scenarios anticipate that the Corette power plant will be mothballed in 2015, as reported by PPL Montana in 2012, and each assumes the plant will not reopen thereafter. As this closure was previously announced, we have not analyzed the potential impact of the closure.

Renewable Energy

Montana generated 1,661 GWh of renewable electricity in 2013. This number clearly varies each year, but is a good base number for estimating existing renewable electricity generation in Montana. These numbers mostly consists of larger wind farms including Judith Gap, Glacier I and II, Rim Rock, Spion Kop, Diamond Willow, and several other wind farms under 20 MW (Musselshell, Two Dot, Horseshoe Bend, and Gordon Butte). There is also some small hydro and small wind included in this number. Montana's existing hydro dams are not included in this number as the EPA rule is currently written; however, hydro generation resulting from capacity upgrades at existing dams (such as the upgrade of Rainbow Dam) would be considered renewable going forward and count towards Montana's target. There are currently several other renewable projects planned for Montana that are discussed below in the scenarios.

The main challenge with building additional renewable energy in Montana is firm transmission access to send that energy out of state. Currently, most major high voltage lines out of Montana are contractually full or mostly full. The anticipated Montana-to-Washington transmission upgrade on the Colstrip line could add 600 MW or more of export capacity out of state and would be necessary to accommodate the potential new Judith Gap area wind development forecast in many scenarios. In addition, the proposed Gordon Butte pumped hydro station could provide available grid balancing services and firm the intermittent output of several hundred MWs of wind energy. If Montana is to add hundreds of MWs of new renewable electricity capacity to the Montana grid between 2015 and 2030, the development of additional resources like the proposed Gordon Butte pumped hydro station to balance the regional grid may be of increasing importance.

One area of available transmission capacity is in southern Montana. Additional renewable electricity generation there could take advantage of available transmission capacity on PacifiCorp transmission lines, and the generation would flow in a southerly and then westerly direction. As such, it would not be reliant on BPA's anticipated transmission upgrades, and would be outside of Northwestern Energy's or BPA's balancing areas. The availability of an alternate transmission route also means such a renewable electricity development would not limit future wind development along the 500-kV Colstrip line or existing constrained transmission in western Montana and central Washington.

Energy Efficiency

Energy efficiency is very often the cheapest way to meet future electricity growth and reduce existing electricity demand. As such, electrical providers across much of Montana are already operating demand-side energy efficiency programs to help contain Montana's electricity rates and energy bills. Montana is averaging about 11 average megawatts (aMW) per year currently in new energy efficiency savings or about 100,000 MWh annually. The electric cooperatives in western Montana receive their electricity supply from BPA and participate in the BPA energy efficiency programs to varying degrees. Overall, BPA programs seem to have averaged about 2.3 aMW of energy efficiency savings for the past 5 years in Montana.[5] NorthWestern Energy's aMW energy efficiency savings over the last 4 years are:[6]

2010	2011	2012	2013
9.18	7.73	10.44	7.30

NorthWestern Energy's annual energy efficiency savings average 8.7 aMW per year over the 2010-2013 period. Currently, Montana-Dakota Utilities and non-BPA supplied co-ops in Montana have not achieved savings on this scale with their energy efficiency programs.

For all five scenarios analyzed below, Montana's 2030 first-year energy efficiency savings would need to increase over recently reported program savings figures. The increased savings necessary vary significantly between a 7% increase over current levels for Scenario 2 to a 220% increase over current levels for Scenario 1. The American Council for an Energy Efficient Economy studied utility energy efficiency programs in 20 states and found that energy efficiency programs on average cost $230 per MWh of first-year energy efficiency savings while having an overall cost of $30 per MWh of cumulative energy efficiency savings achieved over the lifetime of implemented measures.[7] As discussed further below, spending on energy efficiency costs money up front, but can also result in significant benefits such as reduced energy bills for ratepayers and additional in-state jobs.

Each of the scenarios below discuss potential economic benefits, costs, and job impacts resulting from developing a specific level (defined in each scenario) of energy efficiency programs compared to maintaining current energy efficiency spending and savings levels.

Jobs and Tax Revenues

Renewable energy developments have an overall positive economic impact through their creation of new jobs and local and state tax revenue. Based on existing employment levels for wind energy operating in the state, approximately one permanent job and twenty temporary construction jobs are created for every 10 MW of renewable electricity capacity developed in Montana, while the initial capital cost per MW of renewables built in Montana is about $1.5-2.0 million per MW.[8] Property taxes generated by renewable energy developments are difficult to estimate now because most of the developments in the state are currently taking advantage of tax incentives that will expire in the coming years, at which time property tax revenue will increase. Nonetheless, property taxes are still significant. For example, in 2010, property taxes on the NaturEner Glacier Wind Farm I and II located in Toole County were $3.7 million. The Judith Gap Wind Farm generated $1.44 million in property taxes in the same year.[9]

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5 Brian DeKiep, Northwest Power and Conservation Council
6 David Bausch, NorthWestern Energy
7 The American Council for an Energy-Efficient Economy study uses national numbers, which in the absence of Montana-specific numbers, are a good surrogate and are valuable in demonstrating the relative costs and benefits between scenarios.
8 Montana Department of Commerce
9 Montana Department of Commerce

Spending on energy efficiency costs money up front, but can also result in the creation of new jobs and reduced energy bills. Based off the studies by the American Council for an Energy Efficient Economy, increased energy efficiency spending can be expected to have a net positive economic impact. Every million dollars spent on energy efficiency translates into the creation of 20 job years.[10] In contrast, the economy-wide average for all economic activity is 17 jobs per million dollars in spending. Consequently, 3 net jobs are created for every million dollars that is directed into energy efficiency spending instead of general economic spending. Approximately 360 jobs and a net increase of 54 jobs will likely be sustained in Montana through continuing to invest in the state's existing energy efficiency programs.[11]

In addition, spending money on energy efficiency can generate further jobs by reducing ratepayer bills according to the American Council for an Energy Efficient Economy's analyses.[12] Every million dollars in spending that is redirected from energy bills back into ratepayer pockets for use in general economic spending can deliver as many as 7 net jobs.[13] Using this data, were current energy efficiency spending and savings levels to be maintained for the 2017 to 2030 period, Montana could save as much as $650 million and on average increase employment by as many as 325 jobs through energy bill savings.

Costs to Ratepayers

Estimating the costs to Montana ratepayers from new renewable energy is difficult. Under the proposed rule, Montana will claim credit for all renewable electricity generated within the state. It is likely that most new renewable electricity development will be built for and sold to out-of-state ratepayers, will be generated at market-competitive rates, and will not impact Montana ratepayers. Even if some of the new renewables are built to serve Montana loads, the rate impacts are likely to be marginal. This conclusion is reinforced by a recent Renewable Portfolio Standard (RPS) review report by the Montana Energy and Telecommunications Committee, which concluded that the cost of the Montana RPS so far has been minimal to Montana ratepayers.[14]

Energy efficiency is very often the lowest cost resource for meeting future electricity growth and reducing existing electricity demand. One way to increase energy efficiency savings in the state is to rely heavily on utility-run energy efficiency programs, with the price tag at least partially paid by Montana ratepayers as determined by the Montana Public Service Commission. For some of the following scenarios, it is likely that relying on current programs would either be cost-prohibitive or

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[10] A job year is equal to one person working full time for one year. Subsequently throughout the paper, we will refer to a job year as a job.

[11] These figures assume an increase in state energy efficiency spending from a current average of around $15 million per year to $18 million in order to maintain current energy savings levels. However, these energy efficiency cost numbers are still below national averages. Were national average cost figures used, Montana's 11 aMW of first-year energy efficiency savings would cost $22 million.

[12] All calculations of savings on Montana energy bills assume $83 per MWh of retail sales avoided, Montana Historical Energy Statistics, Table E7. http://deq.mt.gov/Energy/HistoricalEnergy/default.mcpx

[13] These job creation figures do not reflect the compensation for lost revenues that utilities will receive for operating their energy efficiency programs, which will reduce the energy bill savings received by Montana ratepayers. As a result, the job benefits of energy efficiency calculated for each scenario below would be reduced in proportion to the potential energy bill savings that is instead directed to compensate regulated utilities for lost revenues.

[14] http://leg.mt.gov/content/Committees/Interim/2013-2014/Energy-and-Telecommunications/Meetings/July-2014/DraftReportPractice.pdf

inadequate. While spending on energy efficiency costs money up front, it has a net benefit in the form of reduced energy bills for ratepayers, providing benefits for the larger economy.

Although the costs of heat rate improvement (including sequestration) at Montana power plants are unknown at this time, as are the jobs it would create, a percentage of these costs could be borne by Montana ratepayers as a result of higher costs from owned generation resources or purchased power.

Pathways to Cleaner Air

Analysis of Five Scenarios

Scenario 1: Existing Energy Generation Plus Heavy Energy Efficiency

The 'Heavy Energy Efficiency' scenario relies primarily on Energy Efficiency and Renewable Energy to meet Montana's target. This scenario requires no heat rate improvement at affected Montana power plants, achieves renewable electricity generation of 2,859 GWh by year 2030, and pursues an aggressive goal of 2,532 GWh of savings from demand-side energy efficiency by year 2030. This scenario's aggressive energy efficiency goal is 150% of the energy efficiency number EPA used to calculate Montana's target and is more than three times Montana's current energy efficiency savings levels. Under this scenario, an emissions rate of 1,761 lbs CO_2/MWh is predicted by 2030.

An important point with this scenario is that energy efficiency is typically the least-cost scenario for both satisfying new electricity demand and also for lowering electricity-based carbon emissions. This scenario would require a big change in energy efficiency programs and commitment in Montana, but illustrates the important role that such a change in commitment could play in reducing Montana's carbon intensity rate.

Description

Building Block #1: Efficiency improvements at all coal-fired power plants

This 'Heavy Energy Efficiency' scenario assumes that the affected power plant fleet does not achieve any efficiency gains that can be used to lower the carbon intensity factor for these units.

Building Block #2: Shift in total electricity generation from coal-fired power plants to existing natural gas combined cycle power plants,

This scenario assumes that Montana does not have any natural gas plants that can replace existing coal generation.

Building Block #3: Increased generation from low- and no-carbon renewable and nuclear energy options

This scenario assumes that renewable electricity generation in Montana increases by 70.5 GWh each year over its 2013 total of 1,661 GWh of electricity generation, eventually reaching 2,859 GWh of generation in 2030. Year 2013 represented a 400 GWh increase over the 2012 levels due to two new wind farms that started up in 2012-2013. Achieving the necessary renewable electricity generation growth would likely require an annual increase of 20 MW of wind capacity, 342 MW in total, to meet this scenario's projected 2020-2030 renewable electricity generation targets. As described in Scenario 2 below, there are a number of projects, planned and potential, that could meet this goal over the next 15 years.

The resulting MWh for the cumulative projects are also shown in the table below.

Year	RE Generation (MWh)
2012	1,261,752
2013	1,660,917
2014	1,731,417
2015	1,801,917
2016	1,872417
2017	1,942,917
2018	2,013,417
2019	2,083,917
2020	2,154,417
2021	2,224,917

Year	RE Generation (MWh)
2022	2,295,417
2023	2,365,917
2024	2,436,417
2025	2,506,917
2026	2,577,417
2027	2,647,917
2028	2,718,417
2029	2,788,917
2030	2,859,417

Building Block #4: Increased investment in energy efficiency

This scenario assumes Montana will achieve a cumulative energy efficiency savings of 2,532 GWh in 2030. In order to meet this target, Montana would have to grow its first-year energy efficiency savings from its current 100 GWh annually to 310 GWh annually by 2022 and maintain that level of first-year savings through 2030. Achieving the cumulative savings targets for this scenario is equivalent to reducing existing Montana electricity consumption by 17% (including all sectors such as residential, commercial, and industrial). Montana's current programs conducted by the state's electrical suppliers, while significant, would need to more than triple in order to match the energy efficiency savings required for this scenario. New energy efficiency programs and funding mechanisms may be necessary to deliver this level of energy efficiency savings. However, many cost-effective areas of energy efficiency, such as more efficient lighting and appliances, have been only partially used in the state and could be incorporated as part of a more aggressive state-wide program for achieving additional energy efficiency savings.

Economic Impacts

Beyond any potential electricity rate impacts, new renewable electricity developments would have an overall positive economic impact through the creation of new jobs and local and state tax revenue. With a build-out of 342 MW of additional renewable electricity capacity in this scenario, about 34 permanent jobs would be created in Montana along with 685 temporary construction jobs.

The approximately 425 aMW of total first-year energy efficiency savings needed between 2017 and 2030 to meet the proposed 20.6 million MWh of cumulative energy efficiency savings would likely cost an additional $600 million over the 2017-2030 time period compared to the $250 million that is estimated to represent future spending levels if existing energy efficiency programs continue to achieve current average savings levels. Between 2017 and 2030, it is estimated that an average of 130 new jobs would be created and sustained over the period from the increased spending in the labor-intensive energy efficiency sector.[15]

It is estimated that if Montana met the scenario's energy efficiency target of 20.6 million MWh of electricity saved between 2017 and 2030, it could increase Montana energy bill savings by more than $1 billion and generate a net increase of as much as 530 jobs over the continuation of current energy efficiency spending and savings levels.[16,17] These savings and net job creation impacts would continue to persist after 2030.

Takeaways from this Scenario

- Potential increase in Montana energy bill savings of as much as $1.1 billion from additional energy efficiency spending beyond current spending levels between 2017 and 2030 ($1.71 billion in total energy bill savings compared to no energy efficiency investments)
- 34 permanent jobs and 685 temporary construction jobs from new renewable energy plus economic impacts of up to $685 million in initial capital investments in state
- A net increase of 130 jobs per year from increased energy efficiency development (183 net jobs from energy efficiency spending in total) plus a potential of up to 530 jobs per year created from additional spending from lower energy bills (up to 855 jobs created in total from energy bill savings)
- 7.0 billion pounds of CO_2 emissions avoided annually by 2030
- $600 million more in spending for demand-side energy efficiency programs ($850 million in energy efficiency spending in total). Some of these costs may be paid by entities outside the state.

[15] In total, this scenario would sustain an estimated net increase of 183 jobs for the economy as a result of increased energy efficiency spending when compared to not investing in any energy efficiency.

[16] In total, this scenario would deliver as much as an estimated $1.71 billion in energy bill savings between 2017 and 2030, and create and sustain as many as 855 jobs from energy bill savings.

[17] As previously noted, this does not reflect potential compensation for lost revenues that utilities currently receive for operating energy efficiency programs. Utility lost revenue compensation will reduce, but not erase, assumed energy bill savings for Montana ratepayers and the associated job benefits. Increasing energy efficiency spending above current levels would still generate energy bill savings and positive job impacts.

Scenario 2: Existing Energy Generation plus L&C Co-Fire, Low Energy Efficiency, Aggressive Renewable Energy

The "L&C Co-Fire" scenario uses all three of the building blocks readily available to Montana plus the co-firing of one affected facility. This scenario uses a 3 percent heat rate improvement at affected power plants; would add 10 percent natural gas co-firing at the Lewis and Clark MDU facility; requires that the existing renewable energy base grow from 1,661 GWh, as reported for the year 2013, to an aggressive level of 4,349 GWh; and has a conservative target of 844 GWh for energy efficiency by year 2030. Put another way, this scenario employs a moderate power plant heat rate improvement, an aggressive renewable electricity component, and relatively low energy efficiency growth. Under this scenario, an emissions rate of 1,725 lbs CO_2/MWh is predicted by 2030.

Description

Building Block #1: Efficiency improvements at all coal-fired power plants

This scenario assumes that all affected power plant fleet operating in 2020 achieve a 3 percent heat rate efficiency gain in 2020 that can be used to lower the carbon intensity factor at each unit.

In addition, it is assumed that the Lewis and Clark MDU facility, in addition to a 3 percent heat rate improvement, would co-fire 10 percent natural gas. The Lewis & Clark power plant can currently co-fire natural gas at any percentage, so there is no capital cost associated with using natural gas at the power plant. It is important to note, however, that co-firing natural gas increases the cost of electricity at Lewis and Clark by $30 per MWh for every MWh that is generated from natural gas instead of coal because of the greater expense of natural gas. MDU is currently considering co-firing natural gas at various percentages at the Lewis and Clark power plant in order reduce emissions of other EPA regulated air emissions.

It is assumed in the scenario, on a MWh basis, that 10 percent of the energy of Lewis and Clark MDU facility would be produced by natural gas resulting in a 5 percent decrease in the carbon intensity factor of the plant (natural gas has a carbon intensity factor approximately 50 percent of coal's). Overall, MDU would achieve an 8 percent efficiency gain for this facility (3 percent heat rate improvement plus 5 percent improvement from co-firing).

Building Block #2: A shift in total electricity generation from coal-fired power plants to existing natural gas combined cycle power plants

This scenario assumes that Montana does not have any existing qualifying natural gas plants that can replace existing coal generation.

Building Block #3: Increased generation from low- and no-carbon renewable and nuclear energy options

The following renewable energy resources are planned or have already begun operation in Montana:

Name	Date Completed	Capacity
FH Stoltze Cogeneration Biomass Plant	2013	2.5 MW
Fairfield Wind Farm	2014	<10 MW
Two Dot Wind Farm	2014	<10 MW
Judith Gap Area Wind	Mid-2020s	150-600 MW

This scenario assumes that the renewable energy as reported to the U.S Energy Information Administration in 2013 would increase each year based on the proposed and potential projects below. The following table shows the projects that make up the potential aggressive renewable development in this scenario. The resulting MWh for the cumulative projects are shown in the second table below.

Project Name	Type	First Year Operational	Capacity (MW)	Capacity Factor
Stoltze Biomass CHP	Biomass	2014	2.5	95%
Fairfield/Two Dot Wind	Wind	2014	20	40%
So. MT Wind Farm	Wind	2018	250	40%
Judith Gap Area Wind	Wind	2022	450	40%
Gibson Dam	Expanded Hydro	2022	15	55%
Legacy Hydro Expansion	Expanded Hydro	2025	15	55%

Year	RE Generation (MWh)
2012	1,261,752
2013	1,660,917
2014	1,681,722
2015	1,751,802
2016	1,751,802
2017	1,751,802
2018	2,627,802
2019	2,627,802
2020	2,627,802
2021	2,627,802

Year	RE Generation (MWh)
2022	4,276,872
2023	4,276,872
2024	4,276,872
2025	4,349,142
2026	4,349,142
2027	4,349,142
2028	4,349,142
2029	4,349,142
2030	4,349,142

Building Block #4: Increased investment in energy efficiency

This scenario assumes Montana will achieve a total cumulative energy efficiency savings of 6.86 million MWh by 2030, which is actually slightly less than the 7.81 million MWh that would likely be saved if existing energy efficiency levels were maintained for the 2017-2030 period. The reduced savings in this scenario is the result of slightly lower energy efficiency savings achieved between 2017 and 2020. However, in order to meet this target, Montana would have to grow its first-year energy efficiency savings by 7 percent by 2022, slightly higher than the 100 GWh currently being achieved, and maintain that level of first-year savings through 2030. Achieving the cumulative savings targets for this scenario is equivalent to reducing existing Montana electricity consumption by 6 percent (including all sectors such as residential, commercial, and industrial). Montana's current programs conducted by the state's electrical suppliers, or additional energy efficiency efforts, would need to be increased slightly to match the energy efficiency savings required for this scenario.

The scenario also assumes Montana will grow its energy efficiency contribution, currently estimated at 0.63 percent of Business as Usual Sales to a level that would achieve cumulative energy efficiency savings of 0.75 percent (844 GWh) by 2030.

Economic Impacts

Scenario 2 achieves the target emission reductions in part through co-firing natural gas at the Lewis & Clark plant. The incremental cost of co-firing with 10 percent natural gas, based on 2012 electricity output numbers at that facility, would be $762,000 annually (254,000 MWh * 10 percent * additional $30 per MWh for using natural gas as the fuel). A portion of this annual cost could be allocated to MDU's Montana ratepayers through electric rates (approximately a quarter of MDU's retail sales are in Montana).

Beyond any potential electricity rate impacts, new renewable energy developments would have an overall positive economic impact through the creation of new jobs and local and state tax revenue. With a build-out of 702 MW of additional renewable electricity capacity in this scenario, about 75 permanent jobs would be created in Montana along with 1,505 temporary construction jobs.

Because this scenario is projecting only a small increase over the first-year energy efficiency savings already being generated in Montana annually, it is possible that the existing structure of utility-operated energy efficiency programs would be the most cost-effective avenue to achieve these savings, so the price tag for these additional energy savings could primarily be paid by Montana utility ratepayers through rates set by the Public Service Commission (as it is currently). It is estimated that the amount of energy efficiency savings needed to meet this scenario would cost an additional $35 million (as compared to $250 million for the continuation of current energy efficiency program savings levels), with a net increase in jobs created annually from directing general economic spending into the more labor-intensive energy efficiency sector (from the roughly 54 net jobs sustained through existing energy efficiency spending levels to 61).

It is estimated that if Montana meets the scenario's energy efficiency target of 6.86 million MWh of electricity saved between 2017 and 2030, it could save as much as $570 million on energy bills and sustain a net increase of 285 jobs per year when compared to not investing in any energy efficiency (although this is 40 jobs less than would be sustained from maintaining current energy efficiency spending and savings levels).[18,19] These savings and net job creation impacts would continue to persist after 2030.

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[18] Cumulative energy savings and potential new jobs sustained from energy efficiency in this scenario are estimated to be less than those for maintaining the state's existing energy efficiency savings rate because this scenario assumes an initial drop in energy efficiency achieved compared to recent years and only surpasses existing average energy efficiency savings in 2021. In total, this scenario would deliver as much as an estimated $570 million in energy bill savings between 2017 and 2030, and create and sustain as many as 285 jobs from energy bill savings.

Takeaways from this Scenario

- 75 permanent jobs and 1,505 temporary construction jobs from new renewable energy plus economic impacts of up to $1.4 billion in initial capital investments in state
- Potential Montana energy bill savings of as much as $570 million from demand-side energy efficiency between 2017-2030 (although $80 million less than the potential energy bill savings delivered if current energy efficiency savings levels were maintained over the period)
- A net increase of 7 jobs per year from increased energy efficiency development (61 net jobs from energy efficiency spending in total), but a potential loss of up to 40 jobs per year created from lower cumulative energy savings (although still potentially a 285 net job increase over not investing in any energy efficiency) as a result of decreased energy efficiency investments during the 2017-2020 period
- 7.5 billion pounds of CO_2 emissions avoided annually by 2030
- A portion of the $760,000 additional cost annually to co-fire natural gas at Lewis and Clark could be allocated to Montana ratepayers through electric rates (approximately a quarter of MDU's retail sales are in Montana)
- $35 million more in spending for demand-side energy efficiency programs ($285 million in energy efficiency spending in total)

[19] See footnote17.

Scenario 3: Existing Energy Generation Plus Moderate Energy Efficiency and Heat Rate Improvement

This scenario examines a moderate heat rate improvement at power plants, with a moderate renewable energy component, and moderate demand-side energy efficiency growth. It uses a 4 percent heat rate improvement at the affected power plant, requires that the existing renewables base grow from 1,661 GWh, as reported for the year 2013, to 3,328 GWh, and has a moderate target of 1,266 GWh for demand-side energy efficiency savings by year 2030. Under this scenario, an emissions rate of 1,765 lbs CO_2/MWh is predicted by 2030.

Description

Building Block #1: Efficiency improvements at all coal-fired power plants

This scenario assumes that the remaining affected power plant fleet each achieve 4 percent heat rate efficiency gains in 2020 that can be used to lower the carbon intensity factor for these units.

Building Block #2: A shift in total electricity generation from coal-fired power plants to existing natural gas combined cycle power plants

The scenario assumes that Montana does not have any existing natural gas plants that can replace existing coal generation.

Building Block #3: Increased generation from low- and no-carbon renewable and nuclear energy options

The scenario relies largely on renewable energy resources that are already proposed or that have begun operation in Montana, as presented in scenario 2 above. The same discussion of transmission upgrades and proposed pumped hydro applies in this scenario.

As discussed above, the scenario assumes that the renewable energy reported in 2013 increases each year based on proposed and potential projects below. The resulting MWh for the cumulative projects are also shown in the second table below.

Project Name	Type	First Year Operational	Capacity (MW)	Capacity Factor
Stoltze Biomass CHP	Biomass	2014	2.5	95%
Fairfield/Two Dot	Wind	2015	20	40%
So. MT Wind Farm	Wind	2018	250	40%
Judith Gap Area Wind	Wind	2022	200	40%

Year	RE Generation (MWh)
2012	1,261,752
2013	1,660,917
2014	1,681,722
2015	1,751,802
2016	1,751,802
2017	1,751,802
2018	2,627,802
2019	2,627,802
2020	2,627,802
2021	2,627,802

Year	RE Generation (MWh)
2022	3,328,602
2023	3,328,602
2024	3,328,602
2025	3,328,602
2026	3,328,602
2027	3,328,602
2028	3,328,602
2029	3,328,602
2030	3,328,602

Building Block #4: Increased investment in energy efficiency

The scenario assumes Montana will achieve a cumulative energy efficiency savings of 1,266 GWh in 2030. In order to meet this target, Montana would have to grow its first-year energy efficiency savings from its current 100 GWh to 155 GWh by 2022 and maintain that level of first-year savings through 2030. Achieving the cumulative savings targets for this scenario is equivalent to reducing existing Montana electricity consumption by 9 percent (including all sectors such as residential, commercial, and industrial). Montana's current demand-side energy efficiency programs conducted by the state's electrical suppliers, while significant, would need to expand by more than 50 percent in order to match the energy efficiency savings required for this scenario. New energy efficiency programs and funding mechanisms may be necessary to deliver this level of energy efficiency savings.

Economic Impacts

Beyond any potential electricity rate impacts, previously discussed under common assumptions, new renewable energy developments will have an overall positive economic impact through the creation of new jobs and local and state tax revenue. With a build-out of 470 MW of additional renewable electricity capacity in this scenario, about 47 permanent jobs and 945 temporary construction jobs would be created in Montana.

The approximately 210 aMW of total first-year energy efficiency savings needed between 2017 and 2030 to meet the proposed 10.3 million MWh of cumulative energy efficiency savings would likely cost an additional $180 million over the 2017-2030 time period compared to the $250 million that is estimated to represent future spending levels if existing energy efficiency programs continue to achieve current average savings levels. Assuming this, between 2017 and 2030, an estimated 38 new jobs would be created and sustained over the period from the increased spending in the labor-intensive energy efficiency sector.[20]

It is estimated that if Montana met the scenario's energy efficiency target of 10.3 million MWh of electricity saved between 2017 and 2030, it could increase energy bill savings by more than $205 million and generate a net increase of as much as 100 jobs over the continuation of current energy efficiency spending and savings levels.[21,22] These savings and net job creation impacts would continue to persist after 2030.

Takeaways from this Scenario

- 47 permanent jobs and 945 temporary construction jobs from new renewable energy plus economic impacts of up to $945 million in initial capital investments in state
- Potential increase in Montana energy bill savings of as much as $205 million from additional energy efficiency spending beyond current spending levels between 2017 and 2030 ($855 million in total energy bill savings compared to no energy efficiency investments)
- A net increase of 38 jobs per year from increased energy efficiency development (91 net jobs from energy efficiency spending in total) plus a potential of up to 105 jobs per year created from additional spending from lower energy bills (up to 430 jobs created in total from energy bill savings)
- 6.8 billion pounds of CO_2 emissions avoided annually by 2030
- $180 million more in spending for demand-side energy efficiency programs ($430 million in energy efficiency spending in total)

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[20] In total, this scenario would sustain an estimated net increase of 91 jobs for the economy as a result of increased energy efficiency spending when compared to not investing in any energy efficiency.

[21] In total, this scenario would deliver as much as an estimated $855 million in energy bill savings between 2017 and 2030, and create and sustain as many as 430 jobs from energy bill savings.

[22] See footnote 17.

Scenario 4: Existing Energy Generation plus Heavy Renewable Energy

The 'Heavy Renewables' scenario relies mostly on new renewable generation capacity to meet the Montana target. This scenario does not use any heat rate improvements at affected power plants, requires that the existing renewable energy base grow from 1,661 GWh, as reported for the year 2013, to 4,458 GWh, and uses the EPA target of 1,688 GWh for demand-side energy efficiency savings by year 2030. Under this scenario, an emissions rate of 1,695 lbs CO_2/MWh is predicted by 2030.

Description

Building Block #1: Efficiency improvements at all coal-fired power plants

This scenario assumes that the affected power plant fleet does not achieve any heat rate improvements that can be used to lower the carbon intensity factor.

Building Block #2: A shift in total electricity generation from coal-fired power plants to existing natural gas combined cycle power plants

This scenario assumes that Montana does not have any existing qualifying natural gas plants that can replace existing coal generation.

Building Block #3: Increased generation from low- and no-carbon renewable and nuclear energy options

This scenario builds on renewable energy resources that are already planned or that have begun operation in Montana, as presented in scenario 2 above. The same discussion of transmission upgrades and proposed pumped hydro applies in this scenario as well.

As discussed above, this scenario assumes that the renewable energy reported in 2013 increases based on the development of the proposed and potential projects listed below. The resulting MWh growth in renewable electricity generation in Montana is also shown in the second table below.

Project Name	Type	First Year Operational	Capacity (MW)	Capacity Factor
Stoltze Cogen Biomass Plant	Biomass	2014	2.5	95%
Fairfield/Two Dot Wind Farms	Wind	2015	20	40%
So. MT Wind Farm	Wind	2018	250	40%
Gibson Reservoir Upgrade	Expanded Hydro	2020	15	55%
Judith Gap Area Wind Farm	Wind	2022	200	40%
S. Montana Solar Farm	Solar	2025	100	18%
Central MT Wind Farm	Wind	2025	200	40%
Advanced Geothermal Plant	Geothermal	2028	25	67%
Agricultural Biogas Facility	Biogas	2030	10	60%

Year	RE Generation (MWh)
2012	1,261,752
2013	1,660,917
2014	1,681,722
2015	1,751,802
2016	1,751,802
2017	1,751,802
2018	2,627,802
2019	2,627,802
2020	2,700,072
2021	2,700,072

Year	RE Generation (MWh)
2022	3,400,872
2023	3,400,872
2024	3,400,872
2025	4,259,352
2026	4,259,352
2027	4,259,352
2028	4,406,082
2029	4,406,082
2030	4,458,642

Building Block #4: Increased investment in energy efficiency

This scenario assumes Montana will achieve a cumulative energy efficiency savings of 1,688 GWh in 2030. In order to meet this target, Montana would have to grow its first-year energy efficiency savings from its current 100 GWh to 205 GWh by 2022 and maintain that level of first-year savings through 2030. Achieving the cumulative savings targets for this scenario is equivalent to reducing existing Montana electricity consumption by 12 percent (including all sectors such as residential, commercial, and industrial). Montana's current demand-side energy efficiency programs conducted by the state's electrical suppliers, while significant, would need to more than double in order to match the energy efficiency savings required for this scenario. New energy efficiency programs and funding mechanisms may be necessary to deliver this level of energy efficiency savings.

Economic Impacts

Beyond any potential electricity rate impacts, discussed previously, new renewable energy developments will have an overall positive economic impact through the creation of new jobs and local and state tax revenue. With a build-out of 822.5 MW of additional renewable electricity capacity in this scenario, about 82 permanent jobs and 1,645 temporary construction jobs would be created in Montana.

The approximately 280 aMW of total first-year energy efficiency savings needed between 2017 and 2030 to meet the proposed 13.7 million MWh of cumulative energy efficiency savings would likely cost an additional $320 million over the 2017-2030 time period compared to the $250 million that is estimated to represent future spending levels if existing energy efficiency programs continue to achieve current average savings levels. Assuming this, between 2017 and 2030, an estimated 68 new jobs would be created and sustained over the period from the increased spending in the labor-intensive energy efficiency sector.[23]

It is estimated that if Montana met the scenario's energy efficiency target of 13.7 million MWh of electricity saved between 2017 and 2030, it could increase Montana energy bill savings by more than

[23] In total, this scenario would sustain an estimated net increase of 122 jobs for the economy as a result of increased energy efficiency spending when compared to not investing in any energy efficiency.

$490 million and generate a net increase of as much as 230 jobs over the continuation of current energy efficiency spending and savings levels.[24,25] These savings and net job creation impacts would continue to persist after 2030.

Takeaways from this Scenario

- 82 permanent jobs and 1,645 temporary construction jobs from new renewable energy plus economic impacts of up to $1.6 billion in initial capital investments in state
- Potential increase in Montana energy bill savings of as much as $490 million from additional energy efficiency spending beyond current spending levels between 2017 and 2030 ($1.1 billion in total energy bill savings compared to no energy efficiency investments)
- A net increase of 68 jobs per year from increased energy efficiency development (122 net jobs from energy efficiency spending in total), plus a potential of up to 245 jobs per year created from additional spending from lower energy bills (up to 570 jobs created in total from energy bill savings)
- 8.8 billion pounds of CO_2 emissions avoided annually by 2030
- $320 million more in spending for demand-side energy efficiency programs ($570 million in energy efficiency spending in total)

[24] In total, this scenario would deliver as much as an estimated $1.14 billion in energy bill savings between 2017 and 2030 and create and sustain as many as 570 jobs from energy bill savings.
[25] See footnote 17.

Scenario 5: Existing Energy Generation Plus CO_2 Sequestration

This scenario examines a carbon sequestration strategy at Colstrip. The scenario also assumes renewable energy generation and demand-side energy efficiency savings would grow at the rates estimated by EPA. This scenario assumes a 20 percent reduction in the carbon emission rates of Colstrip due to carbon capture and sequestration, projects in-state renewable energy generation will grow from 1,661 GWh, as reported for the year 2013, to 2,722 GWh in 2030, and projects the state will achieve cumulative demand-side energy efficiency savings of 1,688 GWh by year 2030. Both the energy efficiency and renewable energy match the targets under the EPA base case. Under this scenario, an emissions rate of 1,611 lbs CO_2/MWh is predicted by 2030.

Description

Building Block #1: Efficiency improvements at all coal-fired power plants

This scenario assumes that none of the affected power plants achieve heat rate improvements, but that Colstrip would achieve a twenty percent reduction in carbon emission rates due to carbon sequestration beginning in 2025, while maintaining their 2012 electricity output.

Carbon sequestration for this scenario could be assumed to be accomplished in a number of different ways. The most likely sequestration technology may be the mineralization of twenty percent of the exhaust gas emitted by Colstrip. This could be accomplished by taking all of the exhaust flow into a reactor to mineralize a fraction of the CO_2 into a solid, or done by taking a portion of the stack flow and removing the majority of the CO_2. Mineralization is a proven process for at least partial removal of CO_2 from gas streams. There are a number of technologies that have demonstrated the feasibility for this and various demonstration projects are moving these technologies to full-scale operation. In addition, the use of CO_2 for enhanced oil recovery is already occurring in Montana and may expand further in the future, creating a potential market for captured CO_2. This scenario could also represent a combination of a heat rate improvement and a carbon capture and sequestration project, so long as the ultimate impact was a 20 percent reduction in net carbon emissions from Colstrip.

Building Block #2: A shift in total electricity generation from coal-fired power plants to existing natural gas combined cycle power plants

This scenario assumes that Montana does not have any existing natural gas plants that can replace existing coal generation.

Building Block #3: Increased generation from low- and no-carbon renewable and nuclear energy options

This scenario uses EPA's Building Block #3 target as the basis for renewable electricity growth in Montana. This target could be achieved, and even surpassed, using renewable energy projects that are already planned or begun operation in Montana, as presented in scenario 2 above. EPA's assumed renewable electricity generation for Montana is shown in the table below.

Year	RE Generation (MWh)
2012	1,261,752
2013	1,261,752
2014	1,261,752
2015	1,261,752
2016	1,261,752
2017	1,337,457
2018	1,417,705
2019	1,502,767
2020	1,598,643
2021	1,696,078

Year	RE Generation (MWh)
2022	1,799,452
2023	1,909,126
2024	2,025,485
2025	2,148,935
2026	2,279,910
2027	2,418,867
2028	2,566,294
2029	2,722,706
2030	2,722,706

Building Block #4: Increased investment in energy efficiency

This scenario assumes Montana will achieve a cumulative energy efficiency savings of 1,688 GWh in 2030. In order to meet this target, Montana will have to grow its first-year energy efficiency savings from its current 100 GWh to 205 GWh by 2022 and maintain that level of first-year savings through 2030. Achieving the cumulative savings targets for this scenario is equivalent to reducing existing Montana electricity consumption by 12 percent (including all sectors such as residential, commercial, and industrial). Montana's current demand-side energy efficiency programs conducted by the state's electrical suppliers, while significant, would need to more than double in order to match the energy efficiency savings required for this scenario. New energy efficiency programs and funding mechanisms may be necessary to deliver this level of energy efficiency savings.

Economic Impacts

We are currently unable to estimate the costs of implementing carbon sequestration at Colstrip, although using advanced carbon capture and sequestration technology would probably significantly increase the cost of electricity generated from Colstrip because of the high capital and operating costs currently associated with technologies under development. Because sequestration is not yet scalable, it would likely be cost-prohibitive today. But with further commitment to research and development, over the next 10 years it could be applicable as a cost-effective technology. No additional costs are expected at the other power plants regulated by the EPA 111(d) plan, because this scenario does not assume any efficiency improvements at the units.

Beyond any potential electricity rate impacts, as previously discussed, new renewable energy developments will have an overall positive economic impact through the creation of new jobs and local and state tax revenue. With a build-out of 300 MW of additional renewable electricity capacity in this scenario, about 30 permanent jobs and 600 temporary jobs would be created in Montana.

The approximately 300 aMW of total first-year energy efficiency savings needed between 2017 and 2030 to meet the proposed 13.7 million MWh of cumulative energy efficiency savings would likely cost an additional $350 million over the 2017-2030 time period compared to the $250 million that is estimated to represent future spending levels if existing energy efficiency programs continue to achieve current average savings levels. Assuming this, between 2017 and 2030, an estimated 68 new jobs would be created and sustained over the period from the increased spending in the labor-intensive energy efficiency sector.[26]

It is estimated that if Montana met the scenario's energy efficiency target of 13.7 million MWh of electricity saved between 2017 and 2030, it could increase energy bill savings by more than $490 million and generate a net increase of as much as 245 jobs over the continuation of current energy efficiency spending and savings levels.[27, 28] These savings and net job creation impacts would continue to persist after 2030.

Takeaways from this Scenario

- 30 permanent jobs and 600 temporary construction jobs from new renewable energy plus the economic impacts of up to $600 million in initial capital investments in state
- Potential increase in Montana energy bill savings of as much as $490 million from additional energy efficiency spending beyond current spending levels between 2017 and 2030 ($1.1 billion in total energy bill savings compared to no energy efficiency investments)
- A net increase of 68 jobs per year from increased energy efficiency development (122 net jobs from energy efficiency spending in total), plus a potential of up to 245 jobs per year created from additional spending from lower energy bills (up to 570 jobs created in total from energy bill savings)
- 13.4 billion pounds of CO_2 emissions avoided annually by 2030
- Unknown costs to implement carbon sequestration at Colstrip. A percentage of the total costs of developing and operating carbon sequestration at Colstrip, proportionate to the amount of electricity purchased from the units for in-state electricity consumption, could be paid by Montana ratepayers, potentially raising their electricity bills.
- $320 million more in spending for demand-side energy efficiency programs ($570 million in energy efficiency spending in total)

[26] In total, this scenario would sustain an estimated net increase of 122 jobs for the economy as a result of increased energy efficiency spending when compared to not investing in any energy efficiency.
[27] In total, this scenario would deliver as much as an estimated $1.14 billion in energy bill savings between 2017 and 2030 and create and sustain as many as 570 jobs from energy bill savings.
[28] See footnote 17.

Conclusion

Montana is blessed with an abundance of energy resources – all of which present unique challenges and opportunities. Even if the EPA did not propose higher standards for carbon reduction, the state would have choices to make about how to adapt to a changing energy economy. Each of the scenarios presented in this discussion paper provide the reader with a way to not only think of how the state could seek to comply with this rule, but how Montana can expand its energy economy.

If the final rule that EPA adopts to limit carbon pollution at power plants is similar to the current draft rule in terms of flexibility, the state will have the ability to meet the new standards in ways that account for our unique economic needs. Each scenario above shows that in choosing its compliance pathway for the proposed rule, Montana can not only keep its existing fleet of plants and associated jobs and economic impact, but that we can also create new jobs.

The state will submit comments to EPA on the draft rule by the deadline of December 1, 2014. We expect EPA to issue a final rule by June 2016. Then, we move from hypothetical scenarios for purposes of public discussion to writing a plan that will demonstrate to EPA how we will meet the final target.