EPA 111(D) STAFF ANALYSIS #1: FINAL RULE

TO: Commissioners
FROM: Margo Schurman and Bob Decker
SUBJECT: EPA § 111(d) Final Rule
DATE: August 12, 2015
CC: PSC Electric

Montana's Goal:

- **Rate-based**
  - **Interim (2022-2029) = 1,534 lb CO2/MWh**
  - **Final (2030) = 1,305 lb CO2/MWh (a 47% reduction from 2012 baseline)**

  or ....
- **Mass-based**
  - **Interim (2022-2029) = 12,791,330 tons CO2**
  - **Final (2030) = 11,303,107 tons CO2 (a 39% reduction from 2012 baseline)**

Recommendations from Comments Submitted to EPA:

Adequately Demonstrated, Baseline Data

PSC 1. EPA should derive baseline data—generation, emissions, capacity factors, et al.—from a statistically representative period instead of from one year (2012 in the proposed rule). For states dependent on fluctuating hydrologic cycles, the baseline period should be 10 years.

EPA is still using 2012 as the baseline year, with an adjustment to MT data for annual variation in the hydrologic cycle as it relates to fossil generation (p. 793).

Adequately Demonstrated, Transmission/Reliability]

PSC 2. Before enacting a final rule, EPA should subject its proposed rule—and the application of the four building blocks—to transmission modeling. Only after such modeling is performed can stakeholders properly evaluate the proposal and its ramifications for the grid.

No transmission modeling is mentioned in the final rule. EPA, DOE and FERC have agreed to coordinate efforts at the federal level to help ensure continued reliable electricity generation and transmission during the implementation of the final rule (p. 51).

PSC 3. EPA should include in the rule a reliability safety valve to prevent the adoption of state plans that result in unreliable grid operations.

The final rule includes a reliability safety valve as an additional reliability assurance, for use where the built-in flexibilities are not sufficient to address an immediate, unexpected reliability situation (p. 854). This is to include an initial period of up to 90 days during which an affected EGU(s) will not be required to meet the emission standard, but will meet an alternative standard (p. 1122).

Adequately Demonstrated, Building Block 1 – Heat-Rate Improvements

The section detailing Building Block 1 starts on page 647 (of 1560).

PSC 4. EPA should modify a state's goal if sufficient evidence exists to demonstrate that a fossil facility cannot obtain a six percent heat-rate improvement because of efficiency measures already undertaken, i.e., operational before the beginning of the rule's baseline data period.

EPA has calculated HRI on a regional level, reducing the Western Interconnection to 2.1 percent and the Eastern Interconnection to 4.3 percent (p. 333). 98.24% of electricity generation in Montana comes from the Western portion of the state's interconnectivity.

PSC 5. A state's heat-rate efficiency target should take into consideration the nature of the fossil fuel stocks used and available in the state and the extent to which those fuels allow for the safe application of alternative methods of consumption for purposes of heat-rate improvement.

See #4. The methodology used to calculate the HRI was modified, and included possible effects of design and fuel characteristics (p. 674).

PSC 6. Any emission of a facility that results from other air pollution rules should not be included in the calculation of that facility's emission rate for purposes of complying with the § 111(d) rule.

This adjustment is not explicitly made in the final rule. Increased emissions due to other air pollution measures is still counted for in the final emission rates, however the methodology uses gross heat rates, not net heat rates (p. 682). An additional 'other rules' section begins on p. 1347, which explains expected results from various rules.

PSC 7. EPA should exempt any heat-rate improvements made to comply with the § 111(d) rule from a requirement to undergo EPA's New Source Review permitting process.

This is partially taken into account, not through exemption, but through modified New Source Review program rules (p. 1341). EPA will consider reviewing the permitting process if/when there is a need that arises from a specific situation.

Outside-the-Fence Measures, Building Block 3 – Renewable Energy

Building Block 3 has been modified extensively, with a new name of "New Zero-emitting Renewable Generating Capacity" and begins on p. 731. The methodology in the final rule is a modified version of the alternative RE approach in the proposed rule with additional adjustments.

PSC 8. In calculating renewable energy goals for states, EPA should utilize state-specific RPS analysis and other renewable energy development data to accurately determine the current level of renewable energy in the state and to arrive at a reasonable expectation for potential future development.

The regional approach to the calculation remained in the final rule, with individual state-specific measures eliminated. The goal was calculated entirely on a regional level. Existing RE capacity constructed prior to 2012 is removed from this building block for compliance – only new generation will be allowed. Additionally, incremental RE generation, rather than total generation, is used in the final rule goal calculation methodology (p. 752).

PSC 9. As part of the recommended analysis above, EPA should tabulate the renewable energy already developed in a state for purposes of carbon reduction and allow the emission-reduction effects of those facilities to be utilized in compliance with the rule.

See #8, specifically regarding removal of existing RE capacity for compliance. Historical capacity additions were added to the RE methodology for goal calculations in high-hydro

states in order to adjust for fluctuation in hydrologic cycles (p. 750). Montana had an adjustment of 107% to 2012 baseline generation.

PSC 10. EPA should perform state-specific analysis of transmission and grid capability to ensure that renewable goals set for states are not established at levels that pose threats to transmission capacity and grid reliability.

The final rule implies that additional/new RE generators can provide more grid support and reliability (p. 761) and new transmission construction is within historical investment magnitudes (p. 766). Incremental grid infrastructure needs can be minimized by repurposing existing transmission resources (p. 767).

PSC 11. The final EPA rule should assign compliance credit for all renewable energy produced in a state to the state where emissions responsibility falls. If a state is responsible for 100% of emissions, no matter where the energy is utilized, the state should also be credited for 100% of renewable energy produced within the state.

The final rule introduces an extensive trading program, dependent upon the type of state plan submitted (i.e. individual vs. multi-state and rate-based vs. mass-based), that allows for trading of Emission Rate Credits. The rule also requires the state plan to prove non-duplicity in accounting for RE or EE measures for compliance (p. 1223).

Outside-the-Fence Measures, Building Block 4 – Energy Efficiency

This building block has been eliminated from the final rule. EE can be used as a method for compliance, but was not used in setting the state goals. Compliance measures must be outlined according to the final rule's two-step process, and will only include new EE programs in low-income and vulnerable communities.

PSC 12. EPA should establish energy efficiency savings rates based on state-specific analyses that take into consideration past and existing efficiency programs. EPA should recognize the savings achieved by those past and existing programs for compliance purposes.

Outside-the-Fence Measures, Conversion from Rate-Based Emissions to Mass-Based Compliance Goals

PSC 13. EPA should provide and rationalize a single acceptable method for translating a rate-based goal into a mass-based goal.

The final rule provides both rate-based and mass-based goals for each state, as well as a conversion formula (p. 823). The formulas and spreadsheets are provided in the Technical Support Document "CO2 Emission Performance Rate and Goal Computation" and is still under revision on EPA's website (will be finalized for publication in the Federal Register).

Cost-Benefit Analysis

PSC 14. EPA should revise its cost-benefit analysis to incorporate the direct costs required for rule compliance and to re-calculate its benefits analysis by revising the current global scope of estimated benefits to a state or regional scope that more closely matches the geographical scope of the estimation of direct costs.

Each section has a new/modified cost-benefit analysis methodology lined out. EPA attempted to outline regional approaches throughout, versus national calculations, but did not go into state-by-state detail.

State Role Under § 111(d)

PSC 15. EPA should clarify several questions regarding the authority of states to administer, execute, and enforce a final § 111(d) rule, including how litigation delay will affect timing of state plan submittal.

The legal section begins on p. 920. The deadline for state plans has been extended. There is no mention on litigation delay specifically. State plan legal authority section starts on p. 967, and general legal components are outlined beginning on p. 990. There are also numerous TSDs that outline additional legal issues.

EPA 111(D) STAFF ANALYSIS #2: MONTANA BIG PICTURE

TO: Commissioners
FROM: Public Policy Bureau (Bob Decker, Margo Schurman, Robin Arnold)
SUBJECT: EPA 111(d)—Staff Analysis #2: Montana Big Picture
DATE: August 14, 2015
CC: PSC Electric

Our first staff report on EPA's 111(d) Final Rule summarized how the Commission's 15 recommendations on the Draft Rule (submitted to EPA in November 2014) were addressed in the Final Rule, which was released August 3. In this second installment, we present an overview of the generation facilities in Montana affected by the Final Rule and the scope of the compliance challenge facing the state.[1]

MT Electric Generation Units Affected by EPA 111(d)

Generator	Capacity (net MW)	2012 Energy (MWh)	2012 Energy (% of total)	CO2 emissions (tons)	CO2 emissions (% of total)	CO2 rate (lb/MWh)	CO2 w/HRI (tons)
Corrette	153	718,795	5%	864,369	5%	2,405	846,217
Colstrip 1	307	1,297,572	9%	1,626,704	9%	2,507	1,592,543
Colstrip 2	307	1,339,921	9%	1,720,254	10%	2,568	1,684,129
Colstrip 3	740	4,680,658	32%	5,564,141	31%	2,378	5,447,294
Colstrip 4	740	4,932,852	34%	5,855,084	33%	2,374	5,732,127
L & C	53	254,009	2%	334,414	2%	2,633	327,391
CELP	35	301,608	2%	436,051	2%	2,892	426,894
YELP	52	454,794	3%	881,745	5%	3,878	863,228
Hardin	107	467,194	3%	641,774	4%	2,747	628,297
Total	**2,494**	**14,447,403**	**100%**	**17,924,536**	**100%**	**N/A**	**17,548,121**

Table 8/13/15
Capacity, energy production, and emission data (columns 1, 3, and 5) from EPA

The table lists the energy production and CO2 emission data from 2012, the baseline year of 111(d), for the nine generation units affected by the rule. Note that all generation units in Montana affected by the rule are coal-fired.[2]

One of the fundamental changes from the Draft Rule now reflected in the Final Rule is EPA's method of calculating state emission targets. In the Draft, EPA applied four "building blocks" to arrive at state-specific allowable emission rates. In the Final Rule, however, EPA utilizes regional interconnection data to arrive at two source-specific CO2 emission rates for power plants—one emission rate for coal plants and one for natural gas combined cycle plants. As a result, affected power plants are subject to the same standards (in either the coal or natural gas category) no matter what state they are located in.

In the Final Rule, Montana's target emission rate dropped from 1,771 lb/MWh to 1,305 lb/MWh, an increase in required CO2 reduction of 26% from the Draft Rule's target rate. Because electric generation in Montana draws significantly from coal, and because Montana has no natural gas

combined cycle plants, the state now faces one of the largest rate-based reduction requirements among all states, i.e., a reduction from 2,481 lb/MWh (baseline level, 2012) to 1,305 lb/MWh. That is, Montana's CO2 emission rate must decrease by 47%.

The Final Rule allows states to comply with the rule through either a rate-based (pounds of CO2 per MWh produced) or a mass-based (total CO2 tonnage per year) approach. Because the mass-based approach makes it easier to comprehend the scope of a state's challenge in complying with the rule, we'll use it to highlight some general points.

(Important: Several aspects of the rule, including data selection, calculation methodology, emission credits and incentives, interstate trading, interim and phase-in periods, and non-emission strategies, such as energy efficiency and renewable resource development, are absent from this analysis; we will address some of them in future reports. The intent here is to broadly define the dimensions of the playing field, not to envision how the compliance game will be played.)

Using a mass-based approach, Montana must reduce its annual CO2 emissions from 17,924,535 tons to 11,303,107 tons, i.e. 6.6 million tons, or 37%.[3] To get a general idea of the size of that obligation, ignore the target date of 2030 and the various policy routes that might be executed to reach that target over several years, and imagine that the target must be reached immediately. By using the above table, you can construct certain scenarios ...

Scenario A

- CO2 reduction required =6.6 M tons
  - — heat rate improvement -.4 M tons (EPA value of 2.1%; column 8 in table)
    = 6.2 M tons
  - — Corette retirement -.8 M tons (already in effect)
    = 5.4 M tons
  - — Colstrip 1 retirement -1.6 M tons (for illustrative purposes; not planned)
    = 3.8 M tons
  - – Colstrip 2 retirement -1.7 M tons (for illustrative purposes; not planned)
- Balance = 2.1 M tons (target not reached)

Scenario B

- CO2 reduction required =6.6 M tons
  - — heat rate improvement - .4 M tons (EPA value of 2.1%; column 8 in table)
    = 6.2 M tons
  - — Corette retirement -.8 M tons (already in effect)
    = 5.4 M tons
  - – Colstrip 3 retirement -5.4 M tons (for illustrative purposes; not planned)
- Balance = 0 M tons (target reached)

These scenarios add perspective to the relative contribution of certain emission-reduction actions. A collective heat-rate improvement of 2.1%, for example, would achieve about 6% of Montana's required mass-based reduction of 6.6 M tons by 2030. The Corette retirement achieves 12%. A Colstrip 1 retirement would achieve 24%, and a Colstrip 3 retirement would achieve 82%.

Presumably, any operational changes or retirement of fossil generators would be compensated for by efficiency, changing energy markets, and the development of renewable resources and/or low-emission resources. The retirement of, say, Colstrip 1 and Colstrip 2 represents a capacity

loss of 614 MW of baseload power. Replacing all, or a significant portion, of that with non-CO2 or less intensive CO2 resources would require resolved pursuit of a multi-pronged strategy.

Again, these scenarios are illustrative, intended to characterize the magnitude of Montana's compliance challenge, not to suggest a compliance strategy. Montana, as most states, will probably strive to produce a plan that blends numerous policies and resource decisions over a span of 15 years to comply with the rule, and it's impossible to say at this time how such a plan will affect any particular existing generator.

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[1] This analysis is based on the presumption that the 111(d) Final Rule takes effect as it was released on August 3, and it looks at the "scope of the compliance challenge facing the state" from a regulatory perspective. It does not examine the legal challenges to the rule or the myriad economic or environmental implications of the rule.

[2] YELP burns petroleum coke, but EPA treats that fuel as coal in 111(d).

[3] The choice of a rate-based, as opposed to mass-based, compliance approach could change the long-term quantity and interim-period timing of required emission reductions. We'll examine and compare the two compliance approaches in a future report.

EPA 111(D) FINAL RULE—STAFF ANALYSIS #3: ENERGY EFFICIENCY

TO: Commissioners
FROM: Public Policy Bureau (Robin Arnold, Bob Decker, Margo Schurman)
SUBJECT: EPA 111(d)—Staff Analysis #3: Energy Efficiency
DATE: August 18, 2015
CC: PSC Electric

Montana's Goal:

- **Rate-based**
  - **Interim (2022-2029) = 1,534 lb CO_2/MWh**
  - **Final (2030) = 1,305 lb CO_2/MWh (a 47% reduction from 2012 baseline)**

or ....

- **Mass-based**
  - **Interim (2022-2029) = 12,791,330 tons CO_2**
  - **Final (2030) = 11,303,107 tons CO_2 (a 39% reduction from 2012 baseline)**

Demand-Side Energy Efficiency:

In the Final Rule, *Demand-side energy efficiency* is defined as "an installed piece of equipment or system, a modification of existing equipment or system, or a strategy intended to affect consumer electricity-use behavior, that results in a reduction in electricity use (in MWh) at an end-use facility, premises, or equipment connected to the electricity grid."

For PSC-regulated utilities in Montana, traditional demand-side energy efficiency (EE) programs are ratepayer funded and administered through the utility.[1] EE measures include energy audits, weatherization, rebates for high-efficiency residential furnaces, rebates for high-efficiency commercial refrigeration, etc. In the Final Rule, other eligible EE programs include state building efficiency codes, state appliance standards, energy service performance contracting (financing projects through a third-party, to be repaid by the building owner/operator in their energy costs), and volt/VAR optimization (smart-grid technologies that reduce line-loss).

Eligible EE measures must be quantifiable and verifiable, be implemented in 2013 or later, and still producing savings in the year 2022 or later. The use of EE measures in a state plan is not federally enforceable and is not included in the federal plan. EE measures can only be utilized in a state measures plan and must be state enforceable (in Montana, this might require legislation to implement a program, such as an energy efficiency resource standard).

The EPA estimates that all states can reach an EE rate of 1% of previous year's electricity sales.[2] For Montana, which currently has EE savings of .54% (including EE savings from co-ops), if the plan starts with .54% in 2020 and ramps up .2% each year until 1% is reached and maintained each year through 2030, the net cumulative savings would be 1,274,000 MWh by 2030. The savings can be credited to electric generating units (EGUs) in the form of emission reduction credits (ERCs) under a rate-based plan, or allowances under a mass-based plan.[3]

For the rate-based plan, ERCs are added to the denominator of the lb/MWh equation to determine the CO_2 rate. ERCs equal to 1,274,000 MWh would decrease CO_2 emissions from 2,481 lb/MWh to 2,280 lb/MWh, or 8.1%.[4]

Under a mass-based plan, EE measures reduce reported CO_2 emissions from affected EGUs by avoiding the need for generation from those EGUs. The reduction of 1,274,000 MWh in sales from the 2012 baseline (14,447,403 MWh) would be equivalent to a reduction in CO_2 emissions of 16,341,606 tons, a decrease of 8.8% from the 2012 baseline of 17,924,353 tons. The savings from EE measures would be slightly less than the savings from retiring Colstrip 1.

Generator	**2012 Energy (MWh)**	**CO_2 Emissions (tons)**	**CO_2 emissions (% of total)**
Corette	718,795	864,369	5%
Colstrip 1	1,297,572	1,626,704	9%
Colstrip 2	1,339,921	1,720,254	10%
EE savings	1,274,000	1,582,747	8.8%

Important: Our purpose in presenting the emission reduction values of potential EE savings in the context of emission quantities from specific coal plants is not to suggest a compliance strategy for Montana, but to illustrate the contributions toward CO_2 emission reduction from EPA-suggested methods and to provide an analytical process that commissioners may use to make general calculations and comparisons. Note that one of EPA's building blocks—renewable energy—is not included in the above table or the scenario analysis below. The role of renewable energy in Montana's 111(d) compliance will be examined in an upcoming staff analysis.

In our second staff analysis, "111(d) Staff Analysis #2: Montana Big Picture," we presented two scenarios for emission reduction in Montana. Scenario A was still 2.1M tons short of its goal when combining heat rate improvements, retiring Corette, and retiring Colstrip Units 1&2. Adding EE savings to that scenario would leave Montana .5M tons short of its CO_2 reduction mass goal.

Scenario A

- CO2 reduction required =6.6 M tons
  - — heat rate improvement -.4 M tons (EPA value of 2.1%)
    = 6.2 M tons
  - — Corette retirement -.8 M tons (already in effect)
    = 5.4 M tons
  - — Colstrip 1 retirement -1.6 M tons (for illustrative purposes; not planned)
    = 3.8 M tons
  - – Colstrip 2 retirement -1.7 M tons (for illustrative purposes; not planned)
    = 2.1 M tons
  - – EE savings -1.6 M tons
    = .5 M tons (target not reached)

The EPA estimates that EE programs would cost a total of $70 million in the first year (the EPA also assumes a 50/50 split between the program cost and the participant cost, which would be $35 million for the program cost, $35 million for the participant cost). Annual total costs increase

to $122 million in 2022, and remain steady at $97 million from 2023-2030. The average program cost for Montana in the years 2020-2030 using the EPA's assumptions is $41.84/MWh.

Savings that occur from EE measures may be banked and applied in future years between the interim date (2022) and the final date (2030).

The EPA has created an optional Clean Energy Incentive Program (CEIP) that will match credits for certain EE measures or renewable energy projects that generate or reduce MWh in 2020 and 2021, the "early action period." States must establish a CO_2 emissions budget and may set aside allowances for the interim plan period (mass-based) or generate early action ERCs (rate-based) to allocate to eligible projects. The EPA will match ERCs or allowances during the early action period from a pool of 300 M tons of CO_2 emissions, with some reserved for eligible wind and solar projects and a portion reserved for low-income EE projects. Any amount unallocated from the 300 M tons would be redistributed among states participating in the program.

In order for EE projects to qualify for matching allowances or ERCs, the measures must be located in or benefit Montana after a final state plan is submitted (or a federal plan is implemented), and result in quantified and verified electricity savings in low-income communities. There is no definition for what qualifies as a "low-income community"; as of August the EPA is looking for input. (Note that the low-income requirement is only for the CEIP programs receiving matching credits; other non-low-income EE can still be used to meet a state's overall emissions goal.) The CEIP design and implementation details will be determined by the EPA in a future action. While the details of the CEIP are not clear at this time, in order for a state to participate in the CEIP, it must include in its initial plan submittal a non-binding statement of intent to participate in the program. The CEIP part of the plan may be revised by a state with supporting documentation after the initial plan is submitted.

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[1] Electric cooperatives in Montana are not regulated by the PSC. Some of them administer EE programs, although details and data for those programs are not available in PSC documents. Estimates of EE potential made by the EPA include regulated, cooperative, and municipal distributors of retail electricity.
[2] Ranges for achievable EE potential vary by study and region. The Northwest Power & Conservation Council estimates EE potential for the Pacific Northwest to be 1.1%, and the Lawrence Berkeley National Laboratory estimates the EE potential for WECC to be in a range from .8%-1.6%.
[3] ERCs are not the same as Renewable Energy Certificates (RECs). 1 ERC=1 MWh, and 1 allowance=1 ton of CO_2.
[4] Calculations for the rate-based and mass-based plans are simplified, and assume there is no growth in CO_2 emissions between 2012 and 2030, and that all EE savings are applied to fossil-fuel EGUs.

EPA 111(D) STAFF ANALYSIS #4: RENEWABLE ENERGY

TO: Commissioners

FROM: Public Policy Bureau (Robin Arnold, Bob Decker, Margo Schurman)

SUBJECT: EPA 111(d)—Staff Analysis #4: Renewable Energy

DATE: August 31, 2015

CC: PSC Electric

This is the fourth in a series of staff reports to the Commission on EPA's 111(d) Final Rule, which seeks to reduce carbon dioxide emissions from electric power plants. Each staff report addresses a particular and significant element of the Final Rule.

The purpose of this series is not to provide details of EPA's methodologies or to suggest a specific compliance strategy for the rule; rather, our objective is to introduce the Commission to the framework of the rule and assist the Commission in understanding the scope of Montana's challenge in complying with it.

This report addresses renewable energy generation, which is one of the three "building blocks" used by EPA to arrive at states' emission goals. Renewable energy was a building block in the Proposed Rule, but EPA considers it differently in the Final Rule and presumes that its role in a state's compliance plan will be greater than it was in the Proposed Rule.

Here are the central elements of EPA's treatment of renewable energy in the Final Rule:

- Renewable energy is defined to include onshore wind, utility-scale solar, concentrated solar, geothermal, and hydropower;
- Existing renewable energy (built before and during 2012) cannot be used for compliance;
- Projected renewable quantities are based on historical development levels and economic modeling (in the Proposed Rule, renewable portfolio standards were used to project achievable renewable energy potential);
- Achievable renewable energy estimates are higher than in the Proposed Rule, based on data from the National Renewable Energy Laboratory depicting lower costs and higher operational efficiencies;
- Renewable energy potential is calculated at the interconnection level (Eastern, Western, and ERCOT);
- Compliance-eligible renewable energy is calculated incrementally; in 2021-22, the projection is based on average annual renewable capacity added in 2010-14, and in 2023-2030, the projection is based on the maximum annual renewable capacity addition in the 2010-14 period;
- Achievable renewable projections are adjusted downward through consideration of various constraints, including terrain variability, transmission limits, turndown limits on fossil fuel units, and a 30% limit of net energy for load of renewables.

The table below illustrates the relative power of specific resource decisions to effect emission reduction in Montana. The table reflects EPA datasets, rounded figures, the presumption of a mass-based (as opposed to rate-based) compliance approach, and the exclusion of numerous potential factors, including energy incentive credits, market trading possibilities, and the impacts of other potential compliance resources. The table is not intended to include all possibilities of rule compliance or to suggest a compliance strategy; it is intended to foster generalized comparisons between the listed resources and to contemplate how difference mixes of resource actions would collectively reduce emissions.

CO2 Reduction Contributions From Various Sources

Source	CO2 Reduction (M tons)
Heat Rate Improvements	0.4
Retire: Corette	0.8
Retire: Colstrip 1	1.6
Retire: Colstrip 3	5.4
Energy Efficiency (1%)	1.6
New Wind: 100 MW	0.4
New Wind: 500 MW	2.0
New Wind: 1000 MW	4.0
Montana Reduction Target (2030, Mass-Based)	6.6

We would be happy to discuss the presumptions and calculations behind the figures in the table. In forthcoming reports to the Commission, we will address other important aspects of the Final Rule, including rate-based and mass-based compliance methods, the Clean Energy Incentive Program, and the potential of market-based utilization of credits and allowances.

EPA 111(D) FINAL RULE—STAFF ANALYSIS #5: STATE PLANS

TO: Commissioners

FROM: Public Policy Bureau (Robin Arnold, Bob Decker, Margo Schurman)

SUBJECT: EPA 111(d)—Staff Analysis #5: State Plans

DATE: September 4, 2015

CC: PSC Electric

Table 1: Montana's Goal

Rate-based
○ **Baseline (2012) = 2,481 lb CO_2/MWH** ○ **Interim (2022-2029) = 1,534 lb CO_2/MWh** ○ **Final (2030) = 1,305 lb CO_2/MWh (a 47% reduction)**
Mass-based
○ **Baseline (2012) = 17,924,535 tons CO_2** ○ **Interim (2022-2029) = 12,791,330 tons CO_2** ○ **Final (2030) = 11,303,107 tons CO_2 (a 39% reduction)**

The EPA's 111(d) Clean Power Plan rule is designed to reduce carbon emissions from affected fossil fuel electricity generating units (EGUs) by the year 2030. Using a regional approach based on the transmission interconnections (Eastern, Western, and ERCOT), different performance emission rate values were calculated for EGUs falling under two categories: coal plants and natural gas plants.

The EPA determined emissions rates for the regions, based on the total generation and emissions from coal and natural gas units in the 2012 baseline year. Potential reductions that could be achieved by 2030 were calculated for each region through the EPA's "Best System of Emission Reduction" (BSER), which includes increasing efficiency of existing coal plants, displacing coal-fired generation with natural gas, and increasing renewable resource production. The reductions were applied to the 2012 baseline to determine each state's interim and final goals.

The most direct way for a state to comply with the rule would be to require all affected EGUs to reduce their emissions rates to the state's final goal by 2030. As that may not be the most cost-effective or efficient way to comply, the EPA designed the rule to allow states to utilize different compliance plans to achieve their CO_2 reduction goal. These plans result in a package of measures that, when combined, achieve the state's final goal.

The rule allows states to measure and report their compliance in one of two ways. The first option is a rate-based goal, which measures CO_2 emissions per megawatt hour (CO_2 lb/MWh) for all of a state's affected EGUs. The second option is a mass-based goal, which measures the amount of CO_2 emissions from affected EGUs in short tons of CO_2 per year.

Montana has nine affected EGUs under this rule, all of which are coal plants.[1] Table 1 at the top of the page outlines Montana's baseline emissions from 2012, the interim goals, and the final 2030 goals for a mass-based and a rate-based approach. Montana has the option to create its own package to comply with the goals, based on either a rate-based or mass-based metric.

Why are the reduction percentages lower for mass-based than for rate-based compliance in Montana?

Adding zero-emitting renewable sources under a rate-based approach could allow affected EGUs to increase carbon emissions while reducing the state's average emissions rate. In order to allow the same flexibility under a mass-based approach, the calculation for the mass-based goal was adjusted based on each state's estimated share of the additional regional potential renewable resources not accounted for in the rate-based methodology. A state's share of additional renewable resources is calculated based on the amount of generation from affected EGUs in the state divided by the total amount of generation from affected EGUs in the region.

Why would a state choose a rate-based or a mass-based approach?

A rate-based approach does not limit the total amount of carbon emissions in a state and allows for greater load growth beyond the EPA 2030 projections. This would be beneficial for states with fast growing populations or large industrial growth, as they could potentially keep all of their affected EGUs with the addition of large amounts of renewable resources in the state to meet large load growth and simultaneously reduce emission rates from existing fossil generating plants.

A mass-based approach may be preferable to states planning on the retirement of large CO_2 emitters (such as coal plants) without needing to replace the generation from the retired plants. For instance, if Colstrip Units 1 & 2 were retired, the amount of generation capacity that was serving other states would not need to be replaced in Montana.[2] The mass-based approach also provides states with the flexibility to incorporate measures such as a Renewable Portfolio Standard or Energy Efficiency Resource Standard to reach the state goal (these measures could place some of the burden to meet state goals on public utilities rather than affected EGUs).

Another consideration for states to keep in mind will be participation in a regional trading program. States that adopt a rate-based plan may trade only with other states utilizing a rate-based plan, and states adopting a mass-based plan may trade only with other mass-based states (information on implementing trading programs for 111(d) compliance will be provided in a future staff memo).

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[1] Corrette, Colstrip 1, Colstrip 2, Colstrip 3, Colstrip 4, Lewis & Clark, CELP, YELP, and Hardin.

[2] This scenario would reduce the mass-based emissions, but would have less effect on rate-based emissions since both emissions and energy output would be reduced (the rate-based emissions are a result of emissions per MWh of energy produced by affected EGUs).