Summary of Travis Kavulla, Montana Public Service Commissioner

Sept. 9, 2014

State Perspectives: Questions Concerning EPA's Proposed Clean Power Plan

This testimony focuses on where the EPA's proposed carbon rule meets the practical realities of the power sector. In particular, I address the reliability impacts of the regulation and the generalizations that underlie the EPA's goal-setting process for states.

Despite "reliability" being a watchword in the conversation surrounding the EPA's regulation, no grid reliability analysis has been conducted in my region. No one is in a position to reach conclusions about the regulation's reliability implications for the Western grid. Moreover, such a study will not be completed by the October comment deadline.

The remainder of this testimony focuses on specific, on-the-ground examples where local realities diverge considerably from the generic assumptions that EPA uses to establish individual state goals. By applying a cookie-cutter formula to states, the EPA's "Best System of Emission Reduction" (BSER) is predicated on untrue generalizations not only about the upgrades available at power plants that emit carbon dioxide, but about the robustness of the electric grid, the nature of natural-gas generators' operations, and the prospects for increasing renewable energy and energy efficiency.

The power plants that generate electricity and the grid that moves electricity to and fro are configured differently in each state and region. Montana and its neighbors rely on a weak grid and only a few generators to meet local consumer demand, exporting much of the rest of in-state electrical generation. Ironically, the EPA's state goal-setting process has the effect of punishing states in my region for being early adopters of pollution controls and for diversifying their fuel mix to include less carbon-intensive power plants. The proposed rule also swaps a local understanding of the possibilities and limitations of renewables and energy efficiency for sweeping assumptions about these things that are not sourced from state-specific experience.

The EPA's rapidly approaching October comment deadline must be extended to provide sufficient time for reliability analysis to be conducted, and many parts of the rule must be reworked considerably if state goals are to be founded on a realistic assessment of what is achievable in a state.

Written Testimony of
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Chairman Whitfield, Ranking Member Rush, and members of the Committee, I am honored to be given the opportunity to offer my thoughts on the Environmental Protection Agency's (EPA's) proposed 111(d) regulation, which if adopted has the potential to reshape large parts of the utility industry. As a state utility commissioner, I am tasked with approving the consumer rates that will be necessary to pay for what the EPA is proposing.

My focus today is not on the underlying policy debate. The Clean Air Act confers on EPA the authority—and indeed requires the agency—to address the emission of carbon dioxide and other greenhouse gases that contribute to climate change. Rather, my concerns regard the approach EPA is taking in fulfilling this responsibility.

I will address first an issue that is overwhelmingly important, the reliability of the electric grid, before moving to a consideration of the specific assumptions the EPA has used to establish state goals. Here, my focus is not on what states may do to comply with the specific lbs/MWh number the EPA has spelled out for them; those conversations will unfold over the coming years. For now, in advance of the EPA's rapidly approaching October comment deadline on the proposed rule, it is crucially important to engage in a discussion about the basis—really, the lack thereof—for the state goals EPA has proposed.

But first, allow me to introduce myself to the subcommittee. I was elected to office in 2010, and represent approximately 200,000 constituents in the State of Montana. The district I represent spans 500 miles across the service territories of numerous electric utilities. In addition to my duties on Montana's Public Service Commission, I serve in a number of other capacities that touch upon this important topic. I am the co-chairman of the Northern Tier Transmission Group's steering committee, which establishes policy for the cooperative planning efforts of several large transmission owners in Montana, Idaho, Utah, Wyoming, and Oregon. Additionally, I am a former Director and currently serve on the Member Advisory Committee of the Western Electricity Coordinating Council (WECC), the organization charged by NERC and FERC with adopting and enforcing reliability standards for the Western Interconnection that spans from California to Alberta. WECC also conducts transmission planning and reliability analyses that model the consequences of public policy proposals like the 111(d) rule. Finally, I serve on the Boards of Directors of the National Association of Regulatory Utility Commissioners and its research arm the National Regulatory Research Institute.

Reliability

Much of the conversation around the EPA's proposed rule has focused on the question of reliability. I will not speculate on the rule's reliability impacts, for the simple reason that no reliability analysis of the EPA's proposed "Best System of Emission Reduction" (BSER) has been conducted for the Western Interconnection, which encompasses 11 states, 2 Canadian provinces, and Mexico's Baja California. Transmission planners at WECC, which is responsible for adopting and enforcing reliability standards for this large slice of the continent, have told state regulators that they cannot accomplish such an analysis by the October comment deadline.

Other than WECC, few if any other organizations are in a position to conduct such an analysis. In any case, none have.

Many, including the EPA itself, have said that whatever else the proposed regulation accomplishes, it must keep the electric grid operating reliably. I agree. Absent a transmission modeling study that concludes that the BSER's Building Block approach would result in a system as reliable as the one we have today, it is inappropriate to claim that the EPA's BSER is adequately demonstrated.

EPA has modeled the outcome of the BSER assumptions using its Integrated Planning Model (IPM). It is important to understand what this model is and is not. The IPM does not and is not intended to model the operations of the transmission grid. Instead, the model focuses on whether in a particular region there are an adequate amount of electric supply resources to meet consumer demand. While this question of resource adequacy is essential to reliability, it is equally necessary to understand whether the resources that exist in a particular region can be delivered to the consumer location of demand. Many of the most critical resources that serve large pockets of consumer demand are located in transmission-congested areas. If this transmission congestion is not incorporated into a model—and, again, IPM does not—then that model cannot reach meaningful conclusions about system reliability. In other words, the way IPM has drawn the regions in its hub-and-spoke representation of the grid do not capture the significant complexity of grid operations *within* the given region. Additionally, IPM uses an old-world definition of regions that does not accurately represent the present realities of how the transmission grid has been divided into Regional Transmission Organizations (RTOs).

Even assuming that the BSER is otherwise a feasible metric for accomplishing the EPA's goal of reducing carbon dioxide emissions, it must be subjected to transmission modeling. This is

not possible before the October comment deadline. For that reason alone, the deadline should be extended.

The EPA's Building Block Approach to Establishing State Goals for Carbon Reduction

As the subcommittee is aware, the EPA's proposed regulation establishes individualized state mandates based on what EPA assumes are feasible accomplishments in four areas: efficiency improvements at power plants, the increased operation of existing natural-gas combined cycle plants, the construction of additional renewable generators powered by wind and solar, and increased energy efficiency on the part of consumers which reduces overall demand. These four Building Blocks are, in general, already being used by states to varying degrees for a variety of purposes, including carbon reduction. Yet the EPA essentially ignores the details of a state's situation, and instead applies a cookie-cutter formula that uses sweeping regional or national assumptions about the degree to which each individual Building Block is achievable. The result is that any given state goal is predicated on a so-called Best System of Emission Reduction that ignores the realities of commercial relationships, the way in which generators are dispatched, the footprint of regional markets, the status of individual power plants, the robustness of the electric and natural gas transmission system, and potential energy efficiency savings on the ground. Even though the state goal-setting process of the BSER is flawed, some states nonetheless would be able to achieve the goal by other means (for example, by simply shutting down coal-fired generators, and not attempting to implement the Rube Goldberg device the Building Blocks represent). But for other states, the application of the BSER's Building Blocks to the state's electric profile results in a goal that is unrealistic via the BSER or by other means short of a complete overhaul of its energy supply mix.

Building Block 1: Efficiency Improvements at Coal-Fired Power Plants

The EPA assumes carbon-emitting power plants that are subject to the rule would be able to achieve a 6% efficiency improvement (i.e., 6% less fuel would need to be burned to obtain the same amount of electricity). This assumption is applied uniformly across the country, regardless of whether a given power plant has or has not made these upgrades already. Ironically, the many power plants that have already made such upgrades are penalized by the proposed rule because it is assumed that a further 6% reduction can be made against the 2012 baseline data the EPA uses, in which the results of efficiency improvements are already embedded.

A specific example of this is the Big Stone plant located in South Dakota. Co-owned by Otter Tail Power, Montana-Dakota Utilities, and NorthWestern Corporation, it provides energy to consumers throughout the Great Plains, including to the MDU customers I represent in Eastern Montana. Big Stone's owners have already made most of the heat-rate upgrades Building Block 1 contemplates. Additional efficiency improvements capable of obtaining another 6% savings are simply unavailable, and the few improvements that could be made are simply not economical. Also, in order to comply with another EPA rule, the Regional Haze Rule for South Dakota, Big Stone is in the process of installing upgrading its Air Quality Control System (AQCS), at a cost of nearly $400 million. In order to control the emissions that cause haze, however, 8 megawatts of the plant's production will have to be dedicated to running the pollution control equipment. This "parasitic load" actually means that more tons of carbon emissions per megawatt-hour of net production will be produced by the plant, but in service of controlling haze. In other words, to comply with one EPA rule endangers Big Stone's ability to obtain the efficiency upgrades that are the assumed possible by the proposed EPA rule.

Montana's 2,100-megawatt Colstrip facility—the second-largest coal-fired power plant in the West—is in the same situation. That facility's operator, PPL-Montana, has made several efficiency improvements over the last decade that have made the plant operate about 5% more efficiently. These upgrades include an approximately 3-4% efficiency improvement resulting from using a new blade design in the turbine rotors, allowing the plant to use the same amount of steam flow to generate more electricity; a less than 1% efficiency gain from boiler upgrades; and a less than 0.5% efficiency upgrade resulting from cooling tower and fan improvements. There are not many other examples of additional projects that could be undertaken to result in efficiency improvements. Those that would work in certain parts of the country—for instance, drying moisture out of coal to improve the efficiency of combustion—will not work for Colstrip, because demoisturized Powder River Basin coal becomes very combustible. Experiments at Colstrip with this approach have resulted in spontaneous combustion events. PPL-Montana already has a strong incentive to pursue efficiency upgrades that reduce cost and emissions alike, and at Colstrip most of those upgrades have already occurred. Only 1-2% efficiency gains remain on the table for Colstrip, yet in setting Montana's goal, the proposed rule assumes that 6% efficiency improvements are available. This is simply not true.

If EPA continues to use Building Block 1 to establish state goals, it should incorporate plant-specific data and not use a generic assumption that does not reflect the present status of individual plants. The agency must give credit to plants that have already made upgrades, and it should not punish states for heat-rate degrades that have resulted from installing pollution control equipment necessary under other air-quality rules.

Building Block 2: Increased Natural Gas Dispatch

Much of the attention paid to the BSER appears to have focused Building Block 2, questioning whether the nation's gas infrastructure is robust enough to support this Building Block's assumption that natural gas combined cycle combustion turbine (CCCT) plants can run consistently at a 70% capacity factor. I share this concern, but would like to focus on another specific example from my region where the EPA's assumptions do not comport with the realities on the ground.

Carbon savings associated with Building Block 2 occur in the EPA's assumptions because for every megawatt-hour of new generation from a CCCT, there is assumed to be a megawatt-hour less of generation from a more carbon-intensive generating unit. It appears that for a state plan to be compliant with the EPA's proposed rule, it would somehow need to demonstrate this offsetting relationship. Yet there are practical barriers that make this one-for-one exchange difficult or impossible.

The Big Stone plant, referred to above in relation to Building Block 1, is again an instructive example. The EPA assumes that this facility would be substantially replaced with natural-gas fired electricity generated at the Deer Creek Generating Station, which under Building Block 2's assumption would run at 70% capacity. These are the only two fossil units in South Dakota, and they serve customers in that state as well as North Dakota, Minnesota, and Montana.

There are several flaws with this assumption. First, the dispatch of these generating units is orchestrated by two separate operators. Although the EPA appears to assume that their operation is seamlessly interrelated, that is simply not the case. Deer Creek is dispatched through the region's Integrated System (IS) jointly operated by Basin Electric Power Cooperative (Basin)

and the Western Area Power Administration (WAPA); in 2016, it is planned that WAPA and Basin will participate in the Southwest Power Pool (SPP). Meanwhile the Big Stone plant operates within the Midcontinent Independent System Operator (MISO), which dispatches the share of power generated at the plant for MDU's customers, including those in Montana. IS/SPP and MISO do not share a dispatch signal that would allow one plant's increased operations to result in the lower dispatch of a plant operating in a different market. To analogize, it would be like suggesting that an apple bought in a supermarket on one side of town means one less will be sold at the store at the other side of town. There may be some interrelation between the two electric markets in question here, but it is not controllable absent a reorganization of the way the two markets interact, which is no easy matter. EPA appears to assume, in Building Block 2, that simply because two power plants are located in the same state, they must have a strong relationship with one another. In some states, this would be true. In South Dakota, in Montana, elsewhere, it is not true.

Additionally, these two power plants—Big Stone and Deer Creek—were built to their particular size and in their particular location, to serve the needs of their utilities' customer bases, not those of other utilities. Each of the various owners of each of these plants own firm transmission rights from these units to their retail loads; naturally, they do not own transmission rights originating at a plant they do not own, to their customers.

As a practical matter, the reduction that EPA assumes relative to Big Stone would result in the plant operating at 23% of capacity. Its minimum run level is 40%, meaning that the plant would either be required to be shut down or not run for a substantial period of the year (with an unknown impact on reliability). As noted above in my comments regarding Building Block 1, this is a plant that is at this very moment undergoing an expensive, $400 million upgrade to

comply with other environmental rules; any "Best System of Emission Reduction" that causes its removal from the supply pool is not worth the name. Meanwhile, Basin designed Deer Creek, which became operational in 2012, to run 12-16 hours per day for five days a week; in other words, it was intended to operate a little less than half of the time, not 70% of the time. One of the reasons it was designed in this way is to integrate Basin's substantial and growing portfolio of wind energy, which is abundant in this part of the nation. Deer Creek needs to have the capability to dispatch up when the wind suddenly does not blow, and need to be able to dispatch down when the wind picks up. Operating at a high capacity factor, 70%, would not allow the kind of ramping that is essential to Deer Creek's purpose. It is yet another irony that operating natural gas plants the way Building Block 2 suggests could hamper those units' ability to accommodate carbon-free wind energy. Utilities have built CCCTs in order to be on call to serve peak demand and to integrate variable energy resources like wind and solar. Yet the EPA rule essentially punishes consumers whose utilities have increased the diversity of their fuel mix by adding a CCCT, because any CCCT that operates at a lower-than-70% capacity factor is, for the purpose of setting a more onerous state goal, assumed to be able to dispatch up to that level on a 24-7 basis.

Building Block 2 simply does not acknowledge the realities of the power sector. EPA should make accommodations for states where no market relationship exists between a CCCT and the coal-fired generating unit the BSER assumes it will offset.[1] It should also assume a lower average dispatch for the many CCCTs whose purpose is not just base-load power, but serving peak needs and integrating weather-dependent renewables.

[1] Enacting the assumptions in Building Block 2, with this condition, would nonetheless require grid operators to dispatch higher-cost plants before lower-cost plants, rearranging what has traditionally been the straightforward practice of dispatching lower-cost units until the system demand is met. This is possible by adding a carbon price to the bid price of a coal plant within a market, and while disadvantageous to consumers, it is nonetheless possible. Building Block 2 in its current form is not possible.

Building Block 3: Increased Renewable Energy

Renewable energy has great promise in Montana and neighboring states, but the ability to construct new wind energy parks is limited by the constraints of the transmission system to send the energy to more populous areas where demand is concentrated, and by the ability of the rest of the generating fleet and the grid to reliably integrate weather-dependent renewable energy which may or may not be generated as needed. These are not intractable problems, but it is clear that the EPA rule has not thoroughly considered them—certainly not on the state-to-state basis that is necessary for the BSER to be adequately demonstrated.

As a preliminary matter, the EPA rule is vague and even self-contradicting on the question of which state should get credit for renewables. Should it be the state where the renewable generator is located, or another state where consumers of the energy might reside? Montana's Colstrip facility is mostly dedicated to serving out-of-state consumers over a long-distance, 500-kilovolt transmission line. Nonetheless, Montana under the EPA's proposed rule is assessed all of the carbon emissions associated with the facility. If this remains the case in the EPA rule, so too must it be clear the Montana-based renewables would count against the carbon footprint of this facility. Without this provision, Montana would not be able to use Building Block 3 as a step toward complying with the state's goal.

Second, the EPA has established the regional targets of Building Block 3 using an erroneous calculation. The EPA has reasoned that each state in a given region—"the West" is one, very large region in the rule—is capable of meeting a renewable energy target that is the average of the Renewable Energy Standards (RES) of the states in that region. For purposes of deriving this average, EPA has said that Montana has a 15% RES. This is misleading. Montana's

RES, like some other states', only applies to certain actors—namely, only to investor-owned utilities and certain small competitive suppliers serving Montana customers. It does *not* apply to consumer-owned utilities, to public power projects, or to generators owned by out-of-state utilities. In effect, Montana has required new renewable energy resources to constitute far less than 15% of the total generating mix. It is unclear what a true average of state requirements would look like, but it would certainly reduce the 21% regional renewable energy target for the West in Building Block 3, perhaps substantially.

There is unquestionably a bounty of wind resources in Montana. The state has the potential to develop more renewable generation than even the EPA's Building Block 3 imagines. But the ability to develop those resources is severely limited by the nature of the transmission grid. WECC has previously modeled scenarios where large amounts of "remote renewables" are located in Montana and Wyoming to serve out-of-state consumers. In those studies, the path limits of the transmission corridors from Montana to the Northwest were routinely (almost half of the time) pushed to the limit, and energy from renewables was forced to be "dumped"—generated, but not able to be transmitted to the customers who need it. One WECC study warned[2]:

> The path rating for Path 8 [the Montana to Pacific Northwest corridor] is currently highly dependent on remedial action schemes that are directly linked with the coal-fired and hydro generation in Montana. There are inertial concerns in the area. The local balancing authorities have advised caution when running studies that dispatch renewable generation before coal-fired and hydro generation. In reality, the rating on Path 8 may have to be decreased when these conventional resources are backed down, or turned off completely.

Building Block 3 calls for less renewable energy than was modeled in those reliability analyses. However, this and other studies have made clear that there are reliability concerns associated

[2] WECC, "2022 Resource Options," (July 25, 2013), p. 51.

with adding renewables in Montana without significant transmission upgrades, which for reasons from siting to finance have been very difficult to come by. Adding capacity to new lines is on a limited basis possible, but it is expensive and these cost assumptions are not discussed in the EPA's proposed rule. On the other hand, if the construction of a new line was necessary to implement Building Block 3, it is not at all certain that this would be possible in time to meet EPA's goals.

Additionally, like for Building Block 2, the EPA assumes that renewable energy and coal-fired energy will be dispatched in an offsetting manner. This requires certain assumptions about the flexibility of coal plants that are unreasonable. Coal plants typically are not designed to cycle quickly to integrate renewables; they are meant to be run relatively flat, ramping up and down over longer periods of time. Even the certain coal units that are today being dispatched more quickly are showing more carbon-intensive heat rates; they emit more carbon per megawatt-hour for the energy they do produce, and it appears that effect has not been captured in the EPA's proposed rule. In Montana, as the quotation from WECC above notes, the high voltage transmission line that runs from Colstrip to points hundreds of miles west is dependent on the inertia this very large coal-fired plant provides. If that facility does not run, then the line may not be reliable to operate. Specific instances of transmission vulnerability, like this one, have been entirely overlooked in the EPA's proposed rule.

Like for Building Blocks 1 and 2, the EPA must not fall through the trapdoor of generalization when it comes to imposing Building Block 3 for the creation of a state goal. Montana's example in this regard is telling.

Building Block 4: Increased Energy Efficiency

The EPA's energy efficiency targets are, unlike renewables, not even predicated on a regional average—but a national average, which supposes that it is possible to achieve an annual 1.5% savings through energy efficiency measures. Each state's utility commission of which I am aware has evaluated the potential energy savings available to the utilities it regulates, and the possibilities depend on many variables, from climate of the region, to the hours of daylight at the particular latitude, to the mix of consumers (industrial versus residential) served by the utilities. That is why each state has a utility commission, and why it makes sense to house this kind of decision-making at the state or local level, and not in a federal agency. Unfortunately, Building Block 4 is perhaps the banner example of the BSER's supposition of an arbitrary target that lacks meaningful substantiation in the real world. The Public Service Commission in Montana (and the comparable agency in many other states) already obligates the utilities that it regulates to acquire all cost-effective energy efficiency available to them. The EPA's rule supposes that there is a substantial amount beyond this available for the taking. This assumption is only thinly evidenced in the EPA's rule.

Additionally, the practical implementation of Building Block 4 runs into the same problem that characterizes Building Blocks 2 and 3: a disconnect between the demand in a state that energy efficiency would apply to, and the generating resources of that state. In the case of Montana, I have observed above that the carbon-emitting units subject to the 111(d) proposed regulation mostly are dedicated to serving out-of-state consumers. Yet Building Block 4 assumes a reduction in demand on the part of Montana consumers, many of whom have nothing to do with the operation of the coal-fired units in question. There is no direct, causal link between a Montanan's energy savings, and the amount of generation output at the Colstrip facility that constitutes the vast majority of Montana's carbon emissions. The EPA rule is vague about how a

state in Montana's position could implement Building Block 4 in a way that the EPA considers compliant, i.e., that shows an offsetting effect between energy efficiency programs and coal-fired generating units.

Additionally, it is unclear how a state plan that includes energy efficiency would be enforceable. Presumably such a plan would attempt to identify specific programs that would lead to energy efficiency gains, but the points of compliance would be possibly thousands of consumers performing small, discrete actions, and not typical of other environmental regulations that require a single plant operator to install pollution control technologies. The Montana PSC's experience with measuring energy efficiency savings is that it relies heavily on assumptions (what was saved against a hypothetical base case). Demonstrating compliance could prove difficult and contentious.

Finally, this Building Block, like others, ironically punishes early adopters of energy efficiency. The Building Block, as applied to states, ramps up at a 0.2% level annually to a 1.5% annual energy savings. So a state that is already aggressive in its energy efficiency programs, and which presumably has invested in more and more costly energy efficiency investments over time, may be starting out at around a 1.5% savings, which the Building Block holds the state to throughout the compliance timeframe. Meanwhile, a state with a modest energy efficiency portfolio may start with, say, a 0.5% annual savings, and it would take five years for the Building Block to ramp up the savings to 1.5%. In short, the proposed rule is more punitive on early adopters and those who have already achieved many energy efficiency gains, than those who have not.

If it continues to use Building Block 4 as part of the BSER, the EPA should only consider the possible energy efficiency savings of consumers who have a direct relationship with the

dispatch of a coal-fired generating unit. Additionally, the EPA should defer to states on identifying the amount of energy efficiency savings that are cost-effective given the profound differences that exist between states in relation to this question.

Other concerns

Basing an entire regulation on a single year of data (in this case, 2012) is problematic for two reasons. First, any given year may be unusual compared to what is typical, and in the Northwest, a good water year and low gas prices caused coal plants to run less often in that year than they otherwise would have. A multi-year average would better represent what is typical. Second, although much of the data EPA collects is subjected to quality assurance and quality control, there are still a number of different methodologies for measuring the carbon intensity of a power plant. The rule's underlying assumption is that reductions will be measurable and real compared to a baseline year's data which is similarly assumed to be measurable and real. This hopeful assumption may not be accurate.

It is clear that the EPA proposal requires major changes, if not a complete overhaul. Even if the EPA did not make changes to deal with the numerous criticisms of matters that the EPA has tentatively settled upon, there are numerous points in the proposed rule where the EPA itself has merely offered a spectrum of potential directions and requested comment about which option the EPA should select. The draft rule is not fully baked, meaning EPA could arrive at a final rule in which states will be seeing key elements of the rule (and the potential interaction between key elements) for the first time. There needs to be another substantial round of comment, with the possibility of further changes, and not a final, immovable rule in 2015.

I have appreciated the opportunity to express these views on the record, and am happy to answer questions about them. I leave you with one final thought: The much-heralded flexibility that the proposed EPA rule provides to states is a meaningless concept, if the underlying goal—a number which is inflexible—has been calculated using generic assumptions that are misleading or false when applied to the facts of a specific state, in a specific part of the transmission grid. The goals established for states must be premised on reasonable, adequately demonstrated measures. The EPA's rule has much progress to make in that regard.