Center for Energy Economics and Public Policy

University of Wyoming

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This document is an update to that posted on August 3rd, describing how the announced rule answered the questions posed in the original document.

What will Wyoming want to know when the new EPA regulations regarding power plant emissions are announced by the Obama Administration on August 3, 2015?

Background:

The Obama Administration announced that on Monday, August 3, 2015 the Environmental Protection Agency (EPA) would release its long-awaited revisions to their Clean Power Plan proposals regulating greenhouse gas (GHG) emissions from the nation's power plants. Fossil-fueled generators in the United States have been responsible for about 70% of electricity production and approximately 32% of the nation's total greenhouse-gas emissions.[1] Of these generators, 75% of carbon emissions come from existing coal-fired plants which emit approximately 2200 to 2500 pounds of carbon dioxide (CO2) per megawatt hour (Ibs. CO2/MWh) and have produced about 40% of total electricity over the last decade. The remainder of CO2 emissions primarily come from natural gas fired power plants, of which the most modern facilities emit approximately 1000 to 1200 Ibs. CO2/MWh.

The EPA's original proposal, called the Clean Power Plan or CPP, was originally released on June 2, 2014, and called for a 30 percent reduction in CO2 emissions from 2005 baseline levels by 2030. Given the improvements that had occurred in the emissions of GHGs between 2005 and the announcement date, the new regulations would have required an additional 17 percent nationwide reduction in power plant CO2 output relative to 2012 levels. Specific state reductions required in the 2014 mandate, however, were not uniform. Wyoming's EPA target would have required a 19 percent reduction in CO2 emissions from those recorded in 2012 by 2030. In addition to the 2030 target, each state also had a set of interim annual targets that they would have to meet on average between 2020 and 2029. The EPA's original proposals would regulate both new and heavily modified or reconstructed plants, (referred to as 111(b) rules for the section of the Clean Air Act they are applied under), and existing plants, which make up the

[1] See http://www.epa.gov/climatechange/ghgemissions/sources/electricity.html. Data is from 2012 to be consistent with documents released on the EPA previously and with the base year used for state target definition. These shares are volatile and will change slightly over time depending on season and technical or regulatory developments.

majority of plants the proposed rules would affect, (referred to as the 111(d) portion of the proposed rules).

The 111(b) rules proposed in 2014 would have required emissions rates from newly constructed coal-fired power plants to be 1,100 lbs. CO2/MWh, less than half the average amount coal-fired generators produce today, effectively requiring the use of new and expensive carbon capture technologies to meet the new limits. Currently such plants do not operate in the United States, though two are slated to begin in 2016 and one opened in 2014 in Canada. Given current market conditions, many analyses of the EPA plan suggest that such an emissions limit would effectively ensure that no new coal-fired power plants would be built in the United States once the rules were adopted; however, even under existing market conditions, specifically, competition from very cheap natural gas and other regulatory requirements already in place, few such facilities had been planned even before the EPA announced its new Clean Power Plan rules.

The original 111(d) proposed rules for existing plants did not specifically limit plant emissions, and instead allowed states to meet an overall state-specific cap in their total CO2 emission rate per megawatt hour of electricity produced. The EPA suggested that states could meet these targets using methods or "building blocks": (i) heat-rate improvements, which would increase the efficiency of coal-fired power plants, (ii) substitution of less CO2-intensive natural gas generation for coal-fired electricity production, (iii) substitution of coal-fired and natural gas-fired generation with GHG-free renewable and nuclear generation, or (iv) the use of energy efficiency measures by consumers of electricity, which would reduce the overall need for electricity production.

The 2014 proposal would have required states to submit plans to meet both their interim targets from 2020 to 2029 and the final 2030 target no later than one year after final rules were defined, with a conceivable one-year extension. To allow greater flexibility in emissions reduction, the EPA also encouraged states to cooperate to reduce the cost of emissions reduction collectively where possible. Anticipating that some states would propose such cooperative frameworks, the EPA allowed a three year deadline for states choosing to submit such plans since the rulemaking necessary to coordinate actions across jurisdictions can be much more complex.

Potential Impacts of the Proposed EPA Plans on Wyoming:

Wyoming produces 40 percent of the nation's coal, all of it for electricity generation. The scale of Wyoming coal production is such that the next six coal-producing states combined did not produce as much coal as Wyoming in 2012. Further, just the two largest of Wyoming's coal mines produce over 20 percent of the nation's coal. In 2012, 93 percent of Wyoming's coal production was exported for use in other states. Of the remaining 7 percent of total production used in Wyoming to produce electricity, approximately two-thirds of this power was then exported to other states. Overall, Wyoming's use of its native coal amounts to a mere 3 percent of its entire coal production.

Given the scale of Wyoming's coal production, any regulations that cause a reduction in coal-fired generation nationally could have profound effects on the state's economy. The coal mining industry in Wyoming directly employed approximately 6,900 people in 2012, and a University of Wyoming study released in 2015 found the industry was responsible for creating an additional 4,100 jobs in supply-related industries, and over 5,000 additional jobs due to the expenditures made by these relatively high-paying jobs. The same study found that the total number of jobs in Wyoming due to the existence of the

coal-mining industry was over 23,000 when including generation and rail transport sectors, their associated supply sectors and the expenditures these jobs also created. Coal mining and related industries also accounted for over 11 percent of the state's total revenues in 2012, and coal-mining revenues form the backbone of the state's resources used to fund public school operations and construction.

No matter how the Clean Power Plan is implemented, impacts on the coal-fired electricity generation could have severe consequences on the state of Wyoming. Wider use of energy efficiency and state cooperation could allow CO2 reductions to be made by more sectors of the economy nationally, minimizing the impact necessary reductions in coal-fired generation to meet the EPA's state targets could cause. An analysis of the potential impacts of the Clean Power Plan by the University of Wyoming's Center for Energy Economics and Public Policy found the proposed EPA regulations as announced in 2014 could reduce Wyoming coal output by between 34 percent to over 50 percent, depending on how widely states used energy efficiency and state cooperation to meet their Clean Power Plan mandated reductions in CO2 emissions.[2] These production losses would translate into approximately 7,300 to over 11,000 jobs lost in the coal mining, coal generation and coal transport sectors in the state. State coal-revenue impacts estimated in the same study could decline by as much as 60 percent in the worst case scenario and would have serious consequences on the funding of state services.

Important Questions Wyoming will have regarding Final EPA Clean Power Plan Rules announced August 3, 2015:

Because of the potential impacts the Clean Power Plan could have on Wyoming, state policy-makers will be keenly watching and analyzing any changes in the EPA proposal originally announced in 2014. The most important questions Wyoming will have can be outlined as follows:

1) *How will other state's targets for emissions reduction change compared to those announced in 2014?*

More important than its own target, Wyoming will want to know how other state emissions reductions have changed when the new rules are released, particularly those that use Wyoming coal. Documents released ahead of the EPA's final rules announcement indicate several changes to the 2014 proposal. Most important is the fact that states will not have to begin complying with reductions until 2022, a two-year delay from the original proposal. This could offer a limited reprieve in the timing and initial scale of Wyoming coal production losses.

In exchange for this relief, however, the Obama Administration has also announced more stringent CO2 targets, with a goal of attaining a 32 percent reduction in CO2 emissions from 2005 levels by 2030. In other words, while states will have more time to prepare, and will be allowed to use coal-fired generation longer before emissions restrictions are imposed, they will have less time to achieve greater CO2 reductions when reduction targets take effect.

[2] See Godby et al. (2015) "The Impact of the Coal Economy on Wyoming," report prepared for the Wyoming Infrastructure Authority http://wyia.org/documents/reports/university-of-wyoming-economic-study-identifies-impacts-relative-to-wyomings-coal-industry/

While the administration has indicated that once targets go into effect the overall reduction in emissions will be greater than in the previous plan nationally, for Wyoming what will matter is how state targets have changed. Wyoming will be most interested in whether collectively states consuming the greatest amounts of Wyoming coal will see relief from the 2014 targets or whether the targets have become tougher, and if so, by how much. These changes will directly affect the amount of coal Wyoming produces in the future.

How other states' targets have been changed will be much more important to Wyoming than whether its own target has changed, since over 90 percent of the coal produced in Wyoming is exported to other states. Once state targets have been announced, economic modelers will be very busy trying to determine how projections for Wyoming coal will be affected under the new rules, and by extension how state employment and government revenues will be affected.

August 3rd rule Impact:

The new EPA rules announced on August 3rd did indeed have significant impact on the targets for many states. In addition to the increase in overall stringency the new rules imply to the country as a whole regarding CO2 emissions, individual state targets were also affected, though the impacts were not uniform. Some states saw their emissions targets rise (become easier) while others declined, becoming potentially more difficult to achieve.

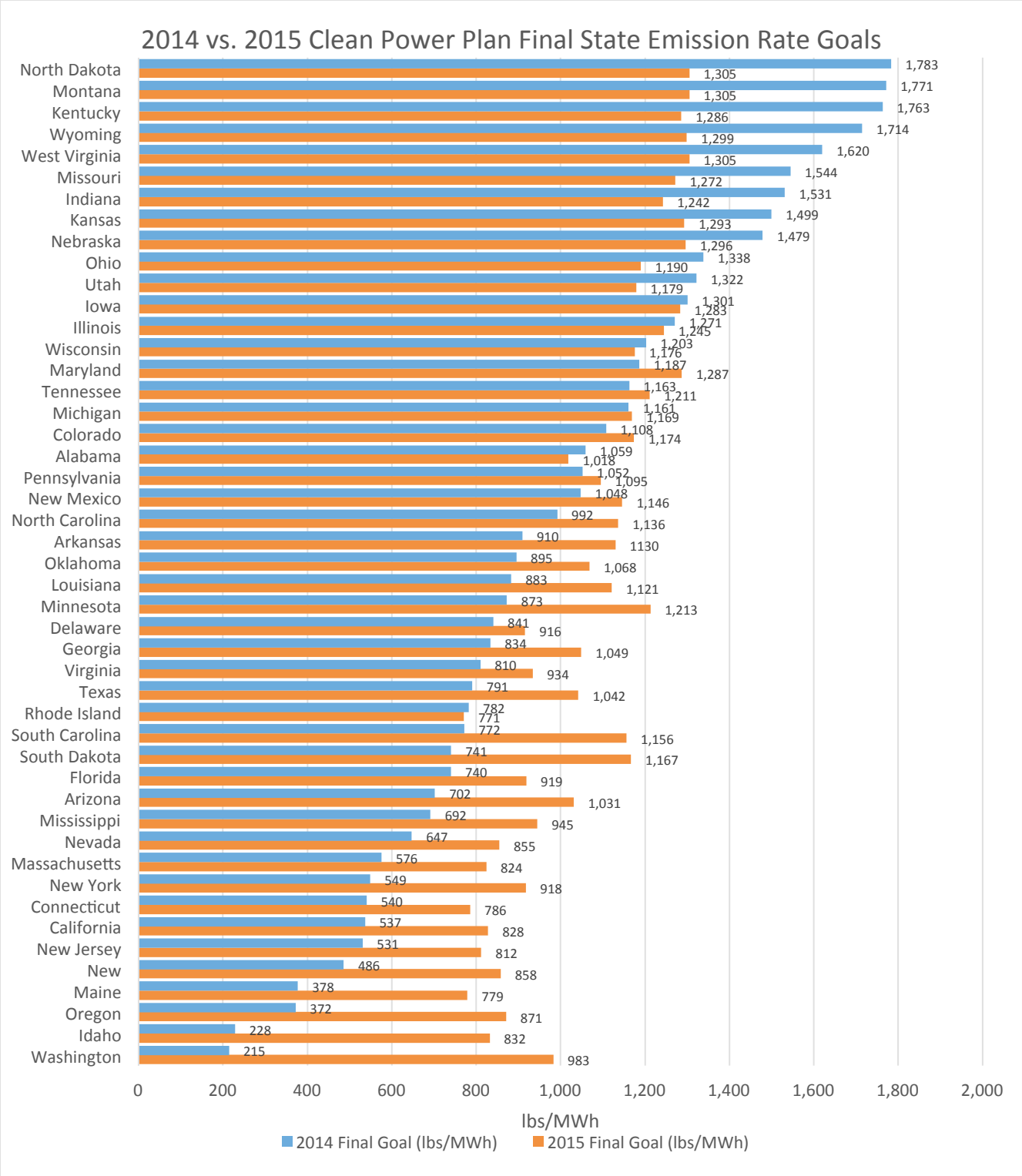
Figure 1 shows how individual state 2030 emissions rate targets changed relative to their targets defined in the previous 2014 proposal. While the new rules include changes in the computation of emissions being controlled, targets are still roughly comparable on the basis of levels. As shown, some states saw significant relief in the reductions necessary, while others saw the opposite. Overall, two generalizations can be made regarding the new rules:[3]

i. State targets are now more uniform with far less variation between states. The 2014 proposal set state targets, at least in part based on what the EPA deemed possible, and at reasonable cost in each individual state. The rules announced on August 3rd based state targets on a uniform set of technology requirements, specifically uniform expectations nationally regarding emissions rates for existing coal and natural gas-fired plants. In 2030, coal fired power plants will be allowed to produce 1305 lbs of CO2/MWh, while gas fired plants will be allowed to produce 771 lbs/MWh. Additional emissions beyond these levels will need to be offset by generation changes elsewhere. Using these uniform standards has had the effect of causing state targets to have far less variance in their final emissions goals than the 2014 proposed rules defined, as shown in Figure 1.

ii. States that had previously adopted policies that incentivized greater use of renewables generally have seen their targets become less stringent, while states like Wyoming that have done comparatively less have seen targets become more demanding. Early adoption seems to have been rewarded in the new targets to a greater degree than in the 2014 proposal. Figure 2 shows the percentage changes in state targets between the 2014 proposal and 2015 rule, arranged from largest rate decreases to largest rate increases. Generally, the states with the most carbon intensive

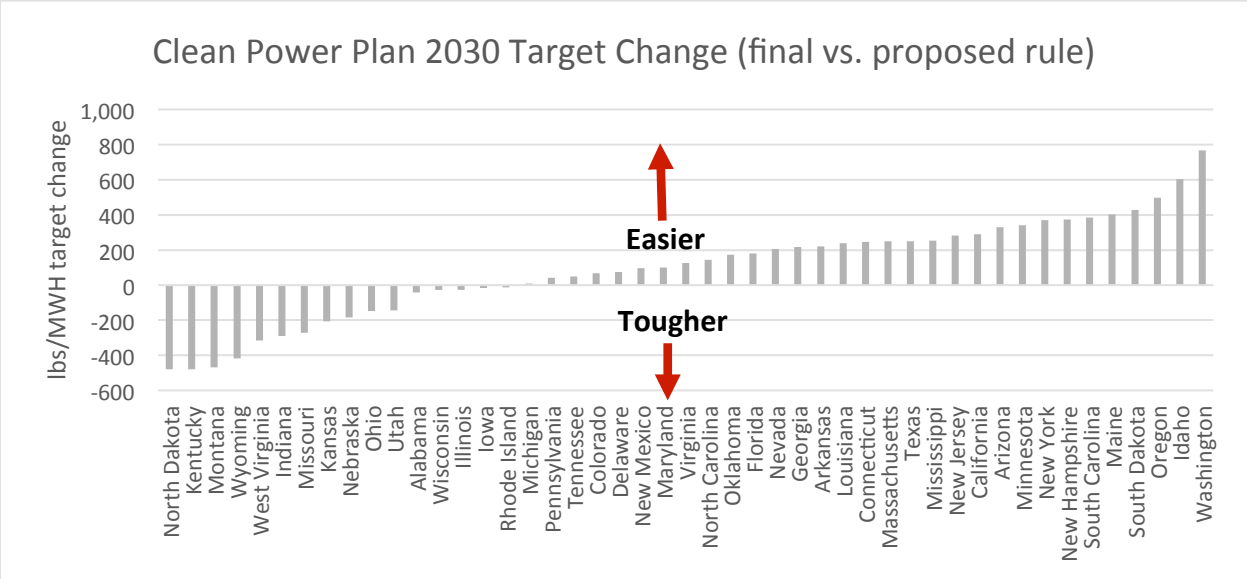
[3] Note that the 2014 and 2015 emissions rate targets are not directly comparable as the computation methodologies differ, but overall declines in the emissions rate in the 2015 rule implies a tougher state standard.

economies have generally seen the greatest reductions in allowable emissions rates under the new rule, while those with less carbon-intensive energy systems have seen greater relief in their goals.



Source: EPA data

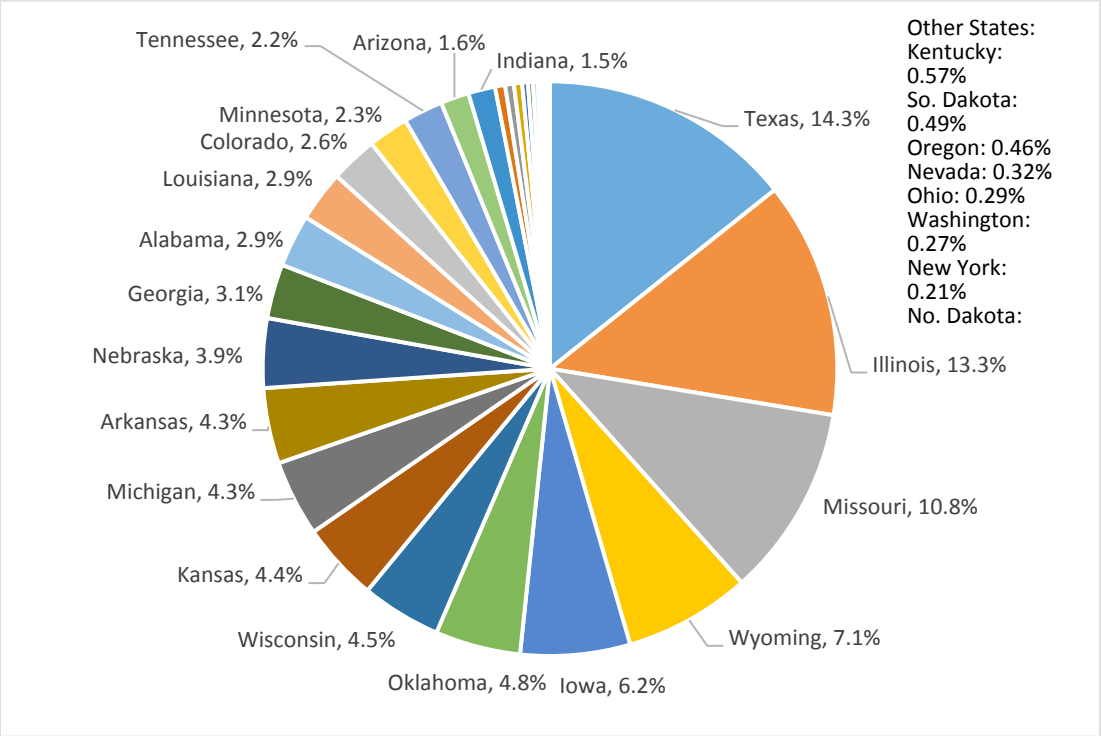
Figure 1: Comparison of 2014 Proposal Targets vs. Final 2015 Rule Emissions Targets by State in 2030.



Source: EPA data

Figure 2: Percentage Changes in 2030 Emissions rate Goals by State, 2014 Proposal vs. 2015 rule.

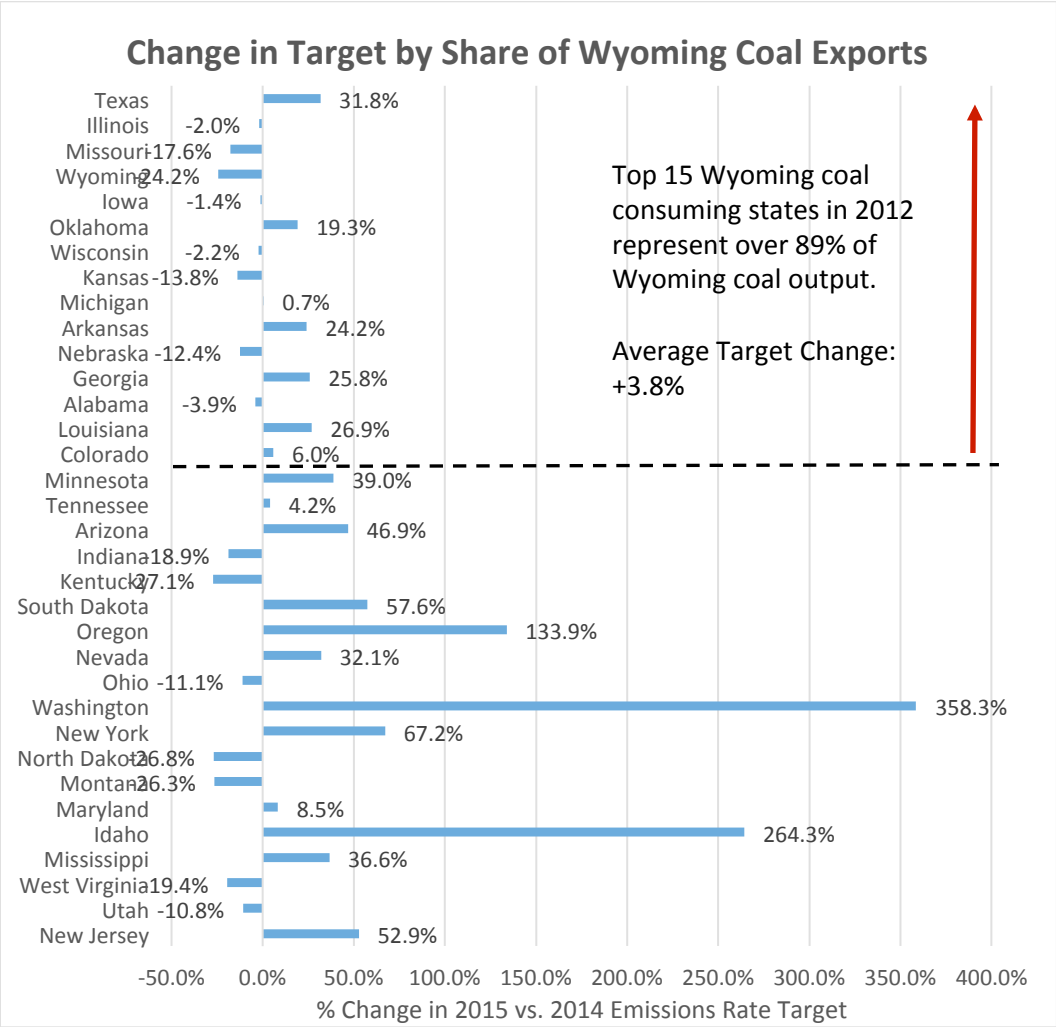
For Wyoming what matters is the distribution of changes in the stringency of state goals, and specifically the changes in goals for states accounting for the greatest proportion of Wyoming coal exports. In 2012, Wyoming coal was used in 34 states, with shares as described in Figure 3.



Source: Energy Information Administration data

Figure 3: Share of Wyoming Coal Exports by Destination State, 2012.

Figure 4 describes how the states' emissions rates changed for the destinations shown in Figure 3. The national standards defined in the 2015 rule are anticipated to impose a 32 percent reduction in CO2 emissions by 2030 from existing power plants, compared to the 30 percent reduction in the original 2014 proposal. EPA simulations suggest the impact of this change is to reduce to 27 percent the national share of electricity generation produced from coal, as opposed to the 30 percent share in 2030 predicted under the 2014 rule. This implies a reduction in coal use as a generating source of 33 percent in the new rule, compared to the 25 percent decline in the proposal of 2014 (relative to the 40 percent share of total generation coal has provided over the past several years). This will reduce predicted Wyoming coal sales significantly given the state provides 40 percent of the nation's coal output. The changes in Wyoming's export state goals though, does not suggest that the state should anticipate reductions in coal output greater than the national changes in coal-fired generation as a whole suggest will occur. As Figure 4 shows, states using Wyoming coal on average have seen targets become slightly less strict, suggesting that while Wyoming coal will be significantly impacted by the reduction in coal use, the state may not be more adversely impacted than the market as a whole.



Source: EPA data

Figure 4: Change in state emissions rate targets by State (presented in order of Wyoming coal consumption from highest to lowest based on 2012 data).

2) How have Wyoming's emissions targets changed?

While other states' potential future demand for Wyoming coal will be of the utmost importance to Wyoming's future, Wyoming will still be very concerned about the emissions reductions it is required to make. In meeting its own standard, Wyoming will be particularly concerned with how its state target has been defined. The state indicated in its response to the EPA regarding the proposed 2014 rules, one of over four million such comments received by the EPA, that there were at least two reasons Wyoming's target should be reconsidered due to what it asserted were errors in the EPA's own assumptions regarding Wyoming power plants. The first was the fact that the 2014 target included an assumption that Wyoming had greater gas-fired generation under construction than was actually the case. At the time the rules were published, Wyoming had one natural-gas fired combined cycle plant generation under construction in the state of the type the EPA had defined as potentially being substituted for coal. Further, at a 200 MW potential, the EPA had assumed the capacity of this plant was almost double what was actually constructed. Correcting this error could reduce the stringency of Wyoming's required emissions target somewhat under the CPP rules, though the error in the EPA's computation was rather minor relative to the size of emissions from Wyoming's coal-fired fleet affected by the rule.

The second error Wyoming has asserted the EPA made was in the assumption that an average 6 percent reduction could be made in the efficiency of all of Wyoming's coal-fired power plants to meet the state's emission target. In submissions made to the EPA, the state concluded that the EPA had improperly assumed that the average 6 percent improvement it had calculated was possible in the national coal-generation fleet, was also possible in Wyoming. Wyoming and its affected utilities have indicated that their coal-fired plants in the state would be hard-pressed to make a 2 percent improvement much less 6 percent improvement without radical plant modifications, and these would not be cost-effective given the remaining service-life of the affected plants in the state. Wyoming was also concerned that such modifications could trigger a new-source review, requiring additional emissions requirements for plants that did undergo such improvements, further undermining the expense and cost effectiveness of such changes.

August 3rd rule Impact:

As shown in Figures 1 and 2, Wyoming's final 2030 emissions rate target actually became stricter in the final 2015 ruling. The reason for this can be defined by a change in the methods used to define state targets in the 2015 rule. The stricter standard also occurred despite the fact that potential heat rate improvements (building block 1) now consider the region of the country the power plant in question is located. Wyoming's assumed improvement has been reduced to 2.1 percent, the improvement assumed possible for the wider western grid, encompassing most of the states in the western half of the country. This change reflects the concern Wyoming and other states voiced in their comments that the 6 percent improvement the 2014 proposal did not reflect regional conditions and was grossly over-optimistic. Further, the use of natural gas fired dispatch (building block 2) was also de-emphasized in the new rules and the original data mistake regarding Wyoming's natural-gas fired potential was corrected. Additionally, building block 4, (energy efficiency) was dropped from the target definition process. Collectively, one might have presumed these changes would have improved Wyoming's final standard had other aspects of the target-setting methodology not been changed.

As described above though, the setting of new state goals were simplified significantly, using a single technology standard for coal and natural gas-fired generators nationally. This had the effect of making state goals in 2030 more uniform. Wyoming, which was previously had one of the highest final target emissions rates saw its rate decline as the variation between states' goals was reduced and resulted in Wyoming's final emissions target rate becoming more stringent.

New goals were also computed on a regional basis in the 2015 rules, and not on Wyoming specific conditions as in 2014. Basing targets on conditions in the wider western interconnect - the national grid Wyoming is a part of, reflects the fact that electrons and electricity power flows do not respect state boundaries. The new goals therefore also reflect the recent increases in renewable energy expansion that have occurred in western states. The result was a greater increase in the potential for renewable energy expansion in Wyoming expected, and this was reflected in a lower final target emissions rate.

Overall, Wyoming's target is now much more stringent than in the 2014 proposal. The means to meet this target have also been simplified in the new rule and the EPA suggests that while tougher, the state should be able to meet the goal, in part through the use of emissions trading if it chooses to. State policy-makers, however, are certain to take an adverse view of this target change, and this was reflected in the Governor's response to the announced Clean Power Plan changes, released on the same day:

"The Clean Power Plan is scientifically flawed and if implemented will not achieve minimum reductions. It is in fact damaging – not just to Wyoming, but the nation. I will continue to fight regulations that are fundamentally bad for Wyoming and exceed the regulatory authority of the federal government." – Statement from Governor Mead's office, August 3rd, 2015.

3) *Will the state benefit from announced changes in the rules to encourage greater renewable generation?*

Wyoming has very good potential wind generation resources. Wyoming experienced a large expansion in wind energy projects from 2008 through 2011 but then ran out of transmission capacity to support additional projects. Since most of the power generated in Wyoming is exported, this constraint has served to minimize the number of new renewable projects built in the state since that time. In documents released ahead of August 3, 2015 announcement of the final CPP rules, the Obama Administration indicated that to encourage the expansion of GHG-free generation, an incentive program will be established to generate credits towards state emission compliance in the years 2020 and 2021 for renewable projects that begin construction after state implementation plans are submitted. Wyoming could benefit from such a change provided large scale renewable projects are built in the state.

Since most renewable generation in Wyoming is exported, and Wyoming has reached the limit of wind-energy expansion without significant increase in transmission, the state will be keenly interested in whether new transmission projects are encouraged by the new rules. The permitting of major new transmission lines takes almost a decade due to Federal permitting processes, and so unless such timelines can be sped up, renewable expansion in the state could be limited to those already underway (one large 3000 MW project is nearing the end of the transmission permitting process). Further, delays

in developing additional transmission could undermine renewable generation projects Wyoming could receive credit for if such construction takes place in the state.

If new rules do incentivize additional renewable expansion elsewhere without facilitating speedier transmission line construction, this could threaten Wyoming in two ways. It could reduce the demand for additional Wyoming wind generation if it is ever built as necessary transmission construction will take much longer than construction of renewable energy projects in other states, causing Wyoming wind to come to market late, and secondly, this additional renewable capacity will potentially reduce the demand for Wyoming coal currently used to produce electricity for use elsewhere.

Wyoming may not only be unable to take full advantage of renewable energy credits that will be proposed under the final rules due to a lack of transmission, and it may also be hurt by such efforts if they undermine its coal and future wind energy demand.

August 3rd rule Impact:

Rules announced August 3rd did not specifically address the transmission infrastructure problems Wyoming experiences. Indeed, it appears that delaying the implementation deadline of the 2015 rule to 2022 is the primary means with which the proposal intends to address not only Wyoming's infrastructure concerns, but other states' infrastructure concerns that were made clear in the 2014 proposal comments submitted to the EPA. The extension allowed to states to prepare for the rule could mitigate some problems regarding infrastructure by allowing greater time for their development before the required emissions reductions in the new rule begin. Additionally, incentive programs announced appear to be intended to further encourage new renewable projects, including Wyoming's Pathfinder and Sierra Madre/Chokecherry wind generation proposals, both of which include significant transmission infrastructure. If these incentives (referred to as the Clean Energy Incentive Program) are successful, they may cause private markets to solve the transmission problems from particularly valuable wind resources such as those in Wyoming. This appears to be the implicit intent of the rule. It is possible that future programs could further influence additional transmission expansion, however none were announced with the new rules, nor were any changes announced to solve to the regulatory conflicts now present in the transmission permitting process.

4) How will changes with respect to energy efficiency in the Clean Power Plan affect Wyoming?

In the 2014 proposed Clean Power Plan rules, states could include energy efficiency programs in the explicit computation of emissions rates toward their EPA-mandated target levels. Announced changes to the CPP include dropping building block four, the use of energy efficiency from computation of final emissions in the final rules. The use of energy efficiency as a means of meeting the Clean Power Plan emissions limits was likely to be legally challenged by opponents of the rules on the grounds that the EPA had overstepped its authority in the regulation of power plants by the use of such mechanisms under Section 111 of the Clean Air Act.

Analysis by several groups, however, including the University of Wyoming has suggested that inclusion of energy efficiency in the CPP could significantly reduce the negative impact on coal production in the state of Wyoming of the Clean Power Plan-mandated emissions reductions by spreading the burden of

CO2 reduction to other sectors of the economy outside of power production. UW analysis by the Center for Energy Economics and Public Policy showed that inclusion of the energy efficiency targets the EPA first suggested possible in 2014 would have limited losses to Wyoming's coal production to declines of approximately 30 percent relative to 2012 coal production levels, compared to losses of over 50 percent without such measures.

Of intense interest to Wyoming will be how the new rules announced might alter state targets for CO2 emissions reductions given the potential for energy efficiency as an emissions reduction strategy has been eliminated from previous rule proposals. The new limits in the 2015 rule, and the elimination of energy efficiency as an explicit strategy to reduce CO2 emissions could impose a greater threat to the Wyoming coal industry than 2014 rules did.

August 3rd rule Impact:

As previously leaked in documents and comments by agency officials prior to the final Clean Power Plan rule announcement on August 3rd, the original 2014 proposal defining of energy efficiency as part of a "Best System of Emission Reduction" (BSER) was removed from the final rule. Instead energy efficiency incentives were included as part of an emissions credit generating scheme meant to incentivize energy efficiency improvements in economically challenged areas of the country. This program, meant to both encourage energy efficiency efforts, and to help economic development in disadvantaged regions, would create emission reduction credits that could be used by states to meet state emissions goals.

It is unclear that this new program will offer Wyoming the same benefits the 2014 proposal did in its expectation of a certain level of efficiency improvement being used to meet state goals. If energy efficiency is not deployed as widely as it would have been under the previous plan, then this could increase reductions in coal-generation relative to conditions the 2014 proposal would have created. Alternatively, the credit creation outlined in the 2015 rule could allow the continued use of coal fired power plants to a greater extent than the 2014 proposal would have, using credits created by such projects to offset carbon emissions from coal-fired plants, allowing such plants to continue operating at higher levels of output. Which outcome occurs will depend on the success of the energy efficiency incentives program, and where such incentives are utilized. If they are primarily utilized in states that Wyoming does not supply coal to, again the result could be a greater reduction in Wyoming coal output than otherwise. At this time it is unclear whether this change will have a significant impact on Wyoming's coal production.

5) *Will renewable production exported to other states continue to be counted toward mandated emissions rate reductions only by states using the power, and not by states generating the renewable power for export?*

The proposed CPP rules in 2014 credited renewable generation towards emissions compliance in the states consuming the renewable generation, not the state generating and exporting such power. Coal-fired electricity generation was not similarly treated and the state producing such power was responsible for its emissions. For a state like Wyoming that exports most of the power it produces, this accounting rule posed clear problems. The accounting rule both penalized the state for its coal

production that is used elsewhere, and it did not allow Wyoming to take credit for any renewable expansion in Wyoming that might support CPP targets in other states if the power was exported.

Wyoming's renewable generation potential could help both this state and others in meeting their generation needs and CO2 emissions compliance standards. If the accounting rule remains, it may require Wyoming to enter formal cooperation mechanisms (such as permit trading) with other states such as California to see any benefit from expanded renewable generation in the state. Otherwise, in order to capitalize on new renewable energy production developed in Wyoming, the state may have to reduce its coal-fired production, with impacts to its own economy. Such actions would not only reduce demand for Wyoming coal but also likely raise electricity prices as Wyoming's coal-fired electricity costs are among the lowest in the country.

August 3rd rule Impact:

Under the 2014 proposal, renewable energy would normally have been recorded as emissions reduction only in the state in which it was consumed, regardless of where it was generated. To avoid this problem, states like Wyoming would have to enter into arrangements to develop specific cooperative programs with other states to allow credit for in-state generated renewable power helping Wyoming meet its emissions targets. If regional credit markets were created, they would have had to have been developed, which can be politically difficult and time consuming. To be most cost effective, such markets must also be carefully designed to ensure compatibility with other regional trading markets.

The final Clean Power Plan rules attempt to promote significantly the use of emissions credit trading as a means of meeting emissions reductions goals. Where the 2014 proposal was very vague in how states might cooperate, suggesting merely that greenhouse gas trading programs be like those already established between some states in the U.S., in the new rules, model trading rules have been provided by the EPA. Such markets could be formed using these pre-defined rules, greatly simplifying the negotiation and law-making process creating of emissions markets might otherwise require. These model rules define how a state could create regulatory conditions that would allow generating firms operating within them to become trade-ready, and thereby be allowed to trade with other firms directly in other trade-ready states.

An emissions credit trading market allows firms to more easily generate credits in one state to sell firms in other states or their own to offset carbon emissions. The use of simple emission trading market rules allows the credit for renewables to be more easily defined by contractual relationships in the market and not by where the power was consumed. This should improve the incentives to develop renewable energy sources where such resources are most cost effective, while simultaneously creating a simple generic market structure to allow fossil-fired generation to trade credits to offset their emissions. States would then only become responsible for ensuring that firms did acquire the necessary offsets to ensure they met their emission rate goals as defined under the state's implementation plan. In the case of Wyoming, allowing firms within its borders to be "trade-ready" would allow the state to make responsibility for emission rate compliance a firm responsibility, and the state would then only have to enforce their state standards.

While the 2014 proposal did not preclude such a market structure, the definition of emissions accounting in the previous rule, combined with no pre-defined market rules that would facilitate the creation of trading environments made such cooperative arrangements more difficult to implement.

The new rules and the supplemental materials such as model trading rules they provide potentially solve this problem, allowing market based incentives and contracting to more easily determine where new renewable energy projects are sited and who they benefit.

6) *How will carbon capture, utilization and storage (CCUS) technologies be incorporated in the new rules?*

In the 2014 rules proposals, the new source performance standards, those rules defining the CO2 emissions allowed from new plants, were set for coal-fired power plants at 1,100 lbs/MWh. Plants in the United States average nearly 2,300 lbs./MWh and can be much higher. The 2014 standards implied CCUS would be necessary for the building of new coal-fired power plants. Due to its current cost, this requirement effectively undermined any new coal-fired power plants being built, at least until the cost of such technologies was reduced. Leaked documents ahead of the new rules suggest the requirement that CCUS be used if new coal-fired power plants are built could be eliminated from the new standards due to legal concerns. Other documents suggest that the new plant standard will be reduced but supportive of CCUS.

While requiring CCUS on new plants would likely not improve the impact on demand for coal under Clean Power Plan rules at current prices for the technology and market conditions, incentives to continue to develop the technology as a means of both reducing CO2 emissions and preserving the use of coal as a low-cost power source could be of future benefit to both Wyoming and the nation. Any programs that could encourage the development of such technology would be potentially benefit Wyoming in the future given its dominant position in the coal market, though CCUS technologies do not promise any immediate advantages to the state. The state could be encouraged if such technologies are promoted or stimulated by any new programs, and could benefit if some of that development work were to occur in the Wyoming. Wyoming generators might also benefit from such developments and policy-makers in the state have been advocating the location of a test center within Wyoming as a means of promoting economic diversification by attracting new technologies.

August 3rd rule Impact:

In the new rules, no new explicit programs were announced to develop carbon capture facilities, nor were they included in incentive plans. Changes to the new source standards, however, did give some relief to firms that may choose to build new coal-fired generation. The final 2015 rules announced for new sources have redefined the necessary CO2 emissions rate for new coal-fired facilities at 1,400 lbs./MWh, or the rate that EPA claims could occur if modern supercritical pulverized-coal facilities were built that included 20 percent carbon capture. For new natural gas combined-cycle plants (NGCC) the rules remain as in the previous proposal at 1,000 lbs./MWh, the emissions rate modern NGCC plants achieve. The coal-fired rule change requires less capture to occur at coal-fired plants and therefore reduces their cost. The intent of the rule is to facilitate increased building of such plants in the future, though currently even at the new standard, given technology and natural gas costs, such plants are not price competitive. With new breakthroughs in carbon capture though, this lower threshold required for

coal-fired power plants could improve the likelihood more will be built in the future, potentially providing higher demand for Wyoming coal than would otherwise occur under the new rules.

Rules for modified and reconstructed plants did not include carbon capture though the emissions rates for modified plants were set at 1,800 lbs./MWh. This could potentially be achieved economically with some form of partial carbon capture, depending on the plant and location. Again, this standard, combined with the less stringent new source standard may incentivize greater research in the area of carbon capture, however, no additional new programs encouraging greater research or development were announced in conjunction with the rule.

Note also that if states allowed it, CCUS reductions could potentially be credit generating. Emissions credit trading on a wider scale as EPA hopes will occur could allow such activity to further incentivize CCUS research and development, and deployment.