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Policy Integrity
NEW YORK UNIVERSITY SCHOOL OF LAW

October 4, 2018

To: Bureau of Land Management

Subject: Errors and Omissions in the Bureau of Land Management's Substitution Analysis in the Wright Area Coal Leasing Remand Environmental Assessment

Submitted by: the Institute for Policy Integrity at New York University School of Law[1]

In September 2017, the U.S. Court of Appeals for the Tenth Circuit held that BLM's 2010 *Final Environmental Impact Statement* (2010 FEIS) on the Wright Area coal lease extensions had arbitrarily relied on an assumption that contradicted basic economic principles: namely, that if the lease extensions had not been granted then other sources of coal would perfectly substitute such that total coal combusted and associated greenhouse gases would remain the same regardless. The Tenth Circuit remanded the 2010 FEIS to BLM to correct the unsupported and incorrect assumption of perfect substitution, which had biased BLM's choice between the no action alternative and the leasing alternative.[2]

In its draft environmental assessment (EA) on remand, BLM now doubles down on that same arbitrary assumption of perfect substitution and concludes that "the leases would not significantly affect nationwide greenhouse gas emissions,"[3] because "greenhouse gas emissions from coal production and combustion for electricity generation could be similar whether or not the [new] tract is leased due to other coal being substituted."[4] Any concerns that the leases could increase greenhouse gas emissions, BLM assures the reader, "are unfounded."[5]

BLM is wrong. Leasing these large tracts of low-cost coal reduces the marginal cost of coal production, which increases the quantity supplied and the quantity demanded for a given price, which increases the combustion and emissions from coal. BLM's continued assumption of perfect substitution relies on incomplete readings of the literature, on out-of-date data cherry-picked out of context, and on conclusions contradicted by its own analysis. It wrongly dismisses the potential for generation shifting, overlooks possible substitutions to renewable energy and demand reductions, and ignores effects on coal exports. BLM fails to actually model the energy substitution effects, relying instead on guesses, and the agency fails to analyze the full upstream and downstream consequences of possible substitutions. BLM also fails to recalculate the supposed economic benefits of leasing that the agency had touted in the 2010 FEIS—benefits that were overestimated in the 2010 FEIS for the same reason that the climate consequences were severely underestimated in the 2010 FEIS: because of overly simplistic and ultimately incorrect assumptions about substitution.

BLM must fix all of these mistakes and omissions in its final EA on remand. A corrected final analysis will show that the leasing alternative carries significant environmental consequences compared to the no action alternative, and that benefits of the leases are significantly diminished from its original analysis.

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[1] No part of these comments purports to present the views, if any, of New York University.
[2] WildEarth Guardians v. BLM, 870 F.3d 1222, 1237-38 (10th Cir. 2017).
[3] BLM, *Wright Area Coal Leasing 10th Circuit Court Remand* at 32 (2018) [hereinafter Draft EA].
[4] Draft EA at 30 (calling this conclusion "feasible").
[5] Draft EA at 31.

Consequently, a corrected final EA will show decisionmakers that the lease extensions are a bad deal for the U.S. government and for the American people.

Scope of the Energy Substitution Analysis

The overly narrow scope of BLM's assessment of energy substitutes is suggested in the title of the draft EA's main subsection on the topic: "Fuel Substitution and Coal Prices."[6] As the title suggests, BLM's assessment focuses first on "the ability to switch coal-burning power plants to natural gas"[7] or to "co-firing with other lower emission fuels,"[8] and second on coal demand's "sensitiv[ity] to coal prices . . . and to . . . oil and natural gas prices."[9] In short, BLM is narrowly focused on the fossil fuel choices of individual power plants based on the prices of fossil fuels, rather than assessing more broadly the choices of all energy consumers.

BLM's narrow framework for analysis overlooks or gives short shrift to several important substitution options. Retrofitting a coal plant to burn natural gas is almost never the first option considered in an energy substitution analysis. Instead, coal-to-gas generation shifting by reprioritizing the dispatching of electricity generators is a much more efficient and preferred option,[10] and yet, after acknowledging the potential of gas to "displace 32 percent of coal generation," BLM dismisses generation shifting as "improbable" due to a handful of factors that the agency ticks off without any further analysis.[11] As discussed below, this quick dismissal is belied by substantial evidence that significant coal-to-gas generation shifting is already taking place and has the potential to continue. Another key omission from this section on substitution is any mention of renewable energy, or indeed of any energy source besides coal, gas, and oil. The section also cursorily dismisses the potential for coal demand to drop in response to coal prices and nowhere clearly discusses the possibility that coal prices could affect overall demand for electricity by spurring energy efficiency and conservation, or that coal prices could spur heatrate and efficiency improvements at coal plants. Nor does the section mention possible effects on coal exports or electricity imports.

All of these factors—substitution to nuclear, hydro, solar, onshore wind, offshore wind, biofuels, and imported electricity; effects on coal exports; heatrate or other technological improvements; and reduced demand for coal and for electricity—are hallmarks of a proper energy substitution analysis, as BLM well knows from having recently used the MarketSim model to conduct an energy substitution analysis for the Greater Mooses Tooth 2 Development Project.[12] It is strange then that BLM now bases its ultimate conclusion that "[e]lectricity generation is typically price inelastic" entirely on the reasoning that "many power plants are designed to operate within a particular fuel type and must operate within

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[6] Draft EA at 18.
[7] Draft EA at 18.
[8] Draft EA at 19.
[9] Draft EA at 19.
[10] This point is made abundantly clear in the very GAO report that BLM cites out of context. The GAO report's ultimate conclusion is that "With respect to the conversion of existing coal-burning plants, stakeholders said that it would be more feasible and cost-effective to construct new natural gas units or dispatch excess capacity at existing natural gas units than to convert a coal plant because of technical and economic factors." Gov't Accountability Office, GAO-08-601R, *Implications of Switching from Coal to Natural Gas* at 5 (2008), https://www.gao.gov/new.items/d08601r.pdf.
[11] Draft EA at 19.
[12] BLM, *Final Supplemental Environmental Impact Statement: Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth 2 Development Project* at 311, table 113 (2018), https://eplanning.blm.gov/epl-front-office/projects/nepa/65817/155289/190057/GMT2_Final_SEIS_Volume_1-_Chapters_1-6.pdf (showing "Energy substitutions for GMT2 Project," including increased fuel imports; substitutions between oil, gas, biofuels, coal, nuclear, hydro, solar, wind, imported electricity, and other options; and reduced demand for fuels or electricity).

certain ranges because of reliability and environmental restrictions."[13] That conclusion fails to consider generation shifting; BLM never presents more than a cursory conclusion that switching to non-coal generation is somehow precluded by reliability; and it is entirely unclear how switching away from coal generation would be prevented by "environmental restrictions," seeing as many feasible substitutes would emit lower amounts of air pollution and produce less residual waste, such as coal ash. Indeed, while environmental restrictions on sulfur dioxide pollution have made the low-sulfur Powder River Basin coal valuable to coal consumers,[14] and, therefore, made it so difficult to find "perfect" *coal* substitutes for Powder River Basin coal, there are no environmental restrictions that would prevent substituting coal-fired electricity with less polluting, *non-coal* energy generation options.

Also notably absent from BLM's assessment is any quantitative discussion of the production costs of coal from these Wright Area leases versus other coal options. While the record underlying the 2010 FEIS and records of decision spoke of the leases' "competitive mining costs" and how substitute coal was "more costly,"[15] the draft EA does not analyze quantitatively how the marginal cost of various substitute coal sources would affect demand for those substitute coal sources.

One final point about the limited scope of BLM's energy substitution analysis is its focus on short-run elasticities of demand, even as the draft EA also touts the ability of utilities to adapt their fuel purchasing choices over a ten-year period.[16] Most of the literature BLM relies on reports short-run elasticities of demand. Over time, the substitutability of energy sources will increase, especially as power plants make technological changes and long-term investments, and as consumers respond with greater conservation.[17] What counts as "short" versus "long" for elasticities is often poorly defined, but at least one study that the Bureau of Ocean Energy Management has relied on for its coal elasticities of demand states that "90 percent of the long run response" to a change in the relative price between traditional fuels has occurred by "the eleventh year following the year of a price change,"[18] which suggests that a 10-year period may already be on the longer end of the spectrum for measuring cross-price elasticities of demand. Many models available to BLM (which BLM has refused to use) capture the shift from short-run to long-run elasticities, and provides yet another reason why energy substitution effects are best analyzed through use of a sophisticated model.

Critique of BLM's Citations and Assumptions on Substitution

BLM concludes that for "electric power generation, the consumption of coal is generally relatively unresponsive to prices."[19] Yet BLM's own citations do not support this conclusion. For example, the figures that the Draft EA cites from *AEO2010* show that moving from coal's low-cost case to a high-cost case will shift several percentage points in the relative market shares of coal, natural gas, and

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[13] Draft EA at 31-32.

[14] 2010 FEIS at 4-136 ("PRB coal has competed well in this market due to its low sulfur content, providing a way for electric generators to achieve acid rain reduction requirements. This makes it valuable in lowering sulfur dioxide (SO2) pollution, as well as competitive mining costs when compared to delivered costs of coal from other coal producing areas.").

[15] *Id.*; *see also* Policy Integrity Amicus Brief, WildEarth Guardians v. BLM, No. 15-8109 at p.8 (10th Cir., submitted Feb. 5, 2016), http://policyintegrity.org/documents/10th_Cir_BLM_Brief.pdf (citing the record as having concluded that substitute coal would be "more costly").

[16] Draft EA at 31 ("Electricity generating utility companies continually review current information and data . . . to determine best future options for generation and infrastructure on long time horizons (10 to 20 years) as well as in the short term.").

[17] N. Gregory Mankiw, *Principles of Economics* at 91 (2009, 5th ed.) ("Goods tend to have more elastic demand over longer time horizons."); *id.* at 105-106.

[18] Clifton Jones, *The Role of Biomass in U.S. Industrial Interfuel Substitution*, 69 Energy Policy 122, 124 (2014).

[19] Draft EA at 31.

renewables, and will also change overall electricity demand.[20] While *AEO2010* predicted over 40% coal through year 2035 in its main scenarios,[21] the more recent *AEO2018* shows that natural gas has already overtaken coal, and renewables will overtake coal by year 2035.[22] Indeed, later in the draft EA, BLM admits that recently and increasingly, gas provides baseload generation.[23] The Draft EA also acknowledges that the relative market share of natural gas increased after 2012, when natural gas's relative cost compared to coal dropped: "Another large increase in natural gas market shares occurred in the 2015-2016 timeframe which is when costs for natural gas decreased to the point of being similar to that of coal. The increased sustained production of shale gas and the resulting lower prices has caused utility operators to shift power generation from higher cost coal plants to underutilized existing natural gas burning generating units or to install new natural gas units."[24] All of this strongly suggests that coal consumption is responsive to prices, despite BLM's conclusion to the contrary.

BLM relies extensively on a 2008 GAO report to claim that the "limited ability" to switch "existing coal-fired power plants . . . to a completely different non-coal fuel source" will result in the "continued use of coal for electricity generation."[25] However, GAO's conclusions from 2008 turned on assumptions about "high natural gas prices,"[26] which no longer hold true after the shale gas boom lowered gas's price. More importantly, the GAO report advised that, rather than converting individual coal plants, "it would be more feasible and cost-effective to construct new natural gas units or dispatch excess capacity at existing natural gas units,"[27] because "EIA data describing the average capacity factors of different generation options demonstrate that significant excess capacity exists at natural-gas-fired plants."[28] BLM misses the most relevant point from the 2008 GAO report, and the agency is far too quick to dismiss the potential for coal-to-gas generation shifting.

In fact, the draft EA cites a 2010 Congressional Research Service report authored by Kaplan for the proposition that excess gas capacity "could potentially displace 32 percent of coal generation."[29] Nevertheless, BLM uses Kaplan instead to conclude that such switching is "improbable" due to various factors that the draft EA lists without ever really explaining.[30] BLM grossly misstates Kaplan's thesis: the Congressional Research Service report never suggests that generation shifting is "improbable," but rather only cautions that "it is unlikely that th[e] maximum [potential of coal-to-gas displacement] could actually be achieved."[31] Even this word of caution should now be tempered by more recent evidence. Kaplan's work was based on, among other factors, the relative fuel prices observed and forecasted through the year 2009,[32] which again largely predated the drop in natural gas prices due to the shale

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[20] Draft EA at 14.
[21] Draft EA at 12.
[22] U.S. Energy Info. Admin., *Annual Energy Outlook 2018* at 84 (2018).
[23] Draft EA at 21.
[24] Draft EA at 23-24.
[25] Draft EA at 18.
[26] GAO, *supra*, at 5.
[27] *Id.* at 5-6.
[28] *Id.* at 16.
[29] Draft EA at 19. *See also* EIA, *Fuel Competition in Power Generation and Elasticities of Subsitution* at 5 (2012) [hereinafter 2012 EIA], summarizing Kaplan: "A report by the Congressional Research Service found that much of the natural gas combined cycle capacity in the United States has a relatively low utilization rate and could potentially be used in place of steam coal capacity to fulfill baseload power demand."
[30] Draft EA at 19.
[31] Cong. Res. Serv., CRS-R41027, *Displacing Coal with Generation from Existing Natural Gas-Fired Power Plants* at 9 (2010), https://www.everycrsreport.com/files/20100119_R41027_1b6446fe90faf3170f735b407a709c00c3e62ae9.pdf.
[32] R41027 was published in January 2010.

boom. Indeed, evidence contained in the draft EA and in *AEO2018* show that natural gas has taken over market share from coal as its relative price has dropped.

BLM next turns to "several studies" to "contradict" the idea that "leasing the four tracts . . . would cause coal prices to drop and therefore increase coal consumption." Those studies are: Dahl and Ko 1998; Ko and Dahl 2001; Tuthill 2008; EIA 2012; and Elbakidze and Zaynutdinaova 2016.[33] Among the problems with these various studies are: a focus on short-run rather than long-run elasticity; a focus only on substitution between fossil fuels and not between coal and renewables or a reduction in overall demand; a reliance on now-outdated data; and a reliance on overlapping work and on un-peer-reviewed work cited without appropriate caveats. The following few paragraphs examines each study in turn.

BLM claims that the U.S. Energy Information Administration's 2012 report on *Fuel Competition in Power Generation and Elasticities of Substitution* "supports the inelastic substitution of coal in electricity generation due to power plants being designed to operate with a particular fuel . . . as well as needing to operate within certain ranges for reliability and to comply with environmental restrictions."[34] In fact, the study's executive summary paints a much different and much rosier picture of coal-to-gas substitution:

> [A] sudden increase in spot prices for Appalachian coal during 2008 has been followed by a sustained decline in the delivered cost of natural gas, both of which have substantially shifted the dispatch pattern for baseload generation in some parts of the country, favoring natural gas-fired united over coal-fired units. . . . The model results indicate that for the United States as a whole, a 10-percent increase in the ratio of the delivered fuel price of coal to the delivered price of natural gas leads to a 1.4-percent increase in the use of natural gas relative to coal.[35]

In short, the fact that EIA found *some* degree of inelasticity of demand does not mean that there will be no substitution from coal to other energy sources; perfect elasticity is not required for some significant substitution to occur. Furthermore, contrary to BLM's conclusion that coal is the most own-price inelastic of the fossil fuels, EIA shows that own-price elasticities vary by region of the country, and "in some regions coal is more responsive to price than natural gas."[36]

Even if BLM's gloomier read of the 2012 EIA study were correct (and it is not), there are several important limitations of the 2012 EIA study.[37] The report looks only at "competition between coal, natural gas and petroleum,"[38] and not other energy substitute options. In fact, while EIA's model assumes that the price of "nuclear, hydropower, and other renewable energy sources" will "have minimal impact on generators' choice of fossil fuel,"[39] the report readily acknowledges, for example, that "the availability of hydropower in any given year can have a tremendous impact on the mix of fuels" in the western U.S. region.[40] The report draws only on data through the year 2010,[41] when relative fuel prices were just beginning to change. The report focuses on a relatively shorter-run period of just

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[33] Draft EA at 19.

[34] Draft EA at 19. The 2012 EIA report also lists reliability and environmental restrictions as likely reasons for some of the inelasticity observed, at page 11, though does not explain any further.

[35] 2012 EIA, *supra*, at 1; *see also id.* at 4 ("Although various factors contributed to this significant year-over-year shift in the generation fuel mix, the relative change in fuel prices was likely one of the primary drivers.").

[36] *Id.* at 12.

[37] The study also identifies as a limitation its reliance on data measured in BTUs, rather than in dollars per MWh, which would "account for relative technological efficiencies and heat rates between generators that use different types of fuel." *Id.* at 13.

[38] *Id.* at 1.

[39] *Id.* at 7.

[40] *Id.* at 11.

[41] *Id.* at 1 ("during the period of 2005-2010"); *but see id.* at 4 ("This shift from coal to natural gas in the southeast has continued into 2010, 2011, and 2012.").

six years, from 2005 to 2010.[42] Because "the capacity mix" in the data "did not vary much during the sample period," the model ran into difficulties with its "attempt[] to account for changes in capacity over the long-run."[43] The report explicitly says that it is "present[ing] the *short-run estimates* of regional cross price elasticities of substitution between coal, natural gas, and oil."[44] Over a longer period of time, even greater substitution effects would be likely. If a longer-run study, based on more recent data and accounting for renewable energy, were run today, the results could be very different. Yet to repeat: even with all its limitations, the conclusions of the 2012 EIA report in no way support BLM's assumption that there will be no meaningful substitution away from coal under the no action alternative.

Turning to the two work by Ko and Dahl (1998 and 2001), BLM cites the latter study as concluding that coal's price inelasticity is so severe that coal's market share changes almost without regard to pricing.[45] BLM seems to have cherry-picked its quotations here. While true that Ko and Dahl report that "Since coal has tended to become less responsive to price, competitive pricing will not prevent coal from losing market share," the article immediately followed that statement with a second sentence: "This paper conjectures that the shifts from coal to gas will increase if restructuring results in more competition in electricity generation."[46] BLM seems to have ignored the importance of this second sentence, especially given the changes in the structure and competition of electricity markets since 1993, which was the year that Ko and Dahl's data came from.[47] Ko and Dahl actually find a larger change in gas demand for a given change in coal price than other literature they review had found, and they find a larger elasticity in those utilities that burn only coal and gas versus in those utilities that burn coal, oil, and gas.[48] Ultimately, Ko and Dahl find "fuel choice to show a considerable amount of price responsiveness."[49] Ko and Dahl's work also has important limitations, including its age (it is based on 1993 data, which is before not just the shale gas boom, but also key changes in the electricity market's structure), its short-run estimates (it is based only on monthly data from 1993),[50] and its focus on fossil fuels to the exclusion of renewables or changes in electricity demand. That said, neither Ko and Dahl's work nor its summary of the literature supports BLM's false conclusion that there would be no meaningful substitution away from coal under the no action alternative.

As for Tuthill (2008), it has been published only as a white paper from the Oxford Institute for Energy Studies.[51] Though such literature that has not undergone peer review publication certainly can be considered and given appropriate weight based on its quality and relevance, it deserves no more weight than any other comparable unpublished work, and perhaps deserves less weight than work that has undergone peer review. Tuthill uses data from 1990-2004 and conducts a "short run analysis" of fuel

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[42] *Id.* at 1.
[43] *Id.* at 13.
[44] *Id.* at 10.
[45] Draft EA at 19 ("Ko and Dahl (2001) concluded that due to coal's price inelasticity, that even with competitive pricing coal could continue to lose market shares in the electric power sector.").
[46] James Ko & Carol Dahl, *Interfuel Substitution in U.S. Electricity Generation*, 33 Applied Econ. 1833, 1842 (2001).
[47] *Id.* at 1839 & n.4 (reporting results from 1993 data, and detailing source of 1993 database).
[48] *Id.* at 1841 (table 7, showing an Egc of 2.3 versus 1.54 depending on whether the utility has two or three fuels, and showing comparisons with other studies); *see also id.* at 1834-38 (summarizing literature).
[49] *Id.* at 1833.
[50] *See id.* at 1837 (explaining that because of "difficulties," the paper does not capture long-run effects directly, but rather hopes that it can "rel[y] on the cross sectional aspects of the data to pick up long run effects"). Still, the short timespan for analysis (just 1993) would likely complicate even such an imperfect proxy.
[51] Lindsay Tuthill, *Interfuel Substitution and Technical Change in the US Electricity Generating Industriy under the Tradable Sulphur Allowance Scheme: 1990-2004* (2008, Oxford Inst. For Energy Studies), http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.398.1631&rep=rep1&type=pdf. *See* page ii, confirming the paper has not undergone formal peer review by the Oxford Institute or elsewhere: "The contents of this paper are the author's sole responsibility. They do not necessarily represent the views of the Oxford Institute for Energy Studies or any of its Members."

substitution.[52] The age of the study limits its usefulness. For example, it cites a 1998 article for the proposition that "renewable fuels (solar, wind, biomass, etc.)" have costs that are "too high relative to those of fossil fuel generation for a firm to choose renewable generation in the absence of environmental regulation."[53] To the extent this ever was true, it is certainly not true now, with *AEO2018* projecting renewables will overtake coal in market share by 2035.[54] Nevertheless, while BLM cites Tuthill for coal's seemingly low own-price and cross-price elasticities,[55] Tuthill ultimately concludes instead that: "Because coal can be stored and combusted at a later date, our elasticities involving coal are, if anything, possibly under-estimates of actual demand and substitution elasticities. This serves as further support for the argument that *short run fuel substitution does, indeed, occur in the industry*."[56] Once again, this citation simply does not support BLM's conclusion that, under the no action alternative, no substitution away from coal would occur.

Finally, BLM cites Elbakidze and Zaynutdinaova (2016) for the proposition that "even if price favors substitution to a non-coal fuel, that utilities relying on coal for electricity generation have limited ability to substitute non-coal fuels."[57] While the paper does indeed make that claim, it is based partly on the 2012 EIA study that BLM already cited,[58] and, moreover, BLM is ignoring several other conclusions from the paper that do not support the draft EA's claims. First, a note about the quality of this presentation paper selected for the Agricultural & Applied Economics Association meeting.[59] Though writing quality is certainly not determinative of the quality of the underlying economic analysis, some of the typographical errors in this work are so severe—such as spelling Rhode Island as "Road Island"[60]—that the writing quality does raise questions about what else may be wrong and whether there are other mistakes in the analysis that a peer review publication process would uncover. Putting those concerns aside, much of the paper goes against BLM's conclusions. The paper begins with the understanding that the electric power sector has "the ability . . . to respond to changes in . . . relative fuel prices."[61] The paper summarizes the past literature as finding that "natural gas was a substitute input for coal . . . to various degrees across the seven electricity generation regions in the US,"[62] and as showing that coal consumption can increase due to "factors like decrease in railroad freight rates and power plants' elastic demand for coal."[63] The paper notes that the decline in coal consumption since 2008 is "not surprising" given changes in relative costs of coal to gas.[64] As for the paper's own results, except for in three states (Iowa, Nebraska, and New Hampshire), the paper finds that "natural gas and coal appear to be substitutes in all states across all three sample periods."[65] The paper also has some of the same

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[52] *Id.* at 1; *id.* at 2 ("The goal of this research is therefore to enhance understanding of short run interfuel substitution in the US electricity generating industry.").
[53] *Id.* at 9.
[54] EIA, AEO2018 at 90.
[55] Draft EA at 19.
[56] Tuthill, *supra*, at 67 (emphasis added).
[57] Draft EA at 19.
[58] BLM may have been referring to this sentence from the paper: "States which depend heavily on coal for electricity generation have limited ability to substitute fuels when prices favor substitution (Gao et al. 2012, EIA 2012)." Levan Elbakidze & Gulnara Zaynutdinova, *Substitution in Electricity Generation: A State Level Analysis of Structural Changes from Hydraulic Fracturing Technology* at 13 (2016), https://ageconsearch.umn.edu/bitstream/235780/2/paper.pdf. To the extent that sentence draws from 2012 EIA, this separate, unpublished paper from Elbakidze and Zaynutdinaova hardly provides additional support for BLM's justification.
[59] *Id.* at 1 ("Selected Paper prepared for presentation").
[60] *Id.* at 8.
[61] *Id.* at 2.
[62] *Id.* at 3 (citing Gao et al. 2013).
[63] *Id.* at 4 (citing Gerking & Hamilton 2008).
[64] *Id.* at 4 (citing Van Kooten et al. 2012).
[65] *Id.* at 11.

limitations we have seen before. For example, it specifically "defer[s] examination of . . . renewable sources."[66]

Thus, even BLM's own citations do not support its claims about energy substitutions.

Two of BLM's other arguments merit some additional discussion before turning to the important literature on energy substitution that BLM has ignored.

BLM relies on coal mines' sub-100% utilization rates to support the idea that other "coal mines could increase production" to substitute "if electricity generation demand warranted."[67] But the question is not whether other coal mines *could* increase production; rather the question is whether they could increase production *at the same marginal cost of extraction and delivery* such that neither market price nor demand nor emissions (upstream or downstream) would change. BLM has not even asked let alone answered that question. Furthermore, BLM fails to look beyond the simple percentage figure in the mine utilization rate to ask *why* these other mines are not fully utilized. A likely explanation for the sub-100% utilization rate of other mines is that the remaining coal at those mines is not currently competitive given other prices in the fuel and electricity markets. BLM does not explain why this currently uncompetitive coal would suddenly become competitive and could magically substitute perfectly for forgone Wright Area coal under the no action alternative.

BLM also assumes that because there would be a 10-year lead before these mines depleted their existing resources prior to the lease extensions,[68] electric utility customers would have plenty of time to locate other substitute sources for their coal.[69] However, time to search for substitute coal does not guarantee that customers would be able to find identical substitute coal at the same marginal private and social cost. For example, Powder River Basin coal is valued by coal consumers for its low sulfur content, but that feature will make it more challenging to find other coal that perfectly substitutes. Even given a 10-year lead period, overall coal demand and emissions—both upstream and downstream—could still change under the no action alternative compared to the leasing alternative. More importantly, those same ten years would also give utilities plenty of time to switch away from coal. Again, almost all the work that BLM relies on for its arguments about substitutability looks at short-run elasticities and also ignores renewable energy, technological innovation, and conservation; in the long run, goods become much more substitutable.

Literature Ignored by BLM

Of the considerable literature on energy substitution analysis that BLM ignores, the most notable omission is the work on energy substitution that the Department of the Interior has relied on elsewhere. Specifically, the Bureau of Ocean Energy Management has developed a model, MarketSim, to study consumer surplus and energy substitutes for its oil and gas leases, by modeling not just oil and gas, but coal, nuclear, renewables, electricity imports, and electricity demand.[70] For its assumptions of "long-run elasticities,"[71] BOEM selected estimates from the literature based on methodological quality, data richness, and statistical significance.[72] For its estimates of elasticity of coal, MarketSim uses Jones

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[66] *Id.* at 4.
[67] Draft EA at 16.
[68] Draft EA at 17.
[69] Draft EA at 18 (assuming that utilities would have 10 years to adapt).
[70] Burea of Ocean Energy Mgmt., BOEM 2015-054, *Consumer Surplus and Energy Substitutes for OCS Oil and Gas Production: The 2015 Revised Market Simulation Model (MarketSim): Model Description* (2015).
[71] *Id.* at 2.
[72] *Id.* at 16.

(2014), which studied long-run inter-fuel substitution among coal, oil, gas, electricity, and biomass using EIA data from 1960-2011.[73] In its draft EA, BLM never explains why it did not consult MarketSim or Jones (2014) for evidence of demand elasticities.

Jones (2014) estimates both short-run and long-run elasticities, and finds that about 17% of the eventual substitution effect occurs in the first year, with 50% of the total substitution occurring by about the third year, and 90% of the total substitution occurring by the eleventh year;[74] "long run elasticities are almost six times larger than their short run counterparts."[75] In other words, the time horizon matters, and the total substitution effect increases with time. The long-run own-price elasticity for coal "is well above unity," meaning that consumers "can significantly reduce their coal usage and switch to one of the other three fuels when coal prices rise."[76] Jones also finds that, even in the short run, coal can be substituted by both natural gas and electricity, as well as by oil, and in fact "the strongest channels of substitution are from coal to electricity, oil or natural gas."[77]

(Jones is further useful because, despite BLM's simplifying assumption that all PRB coal will be combusted at power plants,[78] as BLM acknowledges, around 7% of coal is in fact combusted outside the electric power sector in other industrial, commercial, and institutional applications.[79])

Other useful literature on energy substitution that BLM's draft EA does not mention includes:

- Gerking and Hamilton (2008) find that when rail transportation costs for Powder River Basin coal dropped, "Given the estimated price elasticity of demand for PRB coal of -3.79, this change in relative prices suggests that power plant operators substituted heavily in the favor of PRB coal and away from the use of other alternative fuels for the generation of electric power throughout the market area. This substitution could have occurred, for example, through utilization of coal mixtures tilted toward heavier use of PRB coal and using PRB coal-fired generating units more intensively. . . . [T]he decline in both the mine-mouth price of PRB coal together with the decline in railroad freight rates induced power plant operators to substitute PRB coal for high-sulfur coal as well as *for other fuels because demand for PRB coal is price elastic*."[80] Conversely, therefore, if the marginal costs of PRB coal were to increase—for example, under the no leasing alternative—power plants might substitute "heavily" away from PRB coal, either by using their coal-fired generator less intensively or by switching to coal substitutes with lower transportation costs and therefore lower upstream emissions.
- Nate Blair et al. (2006) concludes that "higher coal prices would dramatically increase" use of renewable wind energy.[81]

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[73] *Id.* at 16-17. Note that while Jones (2014) studied the industrial sector, these estimates are the only demand elasticity figures for coal given by MarketSim (expect for the assumption that for exports coal has an own-price demand elasticity of -1.00), indicating that BOEM applied the elasticities to other coal uses, including electricity. See *Id.* at 17 note 7, applying the industrial sector value from Jones (2014) to the category "Coal—Other."

[74] Clifton Jones, *The Role of Biomass in US Industrial Interfuel Substitution*, 69 Energy Pol'y 122, 124 (2014).

[75] *Id.* at 125.

[76] *Id.* at 125.

[77] *Id.* at 125.

[78] Draft EA at 9.

[79] Draft EA at 10 (in 2008, 93% was combusted at power plants, leaving 7% combusted at other applications); *see also* https://www.eia.gov/coal/production/quarterly/pdf/t32p01p1.pdf (showing similar percentages through year 2017).

[80] Shelby Gerking & Stephen Hamilton, *What Explains the Increased Utilization of Powder River Basin Coal in Electric Power Generation?*, 90 Am. J. Ag. Econ. 933, 948-49 (2008) (emphasis added).

[81] Nate Blair et al., *Long-Term National Impacts of State-Level Policies* 8 (Nat'l Renewable Energy Lab. Conf. Paper 620-40105, June 2006), https://www.nrel.gov/docs/fy06osti/40105.pdf.

- Lu et al. (2012) use a regional econometric model and find that over half of the decrease in emissions from the power sector from 2008 to 2009 are attributed to reduction in relative gas price and the resulting switch away from coal-fired generation (with the rest of emissions reductions mostly due to the economic downturn).[82]
- Knittel et al. (2015) focused on duel-fuel plants that burned both coal and gas at some point between 2003 and 2012, and found that, due to "highly significant" fuel price coefficients, the drop in price of natural gas that occurred between June 2008 and the end of 2012 led to a 19% decrease in carbon dioxide emissions in investor-owned utilities in restructured markets, and a 33% reduction at investor-owned utilities in traditional electricity markets.[83]
- Linn et al., (2014) finds that higher coal prices cause a decrease in heat-rates as well as a significant effect on utilization.[84]
- Fell and Kaffine (2018) undertake a "nuanced examination of the intensive margin response of coal-fired plants to changing relative fuel prices and wind generation," and find that the joint impact of low natural gas prices and high wind generation levels is much larger than the independent impact of each on the reduction in coal-fired generation.[85] This underscores the need for elasticity studies and substitution analyses to consider not just fossil fuel substitutes, but all energy substitute options together.
- Collier & Venables (2014): "The key point is the existence of demand side substitutes for coal, in the form of oil, gas and renewables; the long run price elasticity of demand for a single fuel source (coal) is therefore likely to be high, even if the elasticity of demand for energy as a whole is low."[86]

The above examples are illustrative of the other literature available on this subject. BLM should more thoroughly review the relevant literature. But the clear upshot from these examples and from the literature that BLM itself cites is that coal's own-price and cross-price elasticities in no way support BLM's conclusion that there will be effectively zero substitution away from coal under the no action alternative.

Failure to Consider Counterfactuals

In several conclusions, BLM seems to conflate correlation with causation and ignores the need to compare against a counterfactual baseline scenario.

BLM concludes that because "in 2011 and 2012 when three of the four leases of interest in this EA were sold by BLM, overall coal production was decreasing in the U.S. This indicates that the sale of the three leases did not increase coal production nor coal consumption for electricity generation."[87] That is a

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[82] Lu, X., Salovaara, J. & McElroy, M.B., 2012. Implications of the Recent Reductions in Natural Gas Prices for Emissions of CO2 from the US Power Sector. Environmental Science & Technology, 46(5), pp.3014–3021.
[83] Knittel, C.R., K. Metaxoglou, and A. Trindade (2015), "Natural Gas Prices and Coal Displacement: Evidence from Electricity Markets," MIT-CEEPR Working Papers, 2015- 013, http://ceepr.mit.edu/files/papers/2015-013.pdf.
[84] Linn, J., E. Mastrangelo, and D. Burtraw (2014). Regulating greenhouse gases from coal power plants under the Clean Air Act. Journal of the Association of Environmental and Resource Economists 1 (1), 97–134.
[85] Harrison Fell & Daniel Kaffine, *The Fall of Coal: Joint Impacts of Fuel Prices and Renewables on Generation and Emissions*, 10 Am. Econ. J.: Econ. Pol'y 90 (2018).
[86] Paul Collier & Anthony Venables, *Closing Coal: Economic and Moral Incentives* (2014, Grantham Research Institute Working Paper No. 157), http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2014/05/Closing-Coal-economic-and-moral-incentives.pdf.
[87] Draft EA at 26.

spurious conclusion to draw from that data. Perhaps coal production and consumption would have decreased even more but-for those lease sales. BLM does not bother to compare its data against a counterfactual baseline in which the lease sales did not happen. BLM makes the same mistakes about production at these specific mines, concluding that because coal production decreased at these mines since 2014, the approval of the new tracts "has not caused an increase in production" at these specific mines.[88] Yet, depending on the marginal cost of extraction at different tracts, perhaps production at these specific mines would have decreased even more but-for the extensions to the new tracts. In addition, it is not clear that BLM has fully considered the potential time-lag between when a lease-sale took place and actual production from the tract.

Similarly, BLM concludes that "The fact that Wyoming coal prices slightly increased after 2011 and then tended to remain stable through 2016 after the sale and leasing of three of the four tracts, counters the idea that leasing the tracts would decrease price and thus increase consumption."[89] Again, perhaps the price would have increased and consumption would have decreased even more but-for those lease sales. BLM does not compare against a counterfactual baseline.

Finally, BLM concludes that since "overall electricity generation related CO_2 emissions decreased by 24 percent from 2005 to 2016," it must be true that "offering the leases did not increase nationwide CO_2 emissions."[90] Yet once again, that is a spurious conclusion. Perhaps carbon dioxide emissions would have decreased even more over the period but-for these very leases. Looking solely at a decline in nationwide emissions also ignores the emissions from coal exports over that same time period. If new coal leases go into production even as coal exports increase, it is possible for U.S. emissions to drop even as worldwide greenhouse gas emissions increase.[91]

BLM never does the important analytical work at the very heart of the NEPA process: comparing the environmental state of the world in which the proposed action takes place against a no action scenario. This is precisely why using appropriate models is so valuable, because models can answer these very questions that BLM has ignored by failing to consider counterfactual scenarios.

U.S. Consumption versus Exports

BLM's citation to mine utilization rates, to support its argument that other coal sources are available as substitutes, reveals that BLM's analysis focuses on U.S. consumption and ignores coal exports. For example, BLM concludes that because "the capacity of U.S. coal mines was 1,068.0 million short tons," and "U.S. coal demand is anticipated to average around 750 million short tons per year," then "that equates to an overall U.S. mine utilization rate of approximately 70.2 percent."[92] Yet while it is true that 750/1068 = 70.2%, that figure clearly reflects only "*U.S.* coal demand." At least this portion of the analysis, and perhaps most of the draft EA, thus ignores both current and projected rates of coal exports, ignores how these lease extensions could affect total coal exports, and so ignores the resulting greenhouse gas emissions from changes in total coal exports. Greenhouse gases are, of course, global

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[88] Draft EA at 29.
[89] Draft EA at 27.
[90] Draft EA at 32.
[91] *See* Knittel, C.R., K. Metaxoglou, and A. Trindade (2016), "Are We Fracked? The Impact of Falling Gas Prices and the Implications for Coal-to-Gas Switching and Carbon Emissions," Oxford Review of Economic Policy, 32: 241-259 (finding that a drop in natural gas prices alone may have an ambiguous effect on global carbon emissions, because increased U.S. coal exports partly offset the coal-to-gas switch in the U.S. electric power sector, but arguing that a more meaningful cap on coal use can achieve carbon reductions).
[92] Draft EA at 30.

pollutants that cause the same climate damages with the same impacts to U.S. interests regardless of where in the world they are emitted.

Modeling Energy Substitution Effects

Ultimately, BLM relies on assumptions and hunches to conclude that "since so many other factors . . . contribute to the fuel sources used for electricity generation," not leasing these tracts "does not mean coal consumption by the electric power sector would be reduced."[93] The presence of multiple competing factors is precisely why analysts should employ a model rather than rely on guesses.

BLM offers several reasons why it claims it cannot use NEMS to model the energy substitution effects; none of these reasons holds up to scrutiny.

- BLM claims that EIA does not make available those parts of the model linked to expensive proprietary software and data unless separate licenses are obtained.[94] BLM does not explain whether or why those parts of the model would be essential to using NEMS here, nor does it examine the cost of obtaining those licenses. Meanwhile, EIA provides detailed instructions on its website on how to obtain those licenses.[95]
- BLM cites an EIA website for the proposition that "most people who have requested NEMS in the past have found out that it was too difficult or rigid to use."[96] Yet BLM omits the rest of the context for that quote, which gives as "example" of those requesters who have found NEMS not to be helpful "state-level analysis" and "application to other countries."[97] BLM is clearly neither seeking to model foreign or state-only effects. EIA also explains that several "organizations" have successfully used the model, and that "many" use the model to pull its "data" and "source code."[98] Indeed, it is telling that when the U.S. Court of Appeals for the Eighth Circuit found fault with the U.S. Surface Transportation Board's failure to consider energy substitution effects, the Board's subsequent use of NEMS to model the effects was upheld as reasonable.[99]
- The use of NEMS by other federal agencies like the Surface Transportation Board is notably absent from BLM's list of organizations that have run the model,[100] and the successful use of NEMS by other federal agencies belies BLM's claim that NEMS cannot be run without EIA making modifications for which EIA does not have a budget.[101]
- BLM claims that NEMS cannot "approximate the more localized effects for a specific coal lease since the Coal Production Schedule does not disaggregate its 14 supply regions into smaller areas or leases."[102] Yet the coal module's supply regions do already include both a Wyoming Northern PRB region and a Wyoming Southern PRB region (which are disaggregated from three other Northern Great Plains regions).[103] BLM does not explain why that level of regional specification would be

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[93] Draft EA at 30.
[94] Draft EA at 42.
[95] https://www.eia.gov/outlooks/aeo/info_nems_archive.php
[96] Draft EA at 42 (citing https://www.eia.gov/outlooks/aeo/info_nems_archive.php).
[97] https://www.eia.gov/outlooks/aeo/info_nems_archive.php
[98] https://www.eia.gov/outlooks/aeo/info_nems_archive.php.
[99] Mid States Coal. for Progress v. Surface Transp. Bd., 345 F.3d 520, 549-50 (8th Cir. 2003); Mayo Found. v. Surface Transp. Bd., 472 F.3d 545, 555 (8th Cir. 2006).
[100] Draft EA at 42-43.
[101] Draft EA at 43.
[102] Draft EA at 43.
[103] EIA, *Coal Market Module of the National Energy Modeling System: Model Documentation 2018* at 2, 5, table 1.1 (2018) https://www.eia.gov/outlooks/aeo/nems/documentation/coal/pdf/m060(2018).pdf.

insufficient for the purposes of assessing the energy substitution effects of these very large Powder River Basin leases. (Note also that it is unclear why BLM cites to a 2010 version of the Coal Market Module documentation instead of the 2018 version.)

- BLM suggests that perhaps the "great[est] limitation" is that NEMS "does not distinguish between federally-administered coal versus state administered and private coal leases."[104] It is not immediately clear why, if true, this limitation poses such a problem for BLM. The substitutability of the coal from these lease tracts against other coal sources, other energy sources, or energy demand reductions will depend on relative price, and not on whether the substitute coal comes from federal, state, or private leases. The difference between federal, state, and private leases would matter for recalculating economic benefits in terms of substitute royalty and revenue effects, but BLM has yet to make any effort toward such a recalculation of benefits in the draft EA (see the section below on the need to recalculate economic benefits). And even if a model could not generate such results on economic benefits, the recalculation could be approximated through use of general data about relative shares of federal versus non-federal leases nationwide.
- BLM says that NEMS is too costly to run for "smaller individual coal leasing projects."[105] Calling a lease extension that could produce up to 230 million tons of coal per year—more than twenty percent of the total U.S. coal used for electricity in 2010—a "smaller individual coal leas[e]" defies logic and the basic dictionary definition of "small."
- In a footnote, BLM implies that NEMS should not be used due to transparency as well as complexity concerns.[106] Yet BLM fails to assess other modeling options that might be more transparent and less complex, as discussed in more detail below.

Ultimately, BLM concludes that "NEMS is too cumbersome and costly" to use here.[107] Yet 'cumbersome and costly' is not the standard under NEPA regulations for when agencies are allowed to forgo production of essential information. 40 C.F.R. § 1502.22(a) provides that "If the incomplete information relevant to reasonably foreseeable significant adverse impacts is *essential to a reasoned choice* among alternatives and the overall costs of obtaining it *are not exorbitant*, the agency shall include the information in the environmental impact statement."[108] BLM has not explained why the missing information on energy substitution that a model could generate is not "essential to a reasoned choice"—and given the Tenth Circuit's ruling, it would likely be hard to do so. Nor has BLM explained why the costs of running the model are "exorbitant." This is especially true since BLM has only looked at a single modeling option, when other options may be less costly. Moreoever, this is hardly the only time when access to a model of the energy economy will be useful or necessary to BLM's activities. The costs of licensing and operating the model should be weighed against the long-term benefits of having acces to and experience with this model for future analyses of leases, regulations, and other policy decisions. Compared to all the revenue that BLM expects these kinds of leases will bring to the federal government, the cost of licensing and operating a model that will help the agency ensure its actions are really increasing the net public welfare should seem eminently reasonable.

BLM fails entirely to consider other modeling options besides NEMS. For example, in addition to NEMS, the Surface Transportation Board has also used ICF International's Integrated Planning Model "to assess

[104] Draft EA at 43.
[105] Draft EA at 43.
[106] Draft EA at 43, n.32.
[107] Draft EA at 43.
[108] 40 C.F.R. § 1502.22(a) (emphasis added).

coal production . . . and distribution patterns."[109] Most importantly, the Department of the Interior has already taken some inputs from NEMS, simplified the details, and developed its own model, MarketSim. Though developed by and primarily used by the Bureau of Ocean Energy Management going back decades,[110] BLM itself has also now used MarketSim in its *Draft Supplemental EIS* for the *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth 2 Development Project*.[111]

In 2016, the Institute for Policy Integrity submitted to BLM a detailed report on *The Bureau of Land Management's Modeling Choice for the Federal Coal Programmatic Review*.[112] The report reviewed the suitability of NEMS, MarketSim, and IPM for analyzing, among other things, energy substitution effects. The report highlights the pros and cons of each model, but ultimately concludes that any model is likely a better choice than no model,[113] that models like MarketSim can be modified to meet BLM's needs, and that all of the available models can generate at least some highly useful information to analyze BLM coal leases.[114]

Even if modeling were somehow truly too exorbitant and infeasible (and again, it is not), it still would not follow that BLM's perfect substitution assumption would be the best default position. Instead, a no-substitution assumption would at least provide a useful upper-bound estimate of greenhouse gas emissions and would be consistent with how BLM currently calculates economic benefits (see below). The Federal Energy Regulatory Commission, for example, has used both gross downstream emission estimates and "full burn" estimates in its environmental impact statements to supplement its rough attempts to estimate net post-substitution downstream emissions.[115] By comparison, perfect substitution provides no useful environmental information under NEPA and, as the Tenth Circuit ruled, contradicts basic principles of supply and demand. Again, BLM's best option is to model the energy substitution effects. Only if modeling is truly too exorbitant and infeasible should BLM then apply a default assumption of no substitution.

Upstream and Downstream Consequences of Coal-Coal Substitutes

Even to the extent one source of coal can substitute for another source of coal, the greenhouse gas consequences are not necessarily identical. BLM fails to assess the upstream or downstream

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[109] Surface Transp. Bd., *Draft Environmental Impact Statement for the Tongue River Railraod—Appendix C: Coal Production and Markets* at C.1-9 (2015), https://www.stb.gov/decisions/readingroom.nsf/UNID/E7DE39D1F6FD4A9A85257E2A0049104D/$file/AppC_CoalProduction.pdf.

[110] Bureau of Ocean Energy Mgmt., Dep't of Interior, *Draft Environmental Impact Statement: Liberty Development Project* at 4-50 (Aug. 2017); *see also* Bureau of Ocean Energy Mgmt, *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program* 2012-2017, 110 (2012) (calculating that if the offshore acreage were not leased, 6% of the forgone oil and gas would be replaced by energy conservation). *See generally* Amicus Brief of the Institute for Policy Integrity, WildEarth Guardians v. BLM, No. 15-8109, at pp.19-24 (10th Cir., submitted Feb. 5, 2016), http://policyintegrity.org/documents/10th_Cir_BLM_Brief.pdf (detailing the history of BOEM's use of MarketSim).

[111] BLM, *Draft Supplemental EIS: Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth 2 Development Project, Appendix H* (2018), https://eplanning.blm.gov/epl-frontoffice/projects/nepa/65817/127980/155727/Appendix_H-_BOEM_Greenhouse_Gas_Lifecycle_Model_Methodology.pdf.

[112] Peter Howard, *The Bureau of Land Management's Modeling Choices for the Federal Coal Programmatic Review* (Policy Integrity 2016), https://policyintegrity.org/files/publications/BLM_Model_Choice.pdf

[113] *Id.* at 5 ("If no model meets all criteria, a model should be selected that meets the minimum criteria or that can be modified to meet the minimum criteria.").

[114] *Id.* at 12.

[115] *See* FERC, *Southeast Market Pipelines Project: Final Supplemental Environmental Impact Statement*, FERC EIS 0279F at 5 (2018), https://www.ferc.gov/industries/gas/enviro/eis/2018/02-05-18-FEIS/02-05-18-FEIS.pdf.

consequences of coal-coal substitutions, and instead assumes with no explanation that the relative greenhouse gas emissions would be "not significantly" different.[116]

In terms of downstream emissions, the 2010 FEIS explained that the tracts to be leased are part of the Fort Union Formation, which consists of subbituminous coal.[117] According to EPA's greenhouse gas emission factors for various types of coal, sub-bituminous coal generally emits slightly more carbon dioxide per Btu than the average mixture of coal combusted in the U.S. electric power sector (97.17 kg CO2 per mmBtu for sub-bituminous, versus 95.52 kg CO2 per mmBtu for mixed electric power sector coal).[118] Therefore, in the no action alternative, if sources of coal outside the Powder River Basin substituted for these Powder River Basin tracts, total downstream greenhouse gas emissions per mmBtu could decrease. BLM has failed to analyze whether this difference is significant.

Similarly, upstream emissions and other upstream externalities can differ depending on the source of coal. Besides methane emitted from the coal extraction process, a major source of upstream emissions from coal mining is the transportation of coal from the mine to the consumer. Travel distances for coal from the Powder River Basin are higher than the average travel distance for coal in the United States, and travel costs increase with distance travel.[119] Per metric ton of Wyoming coal mined, the externality costs of greenhouse gas emissions from train transport are nearly twice as high as the externality costs from mine methane—and that does not even count all the other externalities from coal transport, including fatalities from train accidents, health and environmental effects from other air pollution, and congestion and noise from trains.[120] Under the no action alternative, substitute sources of coal will have different, and could have significantly fewer, climate consequences and other externalities. BLM has failed to analyze whether these upstream differences are significant.

Use the Social Cost of Greenhouse Gas Metrics

As explained in a separate set of comments submitted jointly by the Institute for Policy Intergrity and several other organizations, once BLM has properly analyzed the difference in upstream and downstream emissions from leasing versus the no action alternative, to assess whether the environmental consequences are "consequential,"[121] BLM should monetize the real-world climate effects of emissions using the social cost of greenhouse gas metrics.

Recalculate the Assumed "Economic Benefits" of Leasing

BLM states that the entirety of the "supply shortfall" resulting under the no action alternative could have been met by "[n]ew and existing mines producing non-federal coal."[122] The reason BLM gives for assuming that the entirety of the substitution would come from non-federal coal is because "federally-

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[116] Draft EA at 32.
[117] 2010 FEIS at 3-19.
[118] EPA, *Emission Factors for Greenhouse Gas Inventories* (2018), https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf.
[119] Jayni Foley Hein & Peter Howard, *Illuminating the Hidden Costs of Coal* at A13 (Policy Integrity 2015), https://policyintegrity.org/files/publications/Hidden_Costs_of_Coal.pdf.
[120] *Id.* at Table B.5.
[121] 870 F.3d at 1238 ("BLM did not provide any reasoning or analysis for its conclusion that the no action alternative would bear no consequential difference to the proposed leases.").
[122] Draft EA at 17; *see also id.* at 31 (concluding, without explanation, that "the lack of leasing federally-administered coal" could "'lower[ ] production on federal lands and rais[e] it on private land'").

administered coal was only 43.3 percent of the coal produced in fiscal year 2008, therefore anticipating mines producing non-federal coal to support demand shortfalls would make sense."[123]

BLM makes no attempt to explain why it wouldn't be more reasonable to predict that, under its perfect substitution assumption, at least 43.3% of coal substitutes would come from other federally-administered mines, with only the remainder coming from private and state-leased mines.

Possibly this strange and unexplained assumption was a clumsy attempt to avoid having to recalculate the 2010 FEIS's reliance on monetized economic benefits in the form of state and federal revenue. The 2010 FEIS calculated the "economic benefits" of leasing the Wright Area coal and generating federal and state royalties and taxes. BLM stated that, "Under the No Action Alternatives . . . potentially recoverable coal . . . would not be recovered and the economic benefits associated with mining that coal would not be realized by the state or federal government."[124] For each coal field, the 2010 FEIS calculated the "added" state and federal revenues generated by the Leasing Options, over and above the No-Action Alternative. "Federal revenues," for example, "are based on a projected coal price of $11.06 per ton * amount of recoverable coal . . . * federal royalty of 12.5 percent minus state's 50 percent share."[125]

Yet, as BLM is well aware, well over 40% of U.S. coal production already comes from federal leases, and the federal government already collects royalties on those leases. If BLM's perfect substitution assumption were correct, such that other sources of coal can perfectly substitute for the Wright Area coal, then it must also be true that, under the Leasing Option, the Wright Area coal simply substitutes for other sources of coal that would otherwise be mined. At least some of those other sources—perhaps 40 percent or more—would surely have been other federal leases. But if the Wright Area leases perfectly supplant those other leases, those other leases will no longer generate federal revenue. Yet the 2010 FEIS never subtracts from its calculation of "economic benefits" the lost benefits from all those would-be sources of coal that will be supplanted by the Wright Area leases. Similarly, even substitute private leases produce tax revenue, and yet the 2010 FEIS never subtracts from its calculation of state revenues from severance taxes, property and production taxes, or sales and use taxes[126] the lost benefits from all those would-be sources of coal that will be supplanted by the Wright Area leases.

To whatever extent that other coal could substitute for the forgone extraction under the no action alternative, a significant portion of the economic benefits assigned to the leases—from employment, taxes, royalties, production, and so forth—are coming at the expense of other socioeconomic effects from other mines and so do not represent the net "economic benefits" that the 2010 FEIS touts as justification for the leases. This new EA on remand must recalculate the inaccurate and misleading presentation of economic benefits from the 2010 FEIS, as it relates to the perfect substitution argument found arbitrary by the Tenth Circuit.

Sincerely,

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Attachments:
https://policyintegrity.org/files/publications/Hidden_Costs_of_Coal.pdf

https://policyintegrity.org/files/publications/BLM_Model_Choice.pdf

https://policyintegrity.org/documents/10th_Cir_BLM_Brief.pdf

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[123] Draft EA at 17.
[124] 2010 FEIS at 3-307.
[125] 2010 FEIS at ES-15, note 5.
[126] 2010 FEIS at ES-15, note 6 (listing the tax sources of the state revenue calculations).