States of California, New Mexico, New York, and Washington

June 10, 2019

Via Electronic Submission

Kathleen Lacko
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RE: **Comments on the Draft Environmental Assessment, "Lifting the Pause on the Issuance of New Federal Coal Leases for Thermal (Steam) Coal," DOI-BLM-WO-WO2100-2019-0001-EA**

Dear Ms. Lacko:

The undersigned State Attorneys General of California, New Mexico, New York, and Washington ("States") respectfully submit these comments on the Draft Environmental Assessment ("Draft EA") issued by the Bureau of Land Management ("BLM") on May 22, 2019 regarding Secretarial Order 3348, which lifted the moratorium on the federal coal leasing program. The Draft EA was allegedly prepared in response to the U.S. District Court for the District of Montana's April 19, 2019 decision finding that Secretarial Order 3348 constitutes a "major federal action" subject to the requirements of the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321 *et seq*. *Citizens for Clean Energy v. U.S. Dep't of the Interior*, 2019 WL 1756296 (D. Mont. Apr. 19, 2019) ("*Citizens*"). The States are plaintiffs in that lawsuit and have a strong interest in ensuring that BLM fully considers the environmental impacts of federal coal leasing activities, which have not been comprehensively evaluated since 1979.

While the Draft EA purports "to be responsive to" the District Court's ruling, it makes no effort to actually take the "hard look" at the environmental impacts of the federal coal leasing program, as required by NEPA. To the contrary, the Draft EA arbitrarily limits its analysis to just three leases that were issued since March 2017, disregarding the vast majority of activities conducted under the program. The Draft EA also considers an extremely limited range of "issues" and alternatives, ignoring many of the impacts and concerns that BLM itself recently found to warrant consideration in an updated programmatic environmental impact statement ("EIS") for the program. For these reasons and as discussed in further detail below, BLM should withdraw its Draft EA and prepare a draft EIS that fully considers the environmental impacts of the federal coal leasing program.

STATUTORY BACKGROUND

NEPA "is our basic national charter for protection of the environment." 40 C.F.R. § 1500.1(a). NEPA has two fundamental purposes: (1) to guarantee that agencies take a "hard look" at the consequences of their actions before the actions occur by ensuring that "the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts," and (2) to ensure that "the relevant information will be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation of that decision." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349-50 (1989).

NEPA requires the preparation of a detailed EIS for any "major federal action significantly affecting the quality of the human environment." 42 U.S.C. § 4332(2)(C). In taking a "hard look," NEPA requires federal agencies to consider the direct, indirect, and cumulative impacts of its proposed action. *Idaho Sporting Cong. v. Rittenhouse*, 305 F.3d 957, 973 (9th Cir. 2002); 40 C.F.R. §§ 1508.7, 1508.8(a), (b). Moreover, "an agency may not rely on incorrect assumptions or data." *Native Ecosystems Council v. U.S. Forest Serv.*, 418 F.3d 953, 964 (9th Cir. 2005) (citing 40 C.F.R. § 1500.1(b)). "The information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA." 40 C.F.R. § 1500.1(b).

As a preliminary step, an agency may first prepare an environmental assessment ("EA") to determine whether the effects of an action may be significant. 40 C.F.R. § 1508.9. If an agency decides not to prepare an EIS, it must supply a "convincing statement of reasons" to explain why a project's impacts are insignificant. *Nat'l Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 730 (9th Cir. 2001). However, an EIS must be prepared if "substantial questions are raised as to whether a project may cause significant degradation of some human environmental factor." *Idaho Sporting Cong. v. Thomas*, 137 F.3d 1146, 1149 (9th Cir. 1998).

To determine whether a proposed project may significantly affect the environment, NEPA requires consideration of both the context and the intensity of an action. 40 C.F.R. § 1508.27. In evaluating the context, "[s]ignificance varies with the setting of the proposed action" and includes an examination of "the affected region, the affected interests, and the locality." *Id*. § 1508.27(a). Intensity "refers to the severity of impact," and NEPA's implementing regulations list ten factors to be considered in evaluating intensity, including "[u]nique characteristics of the geographic area such as proximity to ... ecologically critical areas," "[t]he degree to which the effects on the quality of the human environment are likely to be highly controversial," "[t]he degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks," and "[t]he degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration." *Id*. § 1508.27(b). The presence of just "one of these factors may be sufficient to require the preparation of an EIS in appropriate circumstances." *Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 865 (9th Cir. 2005).

FACTUAL BACKGROUND

BLM has responsibility for managing coal leasing on approximately 570 million acres of mineral estate owned or otherwise administered by the federal government. Draft EA at 4. As of fiscal year 2018, BLM administered 299 federal coal leases, encompassing 458,636 acres in 12 states, with an estimated 6.5 billion tons of recoverable coal reserves. *Id*. In addition, BLM is currently processing dozens of pending applications for coal leases and lease modifications. *Id*. at 4-5.

BLM manages federal coal pursuant to regulations and a programmatic EIS ("PEIS") that were originally adopted 40 years ago, at a time when the threat of climate change was not fully understood and market conditions, infrastructure development, scientific understanding, and national priorities were dramatically different. The first PEIS for the federal coal program, adopted in 1975, was found to be unlawful because it failed to adequately discuss, or allow comment on, a new coal leasing system and did not sufficiently consider alternatives. *See Nat. Res. Def. Council v. Hughes*, 437 F. Supp. 981, 989-91 (D.D.C. 1977). Separately, the U.S. Supreme Court recognized, in a case challenging the lack of NEPA review for the development of coal in the Northern Great Plains Region, that the federal coal program required a national-level programmatic EIS because it "is a coherent plan of national scope" with "significant environmental consequences." *See Kleppe v. Sierra Club*, 427 U.S. 390, 400 (1976). Around the same time, Congress passed the Federal Coal Leasing Amendments Act of 1975, Pub. L. No. 94-377, 90 Stat. 1083 (1976), which updated sections of the Mineral Leasing Act related to fair market value and speculation. BLM, "Federal Coal Program: Programmatic Environmental Impact Statement – Scoping Report (Jan. 2017) ("Scoping Report")[1] at 5-2.

Citing "significant changes in statutory and Presidential policy and in available data," the Department of the Interior prepared a new PEIS in 1979. *See* 44 Fed. Reg. 42,584 (July 19, 1979). The 1979 PEIS analyzed the environmental impacts of seven alternatives for the federal coal program, including the preferred alternative that was ultimately chosen and largely remains in place today. This program sets forth two primary leasing procedures. First, under the "regional" leasing program, BLM leases tracts based on recommendations from the ten DOI regional coal teams. Scoping Report at 5-7. Second, under the "leasing by application" program, the process is initiated by industry, which identifies where and how much coal it wants to lease. *Id*. The 1979 PEIS contained almost no discussion of climate change; in the few instances where the PEIS does mention the issue, the analysis is vague and outdated. *See* 1979 PEIS at 5-88, 5-97, 5-107.

The 1979 PEIS was last revisited in 1985, when BLM updated its coal leasing regulations and completed a limited supplement to the 1979 PEIS in response to recommendations from the Commission on Fair Market Value Policy for Federal Coal Leasing, which addressed continued irregularities in the leasing process (the "1985 Supplement"). Scoping Report at 5-6 – 5-7. The 1985 Supplement examined the continuation of the federal coal management program and three

[1] The Scoping Report is attached hereto as Exhibit 1.

alternatives: (1) Leasing by Application, (2) Preference Right and Emergency Leasing, and (3) No New Federal Leasing, *i.e.*, the no action alternative. The 1985 Supplement did not consider or evaluate climate change impacts.

Between 1987 and 1990, all six certified coal-producing regions were "decertified" by BLM, such that all federal coal leasing since 1990 has been initiated by industry application. Scoping Report at 5-7. During the 1990s and 2000s, the Powder River Basin became the primary area of federal coal leasing and production, up to 90 percent in recent years, and federal coal commanded a much larger share of national coal production. Scoping Report at 5-8, 5-11.

Several federal entities have identified problems with BLM's outdated structure for management of federal coal. Scoping Report at 6-1 – 6-3. In 2013, DOI's Office of the Inspector General issued a report concluding that "BLM faces significant challenges in the areas of coal leasing and mine inspection and enforcement" and that the BLM's management of the program resulted in millions of dollars in lost royalties to the federal treasury because the agency was "not receiving the full, fair market value for the leases." Off. of the Inspector Gen., DOI, Coal Management Program (June 11, 2013).[2] The Inspector General made several recommendations necessary to "enhance [BLM's] coal management program significantly" and recover these lost revenues. *Id.*

Also in 2013, the Government Accountability Office ("GAO") concluded that BLM had failed to ensure mining companies pay fair market value for leasing federal coal. GAO, GAO-14-140, Coal Leasing: BLM Could Enhance Appraisal Process, More Explicitly Consider Coal Exports, and Provide More Public Information (Dec. 18, 2013).[3] The GAO determined that since 1990, "most" federal coal leases were not sold competitively and had only a single bidder. In particular, of the 107 tracts that were leased between 1990 and 2012, "sales for 96 (about 90 percent) involved a single bidder … which was generally the company that submitted the lease application. More than 90 percent of the lease applications BLM received were for maintenance tracts used to extend the life of an existing mine or to expand that mine's annual production." *Id.*

Moreover, since the issuance of the 1979 PEIS, scientific understanding of "the greenhouse effect" and climate change has grown dramatically, and BLM has recognized the need to address this unprecedented and dire problem. For example, the Intergovernmental Panel on Climate Change ("IPCC") has now issued five reports, each demonstrating with greater certainty that man-made greenhouse gas ("GHG") emissions are causing warming of the planet never before experienced during humankind's existence.[4] In 2009, the U.S. Environmental Protection Agency determined that carbon dioxide and five other greenhouse gases constituted pollutants under the federal Clean Air Act because they endanger the public health and welfare

[2] The DOI Inspector General Report is *available at*: https://www.doioig.gov/reports/coal-management-program-us-department-interior.
[3] The GAO Report is *available at*: https://www.gao.gov/products/GAO-14-140.
[4] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, *available at*: https://www.ipcc.ch/report/ar5/syr.

of Americans in many ways, such as by increasing the likelihood of heat waves, ozone pollution, storm intensity, reduced water supplies, and rising sea levels. 74 Fed. Reg. 66,496, 66,498 (Dec. 15, 2009); Scoping Report at 5-48 – 5-52. As BLM has found, "[v]irtually every community in the US is being impacted by climate change, and Federal programs have an obligation to be administered in a way that will not worsen and help address these impacts." Scoping Report at 6-3.

On March 17, 2015, due to these concerns and others raised by members of Congress, interested stakeholders, and the public, then-Secretary of the Interior Sally Jewell called for "an honest and open conversation about modernizing the Federal coal program." Scoping Report at ES-3. BLM subsequently held listening sessions around the country that summer, heard from 289 individuals during the sessions, and received over 94,000 written comments. *Id*. The oral and written comments reflected several recurring concerns, in particular: that American taxpayers are not receiving a fair return for the leasing of public coal resources; that the federal coal program conflicts with the country's national climate goals; and about the structure of the federal coal program in light of current market conditions, including how implementation of the federal leasing program affects current and future coal markets, coal-dependent communities and companies, and the reclamation of mined lands.

On January 15, 2016, Secretary Jewell issued Secretarial Order 3338, commencing a process to prepare a new programmatic EIS for the federal coal program and putting in place a moratorium on most new leasing activity until that review was complete. *See* Secretarial Order No. 3338, Discretionary Programmatic Environmental Impact Statement to Modernize the Federal Coal Program (Jan. 15, 2016) (the "Jewell Order"). The Jewell Order cited BLM's legal obligations "to ensure conservation of the public lands, the protection of their scientific, historic, and environmental values, and compliance with applicable environmental laws" as well as the agency's "statutory duty to ensure a fair return to the taxpayer." Jewell Order, Section 4. In determining that it was appropriate to suspend the issuance of new federal coal leases while BLM undertook a comprehensive review, the Secretary explained:

> Lease sales and lease modifications result in lease terms of 20 years and for so long thereafter as coal is produced in commercial quantities. Continuing to conduct lease sales or approve lease modifications during this programmatic review risks locking in for decades the future development of large quantities of coal under current rates and terms that the PEIS may ultimately determine to be less than optimal.

Id., Section 5.

The Secretary also stated that "[n]umerous scientific studies" since the program's 1979 PEIS was last updated "indicate that reducing [greenhouse] emissions from coal use worldwide is critical to addressing climate change." *Id*., Section 2.b.ii. Thus, the Secretary determined that "a more comprehensive, programmatic review [was] in order," which "should examine how best to assess the climate impacts of continued Federal coal production and combustion and how to

address those impacts in the management of the program to meet both the Nation's energy needs and its climate goals." *Id*., Section 4.

In March 2016, BLM began a scoping process under NEPA by issuing a Notice of Intent to Prepare a Programmatic Environmental Impact Statement to Review the Federal Coal Program and to Conduct Public Scoping Meetings. 81 Fed. Reg. 17,720 (Mar. 30, 2016). During the spring and summer of 2016, BLM accepted more than 214,000 public comments and held six public meetings in various cities regarding its review of the federal coal program. Scoping Report at ES-3.

On January 11, 2017, BLM released its Scoping Report, which found that "modernization of the Federal coal program is warranted." Scoping Report at ES-4. BLM stated that "[t]his modernization should focus on ensuring a fair return to Americans for the sale of their public coal resources; addressing the coal program's impact on the challenge of climate change; and improving the structure and efficiency of the coal program in light of current market conditions, including impacts on communities." *Id*.; *see id*. at 6-1 ("The need for this action is to undertake a comprehensive review of the Federal coal program and to consider how the program can be improved and modernized in the areas of fair return, climate change, resource management and protection, and program administration.").

As BLM summarized in the Scoping Report:

> The last time the Federal coal program received a comprehensive review was in the mid-1980s, and most of the existing regulations were promulgated in the late 1970s and have been only slightly modified since that time. The direct, indirect, and cumulative impacts of the Federal coal program have not been fully analyzed under the National Environmental Policy Act (NEPA) in over thirty years.

Id. at ES-2. Consequently, BLM stated that it would move forward with the preparation of a draft programmatic EIS by January 2018 regarding the modernization of the federal coal program using the information received during the scoping process, and issue a final PEIS by January 2019. *Id*. at ES-3.

However, just two months later, then-Secretary of the Interior Ryan Zinke issued Secretarial Order 3348 (the "Zinke Order"), which rescinded the Jewell Order, canceled the preparation of the PEIS, and lifted the moratorium on issuing new leases. As the Draft EA states, "the Zinke Order resumed the full measure of the BLM's coal leasing activities as they had been carried out prior to the Jewell Order." Draft EA at 2.

The States challenged this action in federal district court in Montana alleging, among other claims, that restarting the federal coal leasing program without conducting a new environmental review or supplementing the outdated review of the program violated NEPA. *State of California v. Zinke*, Case No. 4:17-cv-42-BMM (D. Mont. complaint filed May 9, 2017). The case was later consolidated with an earlier challenge filed by citizen and tribal groups. *Citizens for Clean Energy v. U.S. Dep't of the Interior*, Case No. 4:17-cv-30-BMM (D. Mont. complaint filed March 29, 2017). Following production of the administrative record, the parties

briefed and argued cross-motions for summary judgment. On April 19, 2019, the District Court ruled that the Zinke Order constituted a "major federal action" that triggers compliance with NEPA and directed the agency to comply with its legal obligations under that statute. *Citizens*, 2019 WL 1756296 at *9-11.

Since the Zinke Order, at least two significant reports on climate change have been published by the federal government, and another has been published by the IPCC. Two of these reports confirm that greenhouse gas emissions are already harming our nation's environment, public health and economy, and that substantial reductions are needed in the next decade to avoid far worse consequences.[5] The third, from the U.S. Geological Survey, finds that "emissions from fossil fuels produced on Federal lands represent, on average, 23.7 percent of national emissions of carbon dioxide ("CO_2"), 7.3 percent of [methane], and 1.5 percent for [nitrogen oxide] over the 10 years included in this estimate [2005-14]."[6]

THE DRAFT EA IS FUNDAMENTALLY FLAWED AND FAILS TO PROVIDE THE "HARD LOOK" REQUIRED BY NEPA

I. The Draft Environmental Assessment Improperly Limits the Scope of the NEPA Review.

NEPA requires that an agency consider the full scope of activities encompassed by its Proposed Action. *See* 40 C.F.R. § 1508.25. This includes a consideration of connected, cumulative, and similar actions, all reasonable alternatives, as well as the direct, indirect, and cumulative impacts of a proposal. *Id.* "An agency impermissibly 'segments' NEPA review when it divides connected, cumulative, or similar federal actions into separate projects and thereby fails to address the true scope and impact of the activities that should be under consideration." *Del. Riverkeeper Network v. FERC*, 753 F.3d 1304, 1313 (D.C. Cir. 2014) (internal quotation marks omitted).

"Connected actions" means actions that "are closely related and therefore should be discussed in the same impact statement." *Id*. at § 1508.25(a)(1). Connected actions must be considered together in order to preclude an agency from "divid[ing] a project into several smaller actions, each of which might have an insignificant environmental impact when considered in

[5] U.S. Global Change Research Program, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018, *available at*: https://nca2018.globalchange.gov/; IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, *available at*: https://www.ipcc.ch/sr15/.

[6] Matthew D. Merrill, *et al*., Federal Lands Greenhouse Gas Emissions and Sequestration in the United States: Estimates for 2005-14 (2018) (hereafter, "Merrill *et al.* Federal Lands Report"), *available at*: https://pubs.er.usgs.gov/publication/sir20185131.

isolation, but which taken as a whole have a substantial impact." *Northwest Resource Info. Ctr., Inc. v. National Marine Fisheries Serv.*, 56 F.3d 1060, 1068 (9th Cir. 1995); *see also Indigenous Envtl. Network v. U.S. Dep't of State*, 317 F. Supp. 3d 1118, 1123 (D. Mont. 2018) (finding that alternative route for oil pipeline was connected action to main proposed pipeline segment and must be considered in same NEPA review). Similarly, "cumulative actions" are those "which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement." 40 C.F.R. § 1508.25(a)(2); *see also Indigenous Envtl. Network v. U.S. Dep't of State*, 347 F. Supp. 3d 561, 578-79 (D. Mont. 2018) (finding that DOI failed to consider cumulative impacts of greenhouse gas emissions from proposed pipeline project in combination with other pipelines). Moreover, "similar actions" are actions "which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography." *Id*. § 1508.25(a)(3).

Here, the Draft EA does not even attempt to analyze the environmental impacts of the federal coal leasing program. Instead, BLM impermissibly limits the scope of its analysis to cover just three federal coal leases that were issued during the 24 months between the March 29, 2017 date of the Zinke Order and the "anticipated date" that the moratorium would have been lifted. Draft EA at 3, 12-14. These three leases are (1) the Alton Coal Tract Lease by Application; (2) Pollyanna 8 Coal Lease, and (3) the South Fork Federal Coal Lease Modification. Draft EA at 6-7. According to BLM, these "three non-exempt leases and their respective issue dates represent the universe of lease issuances traceable to the Zinke Order's resumption of normal leasing procedures." Draft EA at 6. Thus, "BLM herein reviews the environmental effects of the three Federal coal leases issued due to the Zinke Order." *Id*.

There is no legitimate basis for limiting the scope of the Draft EA in this manner. According to the Draft EA, BLM "did not analyze in detail[] the effects of lifting the pause on Federal coal leasing and potential impacts associated with Federal leasing because this issue does not relate to the purpose and need or inform a question of significance." Draft EA at 9.[7] Yet this analysis is precisely what was required by the District Court. To begin, the District Court found that the States' claims were ripe because "Plaintiffs' challenge to the Zinke Order 'may be their only opportunity to challenge [the coal-leasing program] on a nationwide, programmatic, basis.'" *Citizens*, 2019 WL 1756296 at *5 (quoting *Cal. ex rel. Lockyer v. U.S. Dept. of Agriculture*, 575

[7] Despite BLM's claim that it "has elected to analyze the impacts of lifting the coal pause through an EA in an effort to be responsive to" the District Court's ruling, it simultaneously disputes the requirement that it do so. *See* Draft EA at 3; *see also* U.S. Department of the Interior, "BLM Seeks Public Comment on Draft Environmental Assessment for Lifting the Pause on the Issuance of New Federal Coal Leases" (May 22, 2019) ("The district court ruled that Secretarial Order (SO) 3348 … constituted a major federal action triggering compliance with the National Environmental Policy Act (NEPA), despite the fact that to date no SO has required NEPA analysis."), *available at*: https://www.blm.gov/press-release/blm-seeks-public-comments-draft-environmental-assessment-lifting-pause-issuance-new. BLM's tortured position is reflected by the cursory nature of the Draft EA.

F.3d. 999 (9th Cir. 2009)) (brackets in original). The District Court recognized that the States' challenge was not to the processing of three lease applications, but rather to the resumption of the coal-leasing program writ large.

Elsewhere, the District Court found that "[t]he Zinke Order constituted a major federal action triggering NEPA review," *Citizens*, 2019 WL 1756296 at *9, and described the scope of the Order as "lift[ing] the moratorium and direct[ing] BLM to 'process coal lease applications and modifications expeditiously in accordance with regulations and guidance existing before the issuance of' the Jewell Order." *Id.* at *10; *see also id*. at 8 ("The Zinke Order served to re-open public land to coal leasing and to expedite lease applications"). As the District Court's findings indicate, the Zinke Order applies to all future BLM leasing decisions, not merely a small subset of those lease applications that were impacted by the moratorium prior to its termination. The text of the Zinke Order itself confirms the same. In Section 1, the Secretary states that "this Order directs efforts to enhance and improve the Federal coal leasing program," not some subset of the program or a handful of leases. Similarly, in Section 5, the Secretary states that "BLM is directed to process coal lease applications and modifications expeditiously in accordance with regulations and guidance existing before the issuance of Secretary's Order 3338," again without limitation as to the applications that are to be processed "expeditiously."

As the Draft EA acknowledges, the scope of the federal coal leasing program is broad: "As of Fiscal Year 2018, the BLM administered 299 Federal coal leases, encompassing 458,636 acres in 12 states, with an estimated 6.5 billion tons of recoverable Federal coal reserves." Draft EA at 4. Moreover, there are dozens of other lease applications pending with BLM that represent connected or cumulative actions that must be included in any NEPA analysis. *Id*. at 4-5. All of these activities should have been included within the scope of the Draft EA. BLM has no basis for limiting the environmental review to just three leases when the Zinke Order opens the door to leasing generally, for decades to come. The scope of the Draft EA's review must reflect not just the impacts of mining and consuming coal afforded *in the past* by the three leases issued during the last two years, but also the impacts of all the coal that could potentially *in the foreseeable future* be mined and consumed through the federal coal leasing program.

The Draft EA also makes several erroneous assumptions in determining the scope of the analysis that further undermine its validity. First, BLM wrongly assumes that the moratorium on new federal coal leasing would have ended in March 2019, and that leases would simply resume as they had in the past. For example, BLM notes that "[t]here were 45 lease applications pending with the BLM when the Jewell Order was issued," and "[t]he processing and review of these 45 applications would have continued [in] March 2019 at the same rate without pause with or without the Zinke Order." Draft EA at 12. However, this assumption is contrary to language of the Jewell Order, which states: "Continuing to conduct lease sales or approve lease modifications during this programmatic review risks locking in for decades the future development of large quantities of coal under current rates and terms that the PEIS may ultimately determine to be less than optimal." Jewell Order, Section 5.

This assumption results in an incorrect framing of the "action" and the issues. The action at issue is not just a lifting of the moratorium. Rather, by rescinding the Jewell Order, the Zinke Order also canceled preparation of the Programmatic EIS and committed the agency to resuming the coal lease program pursuant to an outdated framework. It is this—the resumption of the program generally—that should be the focus of the Draft EA's environmental review, not just the impact of processing three leases a few months early.

Furthermore, on the basis of its incorrect assumption that the moratorium would end of its own accord in March 2019, BLM incorrectly defines the baseline as a scenario where all the Zinke Order did was end the moratorium prematurely, by 24 months. This is incorrect. The proper baseline for purposes of NEPA review is the status quo, and that is a scenario where the moratorium would have remained in place at least until the Programmatic EIS was complete and then been lifted by an affirmative agency action to address defects in the leasing process based on information the PEIS would have provided. Thus, that state of affairs—where *no new leases are issued at all*—is the proper baseline against which to compare the environmental impacts of the Zinke Order. Put otherwise, but for the Zinke Order, the status quo was not that leasing would not resume until March 2019, but that leasing might not resume at all.

In sum, BLM's failure to consider the full extent of federal coal leasing activities resulting from the Zinke Order, and limiting the analysis in the Draft EA to just three leases approved since March 2017, fails to provide the "hard look" required by NEPA. *See Del. Riverkeeper Network*, 753 F.3d at 1313; *Kleppe*, 427 U.S. at 410 ("Only through comprehensive consideration of pending proposals can the agency evaluate different courses of action"); *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (agency action is arbitrary and capricious if it "entirely failed to consider an important aspect of the problem").

II. The Draft EA Fails to Consider Reasonable Alternatives to the Proposed Action.

The Draft EA also fails to consider a reasonable range of alternatives to the Proposed Action. NEPA requires that BLM provide a "detailed statement" regarding the "alternatives to the proposed action." 42 U.S.C. § 4332(2)(C)(iii); *see also* 40 C.F.R. §§ 1502.14(a); 1508.9(b). Agencies should "[r]igorously explore and objectively evaluate all reasonable alternatives" that relate to the purposes of the project, and briefly discuss the reasons for eliminating any alternatives from detailed study. 40 C.F.R. § 1502.14. The requirement to consider reasonable alternatives "lies at the heart of any NEPA analysis." *California ex rel. Lockyer v. U.S. Dept. of Agric*., 459 F. Supp. 2d 874, 905 (N.D. Cal. 2006). "The existence of a viable but unexamined alternative renders" an environmental review under NEPA inadequate. *Western Watersheds Project v. Abbey*, 719 F.3d 1035, 1050 (9th Cir. 2013) (internal quotations and citations omitted).

Here, BLM considered only two alternatives: (1) Alternative 1, the "No Action Alternative," which assumes that the Jewell Order would have remained in place for an additional 24 months, until March 2019, and (2) Alternative 2, entitled "Resume Normal Leasing Procedures in March 2017," which considers BLM's processing of new lease application in the 24 months since March 2017. Draft EA at 11-13. This framing of the alternatives is

fundamentally flawed and inconsistent with NEPA. BLM describes the "purpose and need" for the action as "to respond to the U.S. District Court of Montana's Order issued on April 19, 2019, in *Citizens* … ." *Id.* at 7. However, the "action" for which the purpose and need must be examined is the Zinke Order itself, not the development of the EA. *See* BLM NEPA Handbook J-1790-1 at 35 ("The purpose and need statement should explain why the BLM is proposing action. Note that you must describe the purpose and need for the *action*, not the purpose and need for the document.") (emphasis in original). Had BLM grappled with the requirement to explain the purpose of the Zinke Order, it would have been forced to acknowledge that an affirmative action was required to end the moratorium. This would have brought sharply into focus that the true "No Action Alternative" is the indefinite continuation of the moratorium.

Moreover, even under BLM's flawed analytical framework, its failure to conceptualize any alternatives other than its so-called "no action" alternative or the proposed action (*i.e.*, the Zinke Order) is stunningly arbitrary and does not come close to meeting NEPA's requirements. There are no shortage of alternatives that BLM did not consider that it should have under NEPA. The Court's Order in no way constrains BLM's consideration of alternatives solely to the Jewell Order or the Zinke Order. For example, an alternative that considered extending the moratorium with no exemptions or exclusions until completion of an EIS would equally serve the purpose and need of responding to the Court's Order in *Citizens*. So too, any number of alternatives that modified the coal-leasing program on a nationwide programmatic basis prior to lifting the moratorium would serve the identified purpose and need.

Indeed, BLM has its own prior work to draw upon. In the January 2017 Scoping Report, BLM identified several potential alternatives for the federal coal leasing program that would allow the agency to ensure a fair return to Americans for the sale of their public coal resources; reduce the impacts with regard to climate change and other environmental issues; and provide for more efficient administration of the program in light of current market conditions, including impacts on communities. Scoping Report at 6-1 – 6-32. For example, to reduce greenhouse gas emissions, BLM identified potential alternatives such as (1) accounting for carbon-based externalities through a royalty rate increase or royalty adder; (2) adopting requirements for the use of compensatory mitigation; (3) establishing a carbon budget to guide federal coal leasing in an effort to limit the amount of greenhouse gas emissions associated with federal coal production; (4) considering opportunities to address methane emissions associated with coal mining operations; and (5) fully analyzing a no new leasing alternative. *Id.* at 6-13 – 6-20. The Draft EA says nothing about the alternatives identified in the Scoping Report.

As discussed above, BLM also improperly assumes that the only difference between the two alternatives is that Alternative 2 would cause environmental impacts earlier than Alternative 1. For example, with regard to greenhouse gas emissions, the Draft EA states that "the total quantity of GHG emissions would be the same under both alternatives. The only difference is that Alternative 2 would produce GHG emissions for the three issued leases 1-11 months earlier, and up to 24-months earlier for the eight pending leases." Draft EA at 20. For socioeconomic impacts and water quality, quantity, and riparian areas, the Draft EA finds no difference between the two alternatives. Draft EA at 24, 26-27. As such, these two alternatives fail to foster

"informed decision-making and informed public participation," in violation of NEPA. *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982).

As the Ninth Circuit has stated, "[t]he existence of a viable but unexamined alternative renders an environmental impact statement inadequate. An agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action, and sufficient to permit a reasoned choice." *Alaska Wilderness Recreation & Tourism Ass'n v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995) (internal citations and quotation marks omitted). BLM's failure to consider reasonable alternatives in the Draft EA is contrary to the requirements of NEPA.

III. The Draft EA Fails to Properly Consider the Environmental Impacts of the Federal Coal Leasing Program.

NEPA requires agencies to take a "hard look" at the environmental consequences of proposed agency actions before those actions are undertaken. *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 993 (9th Cir. 2004). To take the required "hard look" when preparing an environmental assessment, an agency must consider all foreseeable direct, indirect, and cumulative impacts of the proposed action, *Ctr. For Biological Diversity v. Salazar*, 695 F.3d 893, 916–17 (9th Cir. 2012), and provide enough evidence and analysis to determine whether a more in depth analysis is necessary, *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1239 (9th Cir. 2005).

Rather than taking a hard look at *all* foreseeable impacts of the federal coal program, the Draft EA simply summarizes portions of already-completed NEPA reviews for the three leases and with regard to just three "issues" that BLM identified for the Draft EA: (1) greenhouse gas emissions; (2) socioeconomic impacts; and (3) impacts to water quality, quantity, and riparian areas. Draft EA at 8. This cursory analysis fails to comply with NEPA.

There is a wide range of other environmental harms associated with coal mining, production, and transport that BLM failed to consider. For example, the shipment of coal from mining sites in Montana and Wyoming to west coast ports in open top train cars also has significant negative impacts on local air quality and the environment, due to the release of particulate matter pollution and toxic materials.[8] The transport, warehousing, and loading of coal for export also has negative health consequences for workers and nearby communities exposed to coal dust from such operations.

In addition to climate change, BLM itself previously recognized in the Scoping Report that several other environmental impacts that had never been adequately considered in its environmental review for the federal coal leasing program. These included:

- Harm to public lands and wildlife from coal mining;

[8] *See, e.g.*, Jaffe, Daniel, *et al.*, Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA, Atmospheric Pollution Research 6 (2015) 946-952, attached hereto as Exhibit 2.

- Air quality impacts from coal transport and combustion; and
- Disposal of coal ash, which contains hazardous constituents.

Scoping Report at 5-46 – 5-52; *see also id*. at 6-4 ("there is a need for program reform to better protect the nation's other natural resources (e.g., air, water, and wildlife)"). Moreover, BLM found that the environmental justice impacts related to coal mining and downstream activities such as coal transport and export have never been adequately considered. *Id*. at 6-51. The Draft EA violates NEPA in that it fails to consider any of these impacts, much less to determine whether they are significant or to provide a convincing statement why they are not significant.

Of course, there should be little doubt that the resumption of the federal coal leasing activities may result in significant impacts. As the U.S. Supreme Court has found, the federal coal leasing program "is a coherent plan of national scope, and its adoption surely has significant environmental consequences." *Kleppe*, 427 U.S. at 400. Moreover, the District Court found that the States "have raised a substantial question that the lifting of the moratorium could cause environmental impacts from expedited coal mining on public lands" and that the Zinke Order constituted a "major federal action" under NEPA. *Citizens*, 2019 WL 1756296 at *9.

Even as to the three "issues" BLM identifies from three leases, the Draft EA makes no determination whether those impacts are potentially significant and thus require the preparation of an EIS. When a federal agency is not certain whether an EIS is required, it may prepare an environmental assessment, which must provide sufficient "evidence and analysis" for determining whether an action has significant impacts. 40 C.F.R. § 1508.9(a)(1). If the agency concludes there are no significant impacts and issues a FONSI, the agency must provide a convincing statement of reasons why potential impacts are insignificant. *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1211 (9th Cir. 1998). As the District Court found, "if Federal Defendants determine that an EIS would not be necessary, … Federal Defendants must supply a 'convincing statement of reasons' to explain why the Zinke Order's impacts would be insignificant." *Citizens*, 2019 WL 1756296 at *11. Here, too the Draft EA fails to meet the requirements of NEPA. Moreover, as discussed above, BLM has improperly limited the scope of its NEPA review to just three leases. Thus, even if BLM makes express determinations as to significance in a final EA, so long as it retains the artificial limitation on scope, those determinations will not satisfy BLM's NEPA obligations with respect to resumption of the full federal coal leasing program.

In addition, BLM's analysis of the three issues that it does identify is superficial and insufficient. For example, with regard to socioeconomic impacts, BLM finds no such impacts because "each of the three coal leases issued already had sufficient reserves to continue operations through March 2019" and "would have been able to continue producing" under both alternatives.[9] Draft EA at 25. For eight other pending leases, BLM simply states that the

[9] The purported lack of any socioeconomic impacts from the Zinke Order calls into question whether the Order actually served Executive Order 13783's goal of removing burdens on energy development. BLM offers no analysis or consideration of this question.

socioeconomic impacts "are entirely too speculative to assert." *Id*. For impacts to water quality, quantity, and riparian areas, BLM "summarizes the conclusions" of existing NEPA reviews for each of the three leases, and then claims that cumulative effects "are not possible because there is no direct connection between water resources at those locations." *Id*. at 26-32. "This conclusory presentation does not offer any more than the kind of general statements about possible effects and some risk" that the Ninth Circuit has found to be insufficient to constitute the "hard look" required by NEPA. *Klamath-Siskiyou Wildlands Center v. Bureau of Land Mgmt*., 387 F.3d 989, 995 (9th Cir. 2004) (internal quotations and citation omitted).

With regard to climate change, BLM has previously noted that federal coal production and combustion were responsible for about 11 percent of U.S. greenhouse gas emissions in 2014. Scoping Report at 5-31. The agency found that climate change caused by human emission of greenhouse gases threatens public health and welfare in many ways, including increased heat waves, more frequent and intense storms, reduced water supplies, increase wildfires, flooding, and sea level rise. *Id*. at 5-48. The three leases discussed in the Draft EA represent just a small fraction of these significant environmental impacts from the federal coal leasing program.

Moreover, the entire premise of BLM's analysis in the Draft EA—looking only at the impact of a delay of 24 months in the emissions from three leases—is flawed. Draft EA at 20. BLM exacerbates this flaw by then discussing the trends in total energy related emissions, carbon intensity of energy production and coal consumption as a portion of those emissions, without acknowledging that the Administration has proposed to substantially weaken the Environmental Protection Agency's regulation of greenhouse gas emissions from existing coal-fired power plants and emission standards for any new coal-fired power plants, in addition to having taken other steps intended to prop-up coal-fired electricity generators. *Id.* at 20-21.

Further, while BLM spends a paragraph discussing the U.S. Geological Survey's recently published report on GHG emissions from the extraction of fossil fuels produced on federal lands, its brief discussion cites only to cumulative data for emissions from oil, gas and coal, ignoring the report's break out of data specific to coal production and consumption. *Id.* at 22; *compare* Merrill *et al*., Federal Lands Report, at 6-7. BLM spends most of the single paragraph describing parts of the report on federal lands natural system's sequestration of greenhouse gases—which is irrelevant to its NEPA analysis and amounts to a fraction of the emissions from extraction and consumption of fossil fuels. Draft EA at 22.

Similarly, BLM's discussion of the federal government's Fourth National Climate Assessment is confined to a single paragraph that utterly fails to inform the public of the consequences of the emissions associated with resumption of the federal coal leasing program. *Id.* Misleadingly, that paragraph focuses on only one region of the country—the Northern Great Plains—as if to infer that only that area of the country need consider the impact of greenhouse gas emissions from the consumption of coal. *Id.* But, as our States have made clear, greenhouse gas emissions, including those from federal coal, contribute to climate change impacts in our States. *See* Complaint for Declaratory and Injunctive Relief ¶¶ 12-15, *State of California v. Zinke*, Case No. 4:17-cv-42-BMM (D. Mont. filed May 9, 2017). The paragraph also mentions

nothing more than the expected changes in average temperature, offering no description of the public health, environmental, and economic effects of increase in average temperatures on the Northern Great Plains (other than a passing mention of reduced snow cover) or any other part of the country. *Id.*

In addition, the Draft EA arbitrarily refuses to use the social cost of carbon—or any other meaningful cost metric—to accurately assess the greenhouse gas impacts of the action. The social cost of carbon is a federally-developed tool to assist agencies in evaluating the social benefits of reducing CO_2 emissions when analyzing the costs and benefits of agency action. BLM's rationale for rejecting the social cost of carbon protocol lack a reasonable basis.

First, BLM implies that, because the NEPA review process is not a rulemaking process for which the social cost of carbon tool was originally created, and because federal policy has changed, the agency has no obligation to calculate the social cost of carbon. Draft EA at 25. But precedent in the District of Montana, where the ruling that prompted this Draft EA was issued, held that it was arbitrary and capricious for the federal government not to apply the social cost of carbon in a coal leasing context outside of rulemaking. *Montana Envtl. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1096-99 (D. Mont. 2017).

Second, BLM's criticism that the social cost of carbon protocol does not measure the "incremental impact" of a project on the environment does nothing to justify the agency's refusal to use this metric. *See* Draft EA at 23. BLM points to a recent EIS in which the cumulative social cost of carbon ranged from $4.2 to $22.1 billion, *depending on dollar value and discount rate used.* Draft EA at 24 (emphasis added). The fact that the dollar figure is expressed as a range does not negate its utility to the decision maker. In order to compare with other costs and benefits, similar dollar values and discount rates could be used. In any case, NEPA does not allow federal agencies to simply refuse to quantify carbon costs based on such claims of uncertainty or incomplete information.[10]

Third, BLM employs specious logic when it suggests that it would be "unbalanced" to include a social cost of carbon analysis without "a complete monetary cost-benefit analysis, which would include the social benefits of the proposed action to society as a whole." Draft EA at 23. As noted above, BLM concludes that there are *no*, or at most "negligible," socioeconomic

[10] *See Sierra Club v. Fed. Energy Regulatory Comm'n*, 867 F.3d 1357, 1374 (D.C. Cir. 2017) (NEPA "necessarily involves some reasonable forecasting" and "agencies may sometimes need to make educated assumptions about an uncertain future."); *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin*, 538 F.3d 1172, 1200 (9th Cir. 2008) (even where "there is a range of values, the value of carbon emissions reduction is certainly not zero."); *High Country Conservation Advocates v. U.S. Forest Serv*, 52 F. Supp. 3d 1174, 1192 (D. Colo. 2014) (explaining that even with "a wide range of estimates about the social cost of GHG emissions," federal agencies acted arbitrarily in not quantifying the costs); *cf. Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003) ("[W]hen the nature of the effect is reasonably foreseeable but its extent is not, we think that the agency may not simply ignore the effect.").

impacts from the Zinke Order, resulting in an effective benefit monetization of $0. Elsewhere in the Draft EA, however, BLM monetizes economic benefits to the federal government in the amount of $9.81 billion, reflecting royalty revenues.[11] Draft EA at 4.

At the same time, BLM acknowledges that the action *will* result in earlier GHG emissions, but refuses to monetize the harms arising from those emissions. Draft EA at 19. Having effectively monetized the benefits, either as $0 or $9.81 billion, it is arbitrary and capricious for BLM to refuse to monetize the costs, including in particular costs caused by GHG emissions as measured by the social cost of carbon or some other meaningful cost metric. *See Montana Envtl. Info. Ctr.*, 274 F. Supp. at 1074. Thus, the Draft EA does not follow federal guidance, which consistently directs agencies to consider all benefits and costs of a proposed action when engaged in cost-benefit-type analyses. [12]

In sum, BLM's failure to consider the vast majority of environmental impacts resulting from the federal coal leasing program, and its conclusory analysis of just three "issues" related to a handful of coal leases issued since March 2017, fails to provide the "hard look" required by NEPA.

[11] BLM attempts to distinguish an "economic impact" such as increased economic activity from an "economic benefit" because "such impacts might be viewed by another person as negative or undesirable impacts due to potential increase in local population, competition for jobs, and concerns that changes in population would change the quality of the local community." Draft EA at 23. BLM's argument appears to be that such impacts may be appropriately included in a NEPA analysis whether or not a "cost-benefit" analysis is included. Because BLM takes the position that there are not any economic effects (whether they be deemed "impacts" or "benefits"), this point is moot.

[12] *See, e.g.,* Office of Mgmt. & Budget, Circular A-4 at 29 (2003) (agencies should consider "any important ancillary benefits and countervailing risks," including those "secondary to the statutory purpose of the rulemaking"); Exec. Order No. 13563 § 1, 76 Fed. Reg. 3,821 (Jan. 21, 2011) (affirming Exec. Order No. 12866) (directing agencies to assess the "actual results of regulatory requirements" and explicitly require analysis of both direct and indirect costs and benefits); Exec. Order No. 12866 § 1, 58 Fed. Reg. 51,735, 51,741 (Oct. 4, 1993) ("Costs and benefits shall be understood to include both quantifiable measures . . . and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider."); U.S. EPA, Guidelines for Preparing Economic Analyses, 11-2 (2010) (directing the agency to assess "all identifiable costs and benefits," including both direct effects "as well as ancillary benefits and costs").

CONCLUSION

For the reasons discussed above, the States respectfully request that BLM withdraw its Draft EA and prepare a draft EIS that fully considers the environmental impacts of the federal coal leasing program.

Sincerely,

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Exhibit 1

U.S. Department of the Interior
Bureau of Land Management
Washington Office

Volume 1
January 2017

Federal Coal Program

Programmatic Environmental Impact Statement - Scoping Report

Our Vision

To enhance the quality of life for all citizens through the balanced stewardship of America's public lands and resources.

Our Mission

To sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

FEDERAL COAL PROGRAM PROGRAMMATIC EIS SCOPING REPORT

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
AR5	IPCC 2013–2014 Fifth Assessment Report
BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
Btu	British thermal units
CEA	Council of Economic Advisers
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
PEIS	programmatic environmental impact statement
CPP	Clean Power Plan
DME	Office of Valuation Services, Division of Minerals Evaluation
EIA	Energy Information Administration
EIS	environmental impact statement
EPA	Environmental Protection Agency
FCLAA	Federal Coal Leasing Amendments Act of 1976
FLPMA	Federal Land Policy and Management Act of 1976
FMV	fair market value
GAO	Government Accountability Office
GW	gigawatts
INDC	US 2025 Intended Nationally Determined Contribution
IPM	Integrated Planning Model
LBA	lease-by-application
LCOE	levelized cost of electricity

MSHA	Mine Safety and Health Administration
NCA3	2014 National Climate Assessment, Climate Change Impacts in the United States
NEPA	National Environmental Policy Act of 1969
NOx	nitrogen oxides
NRC	National Research Council
OIG	US Department of the Interior, Office of Inspector General
ONRR	Office of Natural Resource Revenue
OSMRE	Office of Surface Mining Reclamation and Enforcement
OVS	Office of Valuation Services
RA	regulatory authority
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO	BLM State Office
SO_2	sulfur dioxide
TWh	terawatt hours
UNFCCC	United Nations Framework Convention on Climate Change
USC	United States Code
USGS	US Geological Survey

Volume I

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EXECUTIVE SUMMARY

BACKGROUND

In addition to its responsibilities for managing 247 million acres of land and other resources, the Bureau of Land Management (BLM) is responsible for managing coal leasing on approximately 570 million acres where the coal mineral estate is owned by the Federal Government. The BLM manages these resources on behalf of their owners, the American people. This responsibility includes advancing the safe and responsible development of energy resources while promoting the conservation and protection of scientific, historic, and environmental values of our lands for generations to come.

The BLM currently administers 306 coal leases encompassing over 475,000 acres in 10 states, with an estimated 7.4 billion tons of recoverable coal. Over the last decade, BLM-administered leases have produced over 4 billion tons of coal, resulting in the collection of over $10 billion in Federal revenue that is shared with the state from which the mineral was mined. The recoverable coal currently under lease is estimated to be enough to continue production at current levels for approximately 20 years.

In 2015, 42 percent of all coal produced in the United States came from publicly owned land, primarily in the Powder River Basin in Wyoming. Between 80 and 90 percent of the coal produced in the United States is used for electricity generation. In recent years there has been a consistent decline in coal-fired electricity generation and, consequently, a decline in coal production. Coal-fired electricity made up 50 percent of US generation in 2005 and by 2015 had declined to 33 percent. Coal production fell from 1.13 billion to less than 0.9 billion tons during this same time period.[1,2] In 2015, US coal production

[1] US EIA. 2016. 2016 Annual Coal Report. November 3, 2016. Available at http://www.eia.gov/coal/annual/
[2] US EIA. 2012. Coal Rank and Minding Method, 1949-2011. September, 2012. Available at https://www.eia.gov/coal/data.php#production

experienced one of the steepest declines in history, and it is projected to decline by an additional 15 percent in 2016.[3] Several major coal companies have instituted bankruptcy proceedings. Some of these companies have since emerged or are in the process of emerging from bankruptcy.

The last time the Federal coal program received a comprehensive review was in the mid-1980s, and most of the existing regulations were promulgated in the late 1970s and have been only slightly modified since that time. The direct, indirect, and cumulative impacts of the Federal coal program have not been fully analyzed under the National Environmental Policy Act (NEPA) in over thirty years. This has led to calls from a variety of sources for review of many facets of the program, including return to the American taxpayer, climate change considerations, resource protection mandates, and process efficiency.

The Secretary of the Interior is authorized to lease coal as she finds "appropriate and in the public interest" (30 United States Code [USC], Subsection 201[a][1]). Consideration of the implications of Federal coal leasing for climate change, as an extensively documented threat to the health and welfare of the American people, falls squarely within the factors to be considered in determining the public interest. Moreover, this consideration is critical in the development of land use plans where the Secretary must "weigh long-term benefits to the public against short-term benefits" (43 USC, Subsection 1712[c][7]). Such consideration is an important part of the Secretary's responsibility under the Federal Land Policy and Management Act (FLPMA) to manage "the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people" (43 USC, Subsections 1701[a][7]; 1702[c]).

When resource extraction from public lands is determined to be appropriate, it is also incumbent upon the Department of the Interior to ensure that the public receives the appropriate compensation for the use of its resources. "No bid [on a coal lease tract] shall be accepted which is less than the fair market value, as determined by the Secretary, of the coal subject to the lease. Prior to his determination of the fair market value of the coal subject to the lease, the Secretary shall give opportunity for and consideration to public comments on the fair market value" (30 USC, Subsection 201[a][1]). This requirement to receive fair market value (FMV) places a floor on the monetary return the public must receive once the Secretary determines that it is appropriate and in the public interest to lease a coal tract. In other words, in determining where, when, and how to lease a coal tract, the Secretary must ensure that the sale of this public resource fairly compensates the public by receiving the highest price a willing seller would realize when leasing to a willing buyer—as would any party seek in selling resources in a commodity market.

[3] US EIA. 2016. Short-Term Energy Outlook. December 2016. Available at http://www.eia.gov/outlooks/steo/pdf/steo_full.pdf

ISSUE IDENTIFICATION

In the spring of 2015, Secretary of the Interior Sally Jewell called for "an honest and open conversation about modernizing the Federal coal program." The Department of the Interior subsequently held listening sessions around the country that summer. Hundreds of individuals attended the hearings in person. The Department heard from 289 individuals during the sessions and received over 94,000 written comments. Through these sessions, the areas of concern to a wide variety of interests became clearer.

As a result, in early 2016 Secretary Jewell issued Secretarial Order 3338 directing the BLM to prepare a Programmatic Environmental Impact Statement (PEIS) under the NEPA to identify and analyze potential leasing and management reforms for the Federal coal program. The PEIS provides the BLM with an efficient and effective tool to consider a wide range of reasonable reform alternatives, evaluate the impacts of those alternatives with a focus on cumulative effects, and provide meaningful opportunities for public engagement to inform future agency decision-making.

This scoping report is the first step in the process of reviewing these complex and interrelated issues. It will be followed by a Draft PEIS that will further analyze and refine the reform options presented here and identify a menu of draft alternatives. Following public comment on that Draft PEIS, a Final PEIS will be produced with a recommended roadmap for reforming the Federal coal program. The final report is expected to be completed in early 2019.

In the spring of 2016, the BLM published a Notice of Intent to prepare a programmatic environmental impact statement to review the Federal coal program and to conduct public scoping meetings. That notice initiated the formal public scoping process for the PEIS, calling for public information and comment. In particular, the Notice of Intent posed questions to the public on the following issues identified as areas of concern in the Secretarial Order:

- How, when, and where to lease
- Fair return
- Climate impacts
- Socioeconomic considerations
- Exports
- Energy needs

The Department of the Interior held six public meetings during the summer of 2016 in all regions of the country, including key areas of Federal coal production. These meetings were attended by about 2,000 people and were also either live-streamed or made available in audio. In addition to oral comments provided at the meetings, about 214,402 written comments (654

unique) were received during the comment period, as well as expert reports and analyses.

Invitations have been extended to 72 potential "Cooperating Agencies" as defined by the NEPA that would function as partners with the BLM in preparing the PEIS. The BLM also has reached out to all federally recognized tribes to determine their interest in formal consultation on the PEIS. An initial meeting with Cooperating Agencies was held on December 13, 2016, and consultation with interested tribes was initiated in the same month.

NATURE OF SCOPING REPORT

This report is the result of the BLM's review and consideration of the materials and analyses received through the listening sessions, public scoping process, or otherwise available. Based on this review, it appears that modernization of the Federal coal program is warranted. While energy markets, communities, environmental conditions, and national priorities have changed dramatically, the program has remained fairly static in its administration over the last thirty years.

This modernization should focus on ensuring a fair return to Americans for the sale of their public coal resources; addressing the coal program's impact on the challenge of climate change; and improving the structure and efficiency of the coal program in light of current market conditions, including impacts on communities.

In each of these areas additional analysis is necessary prior to the recommendation of specific policy choices, in order to provide a complete understanding of the likely impacts of various policies on energy markets, electricity prices, employment, and other critically important issues. These issues will be the focus areas of analysis for the PEIS going forward. However, it is possible at this stage in the process to identify the most promising policies for consideration. This report sets out these currently available policy ideas for addressing these important issues, and the additional data and technical work needed to decide specifically how to move forward. In addition, there are some simpler good government improvements that can be made without significant additional analysis which the scoping report outlines as well.

This report provides context for considering reform opportunities, and it presents preliminary reform options and an analytical framework that will form the basis for the PEIS. This report sets out reform options organized by policy objectives that align with the Secretarial Order, and it expands upon the reform options based on input received. This report also identifies reform options received during the scoping process that are not recommended for further analysis and sets out the reasons for those recommendations. The reform options that will be carried forward for further consideration by the BLM include:

Fair Return

- Increase royalty rate
- Implement FMV determination process changes (i.e., transparency and consistency)
- Limit the use and increase the transparency of royalty rate reductions
- Increase rental rate
- Raise minimum bonus bid
- Implement inter-tract or modified inter-tract bidding processes to increase competition among bidders
- Evaluate current performance bonding amounts; increase bonding levels as necessary
- Convene a royalty policy commission

Reduce/Account for Greenhouse Gas Emissions

- Account for carbon-based externalities through royalty rate increase or royalty adder
- Require compensatory mitigation for greenhouse gas emissions
- Lease per a carbon budget
- Create incentives for methane capture
- No new leasing, except for limited lease modifications

Improve Resource Protection and Management

- Improve application of unsuitability criteria; modify criteria as necessary
- Develop strategic leasing plans that address landscape scale issues, multiple use, and mitigation planning
- Account for additional coal-related externalities, such as public health and environmental impacts
- Strengthen lease applicant qualification requirements
- Apply environmental protections to existing leases
- Develop regional mitigation strategies for existing and new coal development to address public health and environmental impacts
- Develop best management practices for resource protection

Increase Lease Process Efficiency

- Develop strategic leasing plans that allow for tiering of future lease decisions
- Create a pre-application process

- Create a standardized lease application form and develop an electronic application platform
- Establish a single team to develop FMV estimates
- Work with other agencies to evaluate means for eliminating overlapping requirements and redundant processes
- Improve transparency in the leasing process

The BLM believes that there are a number of these options that represent more modest reforms that could be combined with almost any combined option package or future alternative, or implemented as standalone actions. These options represent beneficial program modernization activities and good government practices.

For fair return, these include FMV determination process changes aimed at transparency and consistency, limiting the use of royalty rate reductions and improving the transparency associated with the use of royalty rate reductions, rental rate adjustments to reflect inflation, minimum bonus bid adjustments to reflect inflation, and evaluation of current performance bonding amounts. For greenhouse gas emissions, this includes creating incentives for methane capture.

For resource protection and management, this includes strengthening requirements for companies bidding on leases, all of which would require coordination with the Office of Surface Mining Reclamation and Enforcement (OSMRE). These requirements include prohibiting leasing to self-bonded companies, ensuring sufficient financial resources, ensuring companies have not been cited for major violations of environmental regulations in connection with other operations, and verifying companies have been fulfilling reclamation obligations in connection with other operations. It also includes developing best management practices for resource protection and improving planning to avoid land use conflicts, such as through the modification and improved application of unsuitability criteria or through the development of strategic coal leasing plans.

For lease process efficiency, these include standardizing lease application forms, developing an electronic platform for the submission of applications, working with other agencies to evaluate means for eliminating redundant processes, and improving transparency.

At the Secretary's direction in connection with Order 3338, the BLM is in the process of developing guidance to implement several of these improvements. Additional reforms may be implemented prior to completion of the Final PEIS if further analysis supports taking action on a more expedited timeframe.

To demonstrate how the various options could be combined to develop alternatives in the PEIS, the report sets out three possible option combination packages. Because each option presents its own range of analytic issues and

because that complexity may be compounded by interactions among the reform options if they are implemented in combination, additional analysis is needed before these or other combinations of options can be included as alternatives for consideration in the PEIS. The Draft PEIS also will analyze a "no action" and a "no leasing" alternative.

Possible Option Combination Package #1

1. Fair Return

   Increase the royalty rate to reflect the fair return for coal produced on Federal land. The BLM would identify the most appropriate metric and corresponding royalty rate for Federal coal, reflecting on analysis already conducted by other groups such as the Council of Economic Advisers (CEA).

2. Climate Change/Resource Protection

   Require compensatory mitigation for Federal coal leases. The BLM would require lessees to carry out or fund activities that proportionally offset climate-related impacts, including through investment in a fund managed by an entity that takes on the liability to proportionally offset those greenhouse gas emissions and climate-related impacts. Contribution to the fund would be tied to the units of coal produced. Funds could be used for activities including, but not limited to, carbon offsets, carbon sequestration, climate adaptation, and community resilience.

3. Leasing Process

   a. *Develop strategic leasing plans and utilize modified inter-tract bidding on a $/ton or $/British thermal unit (Btu) basis*. Strategic leasing plans would be developed based on regular reviews of projected domestic coal demand (e.g., over a 5-year window) and the role of Federal coal resources in meeting domestic energy needs. These plans would set lease sales on a regular schedule to accommodate a modified inter-tract bidding system. The BLM would determine a maximum tonnage of coal or maximum number of Btus to be leased consistent with projected demands. Under a modified inter-tract leasing process, all interested companies would bid among themselves for the right to produce a specified quantity of coal in the location of their choice, assuming it is suitable for mining and consistent with the approved land use plan and strategic leasing plan. To the extent that auctions become more competitive through the use of modified inter-tract bidding, resulting in increased bonus bids, the need for a higher royalty rate could be revisited on a periodic basis.

b. *Develop regional mitigation strategies.* Regional mitigation strategies would be developed by the BLM to identify and facilitate compensatory mitigation opportunities at the regional scale, allowing for pre-planning for, and advanced investment in, mitigation opportunities.

4. Community Assistance

a. *Explore use of compensatory mitigation funds to invest in affected communities experiencing reduced coal production.* The BLM would seek to use compensatory mitigation funds to invest in economic diversification and workforce development efforts.

b. *Direct a portion of Federal coal revenues to community assistance.* The BLM would seek to secure Congressional authorization to direct a portion of increased Federal coal revenues toward investments in impacted communities that support economic diversification, job training, mine reclamation, and other community priorities.

Possible Option Combination Package #2

1. Fair Return

Increase the royalty rate to reflect the fair return for coal produced on Federal land. The BLM would identify the most appropriate metric and corresponding royalty rate for Federal coal, reflecting on analysis already conducted by other groups. Because a carbon-based royalty adder, as described under 2, could be instituted in combination with or independent of a potential royalty rate increase based on fair return principles, the BLM will analyze the effects of such changes both individually and cumulatively.

2. Climate Change/Resource Protection

Apply a royalty adder to account for carbon-based environmental and societal costs of coal production and use ($/ton of coal). A royalty adder would tie climate costs directly to production/consumption. As a price mechanism, a royalty adder would provide price certainty to mining operators and downstream purchasers. A royalty adder would apply only to new and renewed leases and, therefore, would be necessarily phased in over time. The BLM would conduct analysis to identify the most appropriate royalty adder taking into account downstream regulations and substitution effects, and reflecting on analysis already completed by other groups. The BLM would also assess the net impact on revenues from such changes, including any potential reduction in bonus bids and production.

3. Leasing Process

   Develop strategic leasing plans and utilize modified inter-tract bidding on a $/ton or $/Btu basis. Strategic leasing plans would be developed based on regular reviews of projected Federal coal demand (e.g., over a 5-year window) and could serve a variety of purposes that meet a number of policy objectives, including addressing resource management concerns at a landscape level and helping to streamline future leasing actions. These plans would set lease sales on a regular schedule to accommodate a modified inter-tract bidding system. The BLM would determine a maximum tonnage of coal or maximum number of Btus to be leased consistent with projected demands. Under a modified inter-tract leasing process, all interested companies would bid among themselves for the right to produce a specified quantity of coal in the location of their choice, assuming it is suitable for mining and consistent with the approved land use plan and strategic leasing plan. To the extent that auctions become more competitive through the use of modified inter-tract bidding, resulting in increased bonus bids, the need for a higher royalty rate could be revisited on a periodic basis.

4. Community Assistance

   a. *Direct a portion of Federal coal revenues to community assistance.* The BLM would seek to secure Congressional authorization to direct a portion of increased Federal coal revenues toward investments in impacted communities that support economic diversification, job training, mine reclamation, and other community priorities.

   b. *The states' portion of increased revenues would be available to invest in impacted communities experiencing reduced coal production.* The additional revenues generated by a royalty rate adder would be split with states consistent with current law and could be used by states to support economic diversification efforts in communities and related activities.

Possible Option Combination Package #3

1. Fair Return

   Increase the royalty rate to reflect the fair return for coal produced on Federal land. The BLM would identify the most appropriate metric and corresponding royalty rate for Federal coal, reflecting on analysis already conducted by other groups.

2. Climate Change/Resource Protection

   a. *Periodically evaluate and ensure that coal production and associated life-cycle emissions are consistent with the need to reduce net domestic greenhouse gas emissions 80 percent below 2005 levels by 2050.* This

tracks to a straight-line reduction from the US 2025 Intended Nationally Determined Contribution (INDC),[4] and it is also consistent with the long-term pathway set forth in the US Mid-Century Strategy for Deep Decarbonization.[5] The BLM would limit the amount of Federal coal leased at a given time based on a carbon budget. The Federal coal leasing levels would be premised on a carbon budget that is commensurate with Federal coal's appropriate contribution to meeting economy-wide greenhouse gas emission reduction targets. In other words, the total amount of coal offered and made accessible under Federal leases would contain lifecycle carbon dioxide (CO_2) emission levels that are less than or equal to the anticipated emissions from Federal coal under an INDC strategy.[6] The BLM would also need to evaluate the effectiveness of applying INDC-based limits to Federal coal leasing if and when no similar limitations are applied to substitute non-Federal energy sources to address concerns over emissions shifting to non-Federal coal sources. This potential shifting to non-Federal coal sources could reduce the environmental benefit of such limits (i.e., due to emissions leakage).

b. *Develop strategic leasing plans.* Strategic leasing plans would incorporate the carbon budget and set lease sales on a regular schedule to accommodate a modified bidding system (see 3a below). These strategic plans could help meet a variety of policy objectives, including addressing resource management concerns at a landscape level and helping to streamline future leasing actions.

3. Leasing Process

Use modified inter-tract bidding on a $/ton or $/Btu basis. The BLM would determine a maximum tonnage of coal or carbon or maximum number of Btus to be leased consistent with the defined carbon budget. Under a modified inter-tract leasing process, all interested companies would bid among themselves for the right to produce a specified quantity of coal in the location of their choice, assuming it is suitable for mining and consistent with the approved land use plan and strategic leasing plan. To the extent that auctions become more competitive through the use of modified inter-tract

[4] Actions described by the United States under the UNFCCC in December 2015 to achieve the long-term goals of the Paris Agreement: to hold the increase in global average temperature to well below 2°C, to pursue efforts to limit the increase to 1.5°C, and to achieve net zero emissions in the second half of this century.

[5] The White House. 2016. US Mid-Century Strategy for Deep Decarbonization. November 2016. Available at https://www.whitehouse.gov/sites/default/files/docs/mid_century_strategy_report-final.pdf

[6] One way to implement this approach would be for the BLM to use an economy-wide model to estimate least cost compliance strategies for meeting INDCs. The BLM could use the model output to derive anticipated Federal coal consumption levels over a 20-year period, and then use that level, in conjunction with reserves already under lease, as a limit on the amount of reserves that are leased.

bidding, resulting in increased bonus bids, the need for a higher royalty rate could be revisited on a periodic basis.

4. Community Assistance

Direct a portion of Federal coal revenues to investments in communities experiencing economic impacts from reduced coal production. The BLM would seek to secure Congressional authorization to direct a portion of increased Federal coal revenues toward investments in communities that support economic diversification, job training, mine reclamation, and other community priorities.

No Action Alternative

Under the no action alternative, the Federal coal program would continue to be administered in the manner in which it is administered currently. Leasing would be conducted through lease-by-applications (LBAs). The current means of determining FMV, royalty rate reductions, minimum bonus bids, and rental rates would remain unchanged. The no action alternative would not address concerns raised by numerous parties about the Federal coal program, including concerns raised by the Government Accountability Office (GAO), the Department of the Interior's Office of Inspector General (OIG), members of Congress, interested stakeholders, and the public.

No Leasing Alternative

Under a no leasing alternative, the BLM would issue no new leases for Federal coal, except for lease modifications within the defined acreage limitations (960 acres or less[7]). Existing coal already under lease would not be impacted. Administration of existing leases would remain unchanged, including existing royalty rates and rental rates. The BLM may also consider combining the no new leasing alternative with other reform options aimed at modernizing the administration of existing leases as part of separate reform packages or alternatives.

These options and option combination packages are based on the best judgment brought to bear based on the comments received and with the data at hand. The development of the PEIS will involve detailed analysis of these options and option combination packages. Of particular relevance will be analyzing effects on energy markets, the energy economy, communities, and the environment. As additional data becomes available during preparation of the PEIS, these options and option combination packages may be revised.

With this in mind, the key areas of analysis for the PEIS, many of which were identified as priorities by the Secretarial Order, include: return to the taxpayer, climate impacts/greenhouse gas emissions, socioeconomic considerations, energy needs (including coal production and exports, as well as substitution effects), energy prices,

[7]As defined in section 432 of the Energy Policy Act of 2005.

other environmental impacts (e.g., water quality and wildlife), and health impacts. The BLM will use the best available science to support its analyses in the PEIS and employ sophisticated power sector modeling to determine the potential outcomes of options and option combination packages. In conducting this analysis, the BLM will also rely on Cooperating Agency expertise and the thoughtful work completed and underway by stakeholders and the public.

This report is intended to provide an educated starting point for the work on the PEIS, and a path forward for continuing to involve and tap the expertise of the public who care about and know about these public lands and resources.

CHAPTER 1
INTRODUCTION

The Bureau of Land Management (BLM) has undertaken scoping as part of its comprehensive review of the Federal coal program and has prepared this scoping report consistent with National Environmental Policy Act of 1969 (NEPA) requirements at Title 40 of the Code of Federal Regulations (CFR), Subpart 1501.7. Scoping is the process by which the BLM solicits internal and external input on the issues, impacts, and potential alternatives that will be addressed in an environmental impact statement (EIS), as well as the extent to which those issues and impacts should be analyzed in the NEPA document.

The objectives of this scoping report are to:

1. Provide an overview of the scoping process for the BLM's Coal Programmatic Environmental Impact Statement (PEIS)
2. Provide a summary of the comments received through the scoping process
3. Provide baseline information regarding the Federal coal program and establish the context in which the BLM will consider potential reform options
4. Present preliminary reform options for the Federal coal program that the BLM will carry forward for further analysis and that may form the basis for the alternatives in the PEIS.
5. Present a preliminary analytical framework for the PEIS

The scoping report is organized into the following chapters:

Chapter 2. Background–Provides background information on the BLM's development of the PEIS, including listening sessions held in 2015, Secretarial Order 3338, and the Notice of Intent.

Chapter 3. Public Involvement and Public Scoping Process–Describes the scoping process undertaken for the PEIS.

Chapter 4. Summary of Comments Received–Provides summaries of the comments received through the scoping process.

Chapter 5. Federal Coal Leasing Program–Describes the Federal coal program and provides baseline information intended to provide context for the BLM's consideration of potential program reform options. This chapter includes: authorities, other Federal agency roles and responsibilities, historical information, state of the coal industry information, coal leasing and production data, market projections for coal, greenhouse gas emissions, socioeconomic considerations, and an overview of the Federal coal leasing process.

Chapter 6. Programmatic Environmental Impact Statement–Provides the BLM's preliminary synthesis of information provided through the scoping process, which will provide the foundation for the Draft PEIS. This chapter includes: a purpose and need statement, preliminary reform options that meet identified policy objectives to be carried forward for further consideration by the BLM, a rationale for dismissing some options from further consideration, a framework for developing program reform alternatives, issues for analysis, an analytical approach, analytical considerations, and a schedule for completion of the PEIS.

CHAPTER 2
BACKGROUND

2.1 INTRODUCTION

The activities that the BLM conducted prior to the initiation of the official NEPA process are described in this chapter.

2.2 LISTENING SESSIONS

On March 17, 2015, Secretary Jewell called for "an honest and open conversation about modernizing the Federal coal program." As previously described, the last time the Federal coal program underwent comprehensive review was in the mid-1980s, and market conditions, infrastructure development, scientific understanding, and national priorities have changed considerably since that time. The Secretary's call was also motivated by concerns raised by numerous parties about the Federal coal program, including concerns raised by the Government Accountability Office (GAO)[8], the Department's Office of Inspector General (OIG)[9], members of Congress, interested stakeholders, and the public. The concerns raised by the GAO and OIG centered on whether taxpayers are receiving fair market value (FMV) for leasing Federal coal on public lands. Other commenters raised concerns that the current Federal leasing structure lacks transparency and competition, while also raising questions regarding current market conditions for the coal industry generally and related implications for Federal resources. Stakeholders also questioned whether the leasing program results in over-supply of a commodity that has significant environmental and health impacts, including impacts on global climate change.

[8] GAO. 2013. Coal Leasing: BLM Could Enhance Appraisal Process, More Explicitly Consider Coal Exports, and Provide More Public Information. GAO 14-140. December 2013. Available at http://www.gao.gov/products/GAO-14-140.

[9] OIG. 2013. Coal Management Program, US Department of the Interior, Report No. CR-EV-BLM-0001-2012. June 2013. Available at https://www.doioig.gov/sites/doioig.gov/files/CR-EV-BLM-0001-2012Public.pdf

In response to the Secretary's call for a conversation to address these concerns, the BLM held five listening sessions regarding the Federal coal program in the summer of 2015. These listening sessions offered the public the opportunity to comment on how the BLM can best carry out its responsibility to ensure that taxpayers receive a fair return for leasing the coal resources managed by the BLM on their behalf. The details of the public listening sessions are provided below in **Table 2-1**. In total, 1,068 individuals attended the listening sessions, and all of the listening sessions were live-streamed. The BLM heard oral comments from 289 individuals during the sessions.

Table 2-1
Listening Sessions

Location	Venue	Date	Number of Attendees
Washington, DC	South Main Interior Building 1951 Constitution Ave. NW	July 29, 2015	114
Billings, Montana	BLM Montana/Dakotas State Office 5001 Southgate Drive	August 11, 2015	365
Gillette, Wyoming	Campbell County Library 2101 South 4-J Road	August 13, 2015	308
Golden, Colorado	Marriott Denver West 1717 Denver West Boulevard	August 18, 2015	161
Farmington, New Mexico	Courtyard Marriott 560 Scott Avenue	August 20, 2015	120
Total			**1,068**

In coordination with the listening sessions, the BLM collected written input on reform of the Federal coal program. In total, 94,045 submissions were received before the comment period closed on September 17, 2015, as reflected in **Table 2-2**, below. The oral and written comments reflected several recurring themes. First, numerous stakeholders expressed concern that American taxpayers are not receiving a fair return for the leasing of public coal resources. Second, many stakeholders expressed concern that the Federal coal program conflicts with the Administration's climate policy and the country's national climate goals, making it more difficult to achieve those goals. Third, there were numerous and varying concerns raised about the structure of the Federal coal program in light of current market conditions, including how implementation of the Federal leasing program affects current and future coal markets, coal-dependent communities and companies, and the reclamation of mined lands.

Table 2-2
Listening Session Submissions

Type of Written Comment	Number of Submissions	Percent of Total
Form letters from all sources (12 groups)*	92,846	98.7
Written comments submitted at the listening session meetings	1,001	1.1
Other written comments	198	0.2
Total written comments	**94,045**	**100**

* Form letter campaigns were initiated by 12 different organizations

2.3 SECRETARIAL ORDER

In response to the broad range of issues raised over the course of the past few years and through the listening sessions, on January 15, 2016, the Secretary of the Interior issued Order No. 3338. The Order directs the BLM to carry out the following:

1) A formal, comprehensive review of the Federal coal program through a discretionary programmatic EIS under NEPA;

2) A pause on significant new coal leasing decisions on public lands while the programmatic review is underway, with limited, enumerated exemptions and exclusions;

3) A series of good government reforms to improve transparency and program administration, including the establishment of a public database to account for the carbon emissions from fossil fuels on public lands by the US Geological Survey (USGS).

The Order states:

> "Given the broad range of issues raised over the course of the past year (and beyond) and the lack of any recent analysis of the Federal coal program as a whole, a more comprehensive, programmatic review is in order, building on the BLM's public listening sessions[.]
>
> …
>
> [T]he purpose of the P[rogrammatic] EIS is to identify, evaluate, and potentially recommend reforms to the Federal coal program. This review will enable the Department to consider how to modernize the program to allow for the continued development of Federal coal resources while addressing the substantive issues raised by the public, other stakeholders, and the Department's own review of the comments it has received.
>
> …

> The PEIS will provide a vehicle for the Department to undertake a comprehensive review of the program and consider whether and how the program may be improved and modernized to foster the orderly development of BLM administered coal on Federal lands in a manner that gives proper consideration to the impact of that development on important stewardship values, while also ensuring a fair return to the American public."

The Order directs the Director of the BLM to expeditiously initiate the NEPA scoping process by inviting Federal, state, and local agencies; Indian tribes; and the public to help identify the environmental issues and reasonable alternatives to be examined in the PEIS. Upon completion of the scoping process, the Director of the BLM is required to provide a scoping report to the Secretary of the Interior along with a proposed schedule for the completion of the PEIS.

2.4 NOTICE OF INTENT

On March 30, 2016, in accordance with NEPA, the BLM published a Notice of Intent to prepare a programmatic environmental impact statement to review the Federal coal program and to conduct public scoping meetings[10] in the *Federal Register* announcing its intent to prepare a PEIS to review the Federal coal program and beginning the formal scoping period. The Notice of Intent, included as **Appendix A**, announced the city and states of the planned public scoping meetings, stated that specific dates and locations would be announced at least 15 days in advance of each meeting, and listed various methods of commenting.

The Notice of Intent provided background on the Federal coal program, a preliminary set of issues that were expected to be addressed in the PEIS, and potential modifications to the Federal coal program suggested by stakeholders during the listening sessions that could be considered in the PEIS. While the full set of issues to be assessed in the PEIS would be defined through the public scoping process, the Notice of Intent included the following preliminary set of issues:

- How, when, and where to lease
- Fair return
- Climate impacts
- Other impacts
- Socioeconomic considerations

[10] BLM. 2016. Notice of Intent to Prepare a Programmatic Environmental Impact Statement to Review the Federal Coal Program and to Conduct Public Scoping Meetings. *Federal Register* 81(61):17720. March 30, 2016. Available at https://www.gpo.gov/fdsys/pkg/FR-2016-03-30/pdf/2016-07138.pdf

- Exports
- Energy needs

These issues were originally identified in the Secretarial Order but expanded to include additional topics and details raised in the listening sessions.

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CHAPTER 3
PUBLIC INVOLVEMENT AND PUBLIC SCOPING PROCESS

3.1 INTRODUCTION

Public involvement entails "the opportunity for participation by affected citizens in rulemaking, decision making, and planning with respect to the public lands, including public meetings or hearings…or advisory mechanisms, or other such procedures as may be necessary to provide public comment in a particular instance" (Federal Land Policy and Management Act (FLPMA), Section 103(d), 43 USC 1702(d)). Council on Environmental Quality (CEQ) regulations and BLM land use planning regulations both provide for specific points of public involvement in the NEPA processes to address local, regional, and national interests (40 CFR 1506.6; 43 CFR Subpart 1610). Guidance for implementing public involvement can be found in the BLM NEPA Handbook H-1790-1[11] Public involvement requirements of both NEPA and the FLPMA will be satisfied through this PEIS process.

Scoping is an early and open process for determining the issues to be addressed and identifying the significant issues related to a proposed action (40 CFR 1501.7). Information collected during scoping may also be used to develop the alternatives to be addressed in a NEPA document. The process has two components: internal scoping and external scoping.

The National Environmental Policy Act requires that there be an early and open process for determining the scope of the issues to be addressed by a study.

Internal scoping is the use of the BLM and Cooperating Agency staff to help determine what needs to be analyzed in a NEPA document conducted through

[11] BLM. 2008. Handbook H-1790-1—BLM National Environmental Policy Act. Washington, DC. January 2008.

an interdisciplinary process. External scoping is a public process designed to reach beyond the BLM. External scoping involves notification and opportunities for feedback from other agencies, organizations, tribes, local governments, and the public. Its aim is to identify the concerns of high importance to the public. Internal and external scoping help ensure the following:

- That issues are identified early and are properly studied
- That issues of no concern do not consume time and effort
- That the proposed action and alternatives are balanced, thorough, and implementable

The BLM follows the public involvement requirements documented in CEQ regulations implementing NEPA (40 CFR1501.7 (scoping) and 1506.6 (public involvement)). The BLM also follows public involvement requirements described in the Department of the Interior regulations implementing NEPA (43 CFR, Part 46).

The BLM solicits comments from relevant agencies and the public, organizes and analyzes all comments received, and then distills them to identify issues that will be addressed during the NEPA process. These issues help define the scope of analysis for the EIS and are used to develop alternatives to the proposed action.

A Notice of Intent, an official legal notice published in the Federal Register, announces that a Federal agency is beginning the preparation of an EIS and often includes information about the public scoping process.

3.2 PUBLIC SCOPING

The formal public scoping period began on March 30, 2016, with the publication of a Notice of Intent in the *Federal Register* (see **Chapter 3**, Notice of Intent, included as **Appendix A**).

The Notice of Intent provided an overview of the project and advertised six public scoping meetings. The BLM advertised the scoping meeting locations and times on the project website and through local media, including press releases and newspaper advertisements. A sample newspaper advertisement is included in **Appendix B**, Scoping Materials.

3.3 SUMMARY OF SCOPING MEETINGS

The BLM hosted six public scoping meetings to provide the public with opportunities to learn about the project and the NEPA process and to offer comments. The Notice of Intent announced that the BLM would hold public scoping meetings at locations across the

1,943 individuals attended scoping meetings held in 6 locations throughout the US from May through June 2016.

country. The actual dates, meeting locations and times, and instructions for providing comments were announced via a press release (see **Appendix B**) and the project website: https://www.blm.gov/programs/energy-and-minerals/coal/coal-peis. The details of the public scoping meetings are provided in **Table 3-1**, below.

Table 3-1
Public Scoping Meetings

Location	Venue	Date	Live-streamed?	Number of Attendees
Casper, Wyoming	Casper Events Center One Events Drive	May 17, 2016	Yes	268
Salt Lake City, Utah	Salt Palace Convention Center 90 South West Temple	May 19, 2016	No (audio only)	550
Knoxville, Tennessee	Tennessee Theatre 604 South Gay Street	May 26, 2016	No (audio only)	115
Seattle, Washington	Sheraton Seattle Downtown 1400 6th Avenue	June 21, 2016	Yes	309
Grand Junction, Colorado	Avalon Theatre 645 Main Street	June 23, 2016	No (audio only)	354
Pittsburgh, Pennsylvania	Pittsburgh Convention Center 1000 Fort Duquesne Boulevard	June 28, 2016	Yes	47
Total				**1,943**

Note: Meetings were from 8 a.m. to 4 p.m., except for Casper, which was 8:30 a.m. to 4 p.m., and Pittsburgh, which was 11 a.m. to 7 p.m.

Each meeting began with a two-hour sign-in and speaker sign-up period. During this time, attendees had the opportunity to sign into the meeting and register their contact information for the mailing list. Attendees could also sign up for two-minute speaking slots by getting a speaker card (see **Appendix B**). Speaker cards were numbered sequentially so that attendees would speak in the order that they arrived.

Scoping Meetings included a PowerPoint Presentation with background information on the Federal coal program and an opportunity for public comment on a first come, first served basis.

After the registration period, the BLM's contractor, Environmental Management and Planning Solutions (EMPSi), provided welcoming remarks, including an explanation of the meeting format. This was followed by a PowerPoint

presentation given by the BLM (see **Appendix B**). The presentation included background information on the Federal coal program, explained the issues that the PEIS will consider, and provided specific topics for which the BLM is seeking public input. In addition, background information on the reform of the Federal coal program (including a Questions and Answers sheet and Secretarial Order 3338) was provided in handouts (see **Appendix B**).

At the conclusion of the presentation, EMPSi opened the meeting to public comments. Attendees who wished to speak were offered the opportunity according to the number on their speaker cards; these were given out sequentially, on a first-come, first-served basis, determined by sign-in order. Once all speakers with speaker cards had spoken, the BLM offered the opportunity for anyone else to speak. Meetings ended when there were no more attendees who wished to speak.

As noted in **Table 3-2**, below, the meetings in Casper, Seattle, and Pittsburgh were live-streamed. The meetings in Salt Lake City, Knoxville, and Grand Junction were available for listening via a phone conference line. Information on how to access these meetings was made available to the public on the project website.

Table 3-2
Remote Access of Public Scoping Meetings

Location	**Live-stream Attendees**
Casper, Wyoming	1,102
Seattle, Washington	420
Pittsburgh, Pennsylvania	147
Location	**Audio Attendee (number of phone lines)**
Salt Lake City, Utah	214
Grand Junction, Colorado	24
Knoxville, Tennessee	93

3.4 TRIBAL CONSULTATION

The United States has a unique legal relationship with American Indian tribal governments as set forth in the Constitution of the United States, treaties, Executive Orders (e.g., Executive Order 13175), federal statutes, federal policy, and tribal requirements, which establish the interaction that must take place between federal and tribal governments. An important basis for this relationship is the trust responsibility of the United States to protect tribal sovereignty, self-determination, tribal lands, tribal assets and resources, and treaty and other federally recognized and reserved rights. Additionally, tribal consultation is required by the National Historic Preservation Act (54 USC 300101, et seq.). Tribal consultation is undertaken by the BLM to identify the cultural values,

religious beliefs, traditional practices, and legal rights of Native American people, which could be affected by the BLM's actions on Federal lands.

Given the national focus of the PEIS and potential for decisions made through the PEIS to impact resources and values of Tribes across the United States, the BLM sent letters to all federally recognized tribes asking if they wanted to consult with the BLM on the PEIS. The BLM sent Tribal consultation invitation letters on October 3, 2016, to 212 tribal entities (see **Table 3-3**) and initiated tribal consultation with interested tribes in December 2016.

Table 3-3
Tribal Consultation Invitees

Tribal Invitee	State
Absentee Shawnee Tribe	OK
Alabama Quassarte Tribal Town	TX
Alabama-Coushatta Tribe	TX
All Indian Pueblo Council	NM
Apache Tribe of Oklahoma	OK
Arctic Slope Regional Corporation	AK
Assiniboine Sioux Tribe	MT
Atqasuk Corporation	AK
Atqasuk Village	AK
Blackfeet Tribal Business Council	MT
Blue Lake Rancheria	CA
Bureau of Indian Affairs	MT
Caddo Nation	OK
Canoncito Navajo Band, Tohajiilee Chapter	NM
Catawa Indian Nation	SC
Cherokee Nation	OK
Cheyenne River Sioux Tribe	SD
Cheyenne-Arapaho Tribes	OK
Chickasaw Nation	OK
Chippewa Cree Tribe	MT
Choctaw Nation of Oklahoma	TX
Citizen Potawatomi Nation	OK
City of Anaktuvuk Pass	AK
City of Atqasuk	AK
City of Barrow	AK
City of Kaktovik	AK
City of Nuiqsut	AK
City of Point Hope	AK
City of Wainwright	AK
Colorado River Indian Tribes	AZ
Comanche Nation	OK
Confederated Salish and Kootenai Tribes	MT
Confederated Tribes of the Gosute Reservation	UT
Cook Inlet Region, Inc.	AK

Table 3-3
Tribal Consultation Invitees

Tribal Invitee	State
Crow Creek Sioux Tribe	SD
Crow Tribe	MT
Cully Corporation, Inc.	AK
Delaware Nation	OK
Delaware Tribe of Indians	OK
Eastern Band of Cherokee Indians	NC
Eastern Shawnee Tribe	MO
Euchee Tribe of Indians	OK
Five Sandoval Indian Pueblos	NM
Flandreau Santee Sioux Tribe	SD
Fort Belknap Indian Community	MT
Fort Mohave Tribe	CA
Fort Peck Tribes	MT
Fort Sill Apache Tribe of Oklahoma	OK
Gila River Indian Community Council	AZ
Hopi Tribal Council	AZ
Inupiat Community of the Arctic Slope	AK
Iowa Tribe of Kansas and Nebraska	KS
Iowa Tribe of Oklahoma	OK
Jena Band Choctow Indians	LA
Jicarilla Apache Nation	NM
Kaktovik Inupiat Corporation	AK
Kansas Kickapoo Tribe	KS
Kaw Nation	OK
Kialegee Tribal Town	OK
Kickapoo Traditional Tribe of Texas	TX
Kickapoo Tribe of Oklahoma	OK
Kiowa Tribe of Oklahoma	OK
Kuukpik Corporation	AK
Little Shell Tribe of Chippewa Indians	MT
Lower Brule Sioux Tribe	SD
Lower Sioux Indian Community	MN
Mescalero Apache Tribe	NM
Miami Nation	OK
Mississippi Band of Choctaw Indians	MS
Modoc Tribe	OK
Morongo Band Mission Indians	CA
Muscogee (Creek) Nation	OK
Naqragmiut Tribal Council	AK
Native Village of Barrow Inpuiat Traditional Government	AK
Native Village of Kaktovik	AK
Native Village of Nuiqsut	AK
Native Village of Point Hope	AK
Native Village of Point Lay	AK
Navajo Nation	AZ

Table 3-3
Tribal Consultation Invitees

Tribal Invitee	State
Navajo Nation Council	AZ
Navajo Nation Division of Natural Resources	AZ
Navajo Nation Oil and Gas Company	AZ
Navajo Nation, Aneth Chapter	UT
Navajo Nation, Mexican Water Chapter	AZ
Navajo Nation, Oljato Chapter	UT
Navajo Nation, Red Mesa Chapter	UT
Navajo Nation, Teecnospos Chapter	AZ
Navajo Nation, Alamo Chapter	NM
Navajo Nation, Baahaali Chapter	NM
Navajo Nation, Baca/Prewitt Chapter	NM
Navajo Nation, Becenti Chapter	NM
Navajo Nation, Beclabito Chapter	NM
Navajo Nation, Burnham Chapter	NM
Navajo Nation, Casamero Lake Chapter	NM
Navajo Nation, Chichiltah Chapter	NM
Navajo Nation, Churchrock Chapter	NM
Navajo Nation, Counselor Chapter	NM
Navajo Nation, Coyote Canyon Chapter	NM
Navajo Nation, Crownpoint Chapter	NM
Navajo Nation, Crystal Chapter	NM
Navajo Nation, Gadii ahi/To'Koi Chapter	NM
Navajo Nation, Hogback Chapter	NM
Navajo Nation, Huerfano Chapter	NM
Navajo Nation, Iyanbito Chapter	NM
Navajo Nation, Lake Valley Chapter	NM
Navajo Nation, Little Water Chapter	NM
Navajo Nation, Manuelito Chapter	NM
Navajo Nation, Mariano Lake Chapter	NM
Navajo Nation, Mexican Springs Chapter	NM
Navajo Nation, Minerals Department	AZ
Navajo Nation, Nageezi Chapter	NM
Navajo Nation, Nahodishgish Chapter	NM
Navajo Nation, Naschitti Chapter	NM
Navajo Nation, Nenahnezad Chapter	NM
Navajo Nation, Newcomb Chapter	NM
Navajo Nation, Ojo Encino Chapter	NM
Navajo Nation, Pinedale Chapter	NM
Navajo Nation, Pueblo Pintado Chapter	NM
Navajo Nation, Ramah Chapter	NM
Navajo Nation, Red Lake #18 Chapter	NM
Navajo Nation, Red Rock Chapter	NM
Navajo Nation, Rock Springs Chapter	NM
Navajo Nation, San Juan Chapter	NM
Navajo Nation, Sanostee Chapter	NM

Table 3-3
Tribal Consultation Invitees

Tribal Invitee	State
Navajo Nation, Sheepsprings Chapter	NM
Navajo Nation, Shiprock Chapter	NM
Navajo Nation, Smith Lake Chapter	NM
Navajo Nation, Standing Rock Chapter	NM
Navajo Nation, Thoreau Chapter	NM
Navajo Nation, Toadlena/Two Grey Hills Chapter	NM
Navajo Nation, Tohatchi Chapter	NM
Navajo Nation, Torreon Chapter	NM
Navajo Nation, Tsayatoh Chapter	NM
Navajo Nation, Twin Lakes Chapter	NM
Navajo Nation, Upper Fruitland Chapter	NM
Navajo Nation, Whitehorse Lake Chapter	NM
Navajo Nation, Whiterock Chapter	NM
Navajo Utah Commission	UT
National Council of American Indians (NCAI)	Washington, DC
Nez Perce Tribe	ID
North Slope Borough	AK
Northern Arapahoe Nation	WY
Northern Cheyenne Tribe	MT
Nunamiut Corporation, Inc.	AK
Oglala Sioux Tribe	SD
Ohkay Owingeh	NM
Olgoonik Corporation	AK
Osage Nation	OK
Otoe-Missouria Tribe	OK
Ottawa Tribe	OK
Pala Band Mission Indians	CA
Pamunkey Tribe	VA
Pawnee Nation of Oklahoma	OK
Peoria Tribe of Indians	OK
Poarch Band of Creek Indians	AL
Ponca Nation	OK
Prairie Band Potawatomi Nation	KS
Pueblo of Acoma	NM
Pueblo of Cochiti	NM
Pueblo of Isleta	NM
Pueblo of Jemez	NM
Pueblo of Laguna	NM
Pueblo of Nambe	NM
Pueblo of Picuris	NM
Pueblo of Pojoaque	NM
Pueblo of San Felipe	NM
Pueblo of San Ildefonso	NM
Pueblo of Sandia	NM
Pueblo of Santa Ana	NM

Table 3-3
Tribal Consultation Invitees

Tribal Invitee	State
Pueblo of Santa Clara	NM
Pueblo of Santo Domingo	NM
Pueblo of Taos	NM
Pueblo of Tesuque	NM
Pueblo of Zia	NM
Pueblo of Zuni	NM
Pyramid Lake Paiute Tribe	NV
Quapaw Tribe	OK
Quechan Tribe	AZ
Rosebud Sioux Tribe of Indians	SD
Sac & Fox Nation of Missouri in Kansas & Nebraska	KS
Sac and Fox Tribe	OK
Salt River-Pima Maricopa Indian Community	AZ
San Carlos Apache Tribe	AZ
Santee Sioux Tribe of Nebraska	NE
Seminole Nation	OK
Seminole Tribe of Florida	FL
Seneca-Cayuga Tribe	OK
Shawnee Tribe	OK
Shoshone Bannock Tribes	ID
Shoshone Tribe of Wind River Indian Reservation	WY
Sisseton-Wahpeton Oyate Tribes	SD
Soboba Band Mission Indians	CA
Southern Ute Tribe	CO
Spirit Lake Sioux Nation	ND
Standing Rock Sioux Tribe	ND
Thlopthlocco Tribal Town	OK
Three Affiliated Tribes: Mandan, Hidatsa, and Arikara Nation	ND
Tikigaq Corporation	AK
Tohono O'Odham Nation of Arizona	AZ
Tonkawa Tribe	OK
Turtle Mountain Band of Chippewa	ND
Ukpeagvik Inupiat Corporation	AK
United Keetoowah Band of Cherokees	OK
Ute Indian Tribe	UT
Ute Mountain Ute	CO
Wainwright Traditional Council	AK
White Mesa Ute Administration	UT
White Mountain Apache Tribe	AZ
Wichita & Affiliated Tribes	OK
Wyandotte Nation	OK
Yankton Sioux Tribe Bus. & Claims Committee	SD
Ysleta del Sur Pueblo	TX
Total number of Tribal invitations: 212	

3.5 COOPERATING AGENCIES

The Cooperating Agency role derives from NEPA, which calls on Federal, state, and local governments to cooperate with the goal of achieving "productive harmony" between humans and their environment (42 USC, Sections 4321-4347). The CEQ regulations that implement NEPA authorize the lead Federal agency to invite State, local, and tribal governments, as well as other Federal agencies, to serve as Cooperating Agencies in the preparation of environmental impacts statements (40 CFR, Subparts 1501.5, 1501.6).

The Cooperating Agency relationship is distinctive, moving beyond consultation to engage officials and staff of other agencies and levels of government in working partnerships. The Cooperating Agencies share skills and resources to help shape the BLM environmental analyses to better reflect the policies, needs, and conditions of their jurisdictions and the citizens they represent. The benefits of enhanced collaboration among agencies in preparing NEPA analyses are as follows:

- Disclosing relevant information early in the analytical process
- Applying available technical expertise and staff support
- Avoiding duplication with other Federal, state, tribal, and local procedures
- Establishing a mechanism for addressing intergovernmental issues

State agencies, local governments, tribal governments, and other Federal agencies may serve as Cooperating Agencies. Cooperating Agency eligibility is defined as any Federal agency other than a lead agency that has jurisdiction by law or special expertise with respect to any environmental impact. A state or local agency with similar qualifications may be a Cooperating Agency. When the effects are on a reservation, an Indian tribe may by agreement with the lead agency become a Cooperating Agency (40 CFR, Subpart 1508.5).

"Jurisdiction by law" means agency authority to approve, veto, or finance all or part of the proposal (40 CFR, Subpart 1508.15). "Special expertise" means statutory responsibility, agency mission, or related program experience (40 CFR, Subpart 1508.26).

In accordance with 40 CFR, Subpart 1501.6, the BLM requested participation of Cooperating Agencies in the preparation of the PEIS. This included Federal agencies with jurisdiction by law or special expertise. In addition, the BLM invited state government representation from those states and counties where active coal leases exist. The BLM invited a total of 72 agencies that were eligible for Cooperating Agency status. The BLM requested a response by October 26, 2016. **Table 3-4** lists the Federal, state and local agencies that were invited as Cooperating Agencies.

Table 3-4
Cooperating Agency Invitees

Federal Invitees
Fish and Wildlife Service
Office of Surface Mining Reclamation and Enforcement
Bureau of Ocean Energy Management
Environmental Protection Agency
US Forest Service
Bureau of Indian Affairs
Office of Valuation Services
Energy Information Administration
Office of Natural Resources Revenue
National Park Service
US Geological Survey
Total invitations sent to Federal entities: 11
State Invitees
Alabama
Arkansas
Colorado
Kentucky
Montana
North Dakota
New Mexico
Ohio
Oklahoma
Utah
Washington
West Virginia
Wyoming
Total invitations sent to state entities: 13
County Invitees
Jefferson County, Alabama
Tuscaloosa County, Alabama
Walker County, Alabama
Scott County, Arkansas
Sebastian County, Arkansas
Delta County, Colorado
Garfield County, Colorado
Gunnison County, Colorado
Las Animas County, Colorado
Moffat County, Colorado
Rio Blanco County, Colorado
Routt County, Colorado
Clay County, Kentucky
Floyd County, Kentucky
Leslie County, Kentucky
Big Horn County, Montana
Fallon County, Montana
Musselshell County, Montana

Table 3-4
Cooperating Agency Invitees

Richland County, Montana
Rosebud County, Montana
McLean County, North Dakota
Mercer County, North Dakota
Williams County, North Dakota
McKinley County, New Mexico
San Juan County, New Mexico
Morgan County, Ohio
Perry County, Ohio
Haskell County, Oklahoma
Latimer County, Oklahoma
Le Flore County, Oklahoma
Carbon County, Utah
Emery County, Utah
Kane County, Utah
Salt Lake County, Utah
Sanpete County, Utah
Sevier County, Utah
Lewis County, Washington
Wayne County, West Virginia
Campbell County, Wyoming
Carbon County, Wyoming
Converse County, Wyoming
Lincoln County, Wyoming
Sweetwater County, Wyoming
Uinta County, Wyoming
Total invitations sent to county entities: 48
Total invitations sent: 72

In accordance with the Department of the Interior regulations implementing NEPA, the BLM must consider any request by an eligible government entity to participate as a Cooperating Agency (43 CFR, Subpart 46.225[c]). The request must be evaluated against Cooperating Agency eligibility criteria—jurisdiction by law or special expertise. Note that Campbell County, Wyoming, and the State of Wyoming requested to be Cooperating Agencies in their scoping comment letters; these groups were also included on the invitation list.

All designated Cooperating Agencies will sign memoranda of understanding with the BLM. The BLM held an initial meeting with Cooperating Agencies in December 2016.

3.6 FUTURE PUBLIC INVOLVEMENT ACTIVITIES

Future public involvement for this NEPA effort includes public review and comment on the Draft PEIS and public review of the Final PEIS. The BLM will continue to conduct public outreach via newsletters, news releases, the project website, and other media throughout the PEIS process.

CHAPTER 4
SUMMARY OF COMMENTS RECEIVED

4.1 COMMENT ANALYSIS PROCESS

All written submissions postmarked or received on or before September 15, 2016, are documented in this scoping summary report. Submissions received after this date are not incorporated in this report, but these and any other comments received throughout the PEIS process will be considered in the development of the PEIS and alternatives formulation, as appropriate.

Written comments were collected via the following methods:

- Project e-mail account at BLM_WO_Coal_Program_PEIS_Comments@blm.gov
- E-mail account at blm_wo_coal_comments@blm.gov
- US Postal Service
- Delivered in person at public scoping meetings or to the Washington, DC office of BLM

The most common format used for submissions was e-mail. A list of commenters is provided in **Appendix C**, List of Commenters.

The public could also provide verbal comments at the scoping meetings, which were documented by a court reporter. A transcript of all verbal comments was provided for each meeting, and these comments were also considered in the comment analysis process.

The BLM screened each written submission to determine if it was a form letter or a unique submission. Form letters are typically created by an organization and then circulated to individuals for submittal to the BLM. Unique submissions are those with distinct, unique text and not part of a form letter. The BLM worked

with representatives from organizations initiating form letter campaigns to ensure that all copies of form letters were received.

A copy of all unique submissions and a representative copy of each form letter were made available for public review on the project website on September 29, 2016.

All unique submissions were assigned a submission tracking identifier and commenter information, and submission text was entered into a comment analysis database. The text of each unique submission was then reviewed to determine if it contained substantive comments. Although all comments received through the scoping process have been considered by the BLM, substantive comments are defined in the BLM NEPA Handbook (Section 6.9.2.1) as comments that do one or more of the following:

- Raise issues that the BLM has not considered or reinforce issues that the BLM has already identified
- Present data or information that can be used when developing alternatives
- Present reasonable alternatives or reform options
- Present data or information that the BLM can use when it considers the impacts of the alternatives
- Raise concerns using reasoning; they may include concerns regarding public land resources, BLM-administered lands, or mineral estate in the project area

In accordance with the BLM NEPA Handbook (Section 6.9.2.1), comments that are not considered substantive include:

- Those in favor of or against an action without any reasoning, such as "I don't like _____," without providing any rationale
- Those without justification or supporting data, such as "allow more development"
- Those that provide background supporting information not directly related to the action

All substantive comments were categorized according to issue topic categories, as detailed below. Details for unique submissions are included below, in **Section 4.2**, Summary of Unique Submissions, followed by information on form letters and petitions received in **Section 4.3**, Form Letter Summary.

The BLM received 1,118 unique submissions via email, mail, and at public meetings.

Information from these comments, including key issues, data, and other information from the public, was queried to prepare this scoping summary report.

4.2 SUMMARY OF UNIQUE SUBMISSIONS

The BLM received 1,118 unique submissions out of 214,866 total submissions. **Table 4-1** and **Figure 4-1**, below, show the submission methods for the unique submissions. Of the 1,118 unique submissions, most were comments offered verbally at the public meetings (41.5 percent of total submissions), followed by comments submitted by e-mail (37.9 percent of total submissions). When multiple copies of a submission were received from different sources (e.g., submitted via e-mail and mail) only the original copy was included in the totals.

Table 4-1
Submissions by Methods of Submittal

Submission Method	Count	Percent of Total
E-mail	424	37.9
Mail	47	4.2
Paper copy submitted at a public meeting	183	16.4
Public meeting transcript	464	41.5
Total Submissions	**1,118**	**100**

Note: Includes unique submissions only

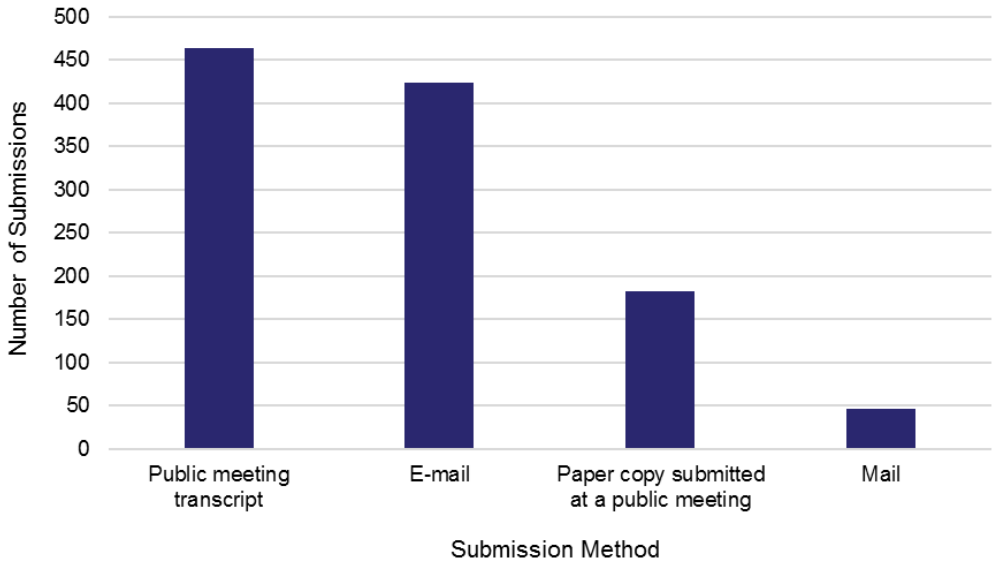

Figure 4-1. Submissions by Methods of Submittal Count

Figure 4-2 and **Table 4-2**, below, show the affiliation for each submission. Most submissions (68.5 percent) were provided by individuals, followed by organizations (nonprofit and citizen's groups; 18.0 percent). Letters received via mail or e-mail were considered to represent an organization, government, or other group when commenters signed them using official titles from these groups. (Note that speakers at the public scoping meeting often cited affiliation with organizations or other groups, and their comments were therefore classified as representing these groups. The BLM recognizes that these commenters may not be official representatives of these groups, so submissions from organizations may be over-represented.) **Appendix C**, List of Commenters, includes the organization affiliation, if provided, by commenters. The 1,118 unique submissions were submitted by 1,239 commenters.[12]

Table 4-3 and **Figure 4-3**, below, show the location of commenters by state for unique submissions; 309 commenters (25.5 percent) did not provide state location information. Most of these commenters submitted their comments by e-mail and, therefore, did not have location information associated with their entry. Of the commenters who did provide location information, most were from Washington (15.0 percent), followed by Colorado (12.6 percent). The largest numbers of commenters were from those locations where public meetings were held and very well attended, with the exception of the state of Montana.

Table 4-2
Submissions by Affiliation

Affiliation	Count	Percent of Total
Anonymous	1	0.1
Elected official	20	1.8
Federal government	8	0.7
Individual	766	68.5
Local government	34	3.0
Organization (nonprofit or citizens groups)	201	18.0
Private industry	57	5.1
State government	21	1.9
Trade group	7	0.6
Tribal government	3	0.3
Total Submissions	**1,118**	**100**

Note: Includes unique submissions only

[12] There are more commenters than submissions because some submissions had multiple commenters associated with them.

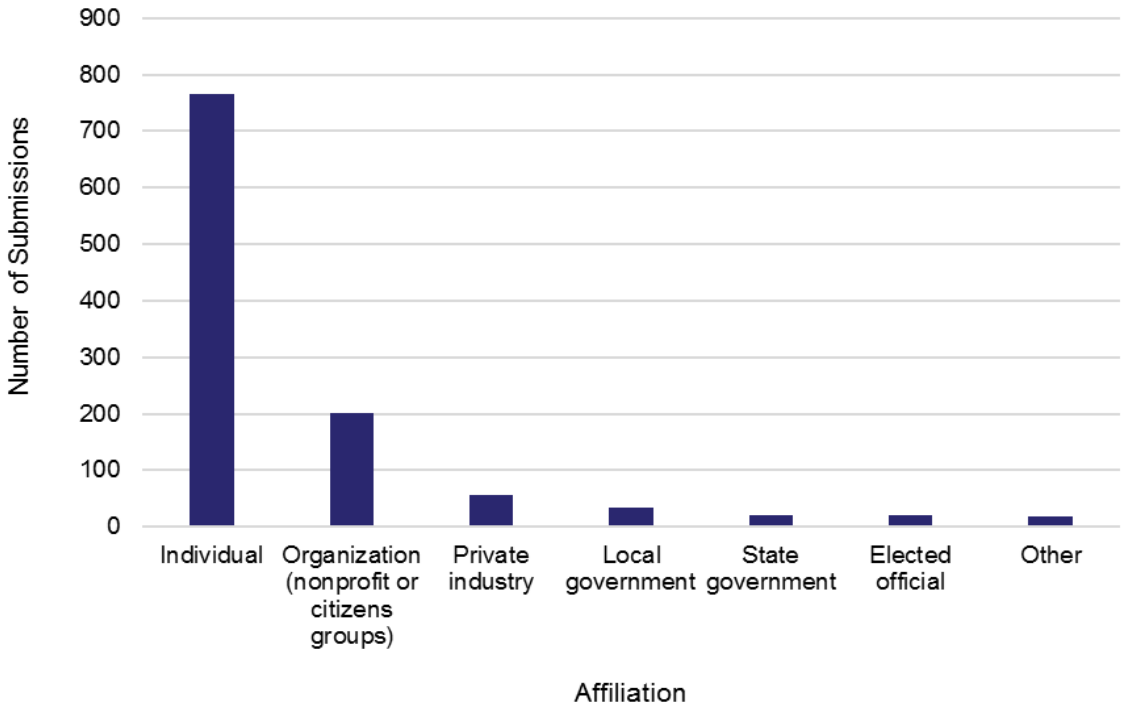

Figure 4-2. Submissions by Affiliation

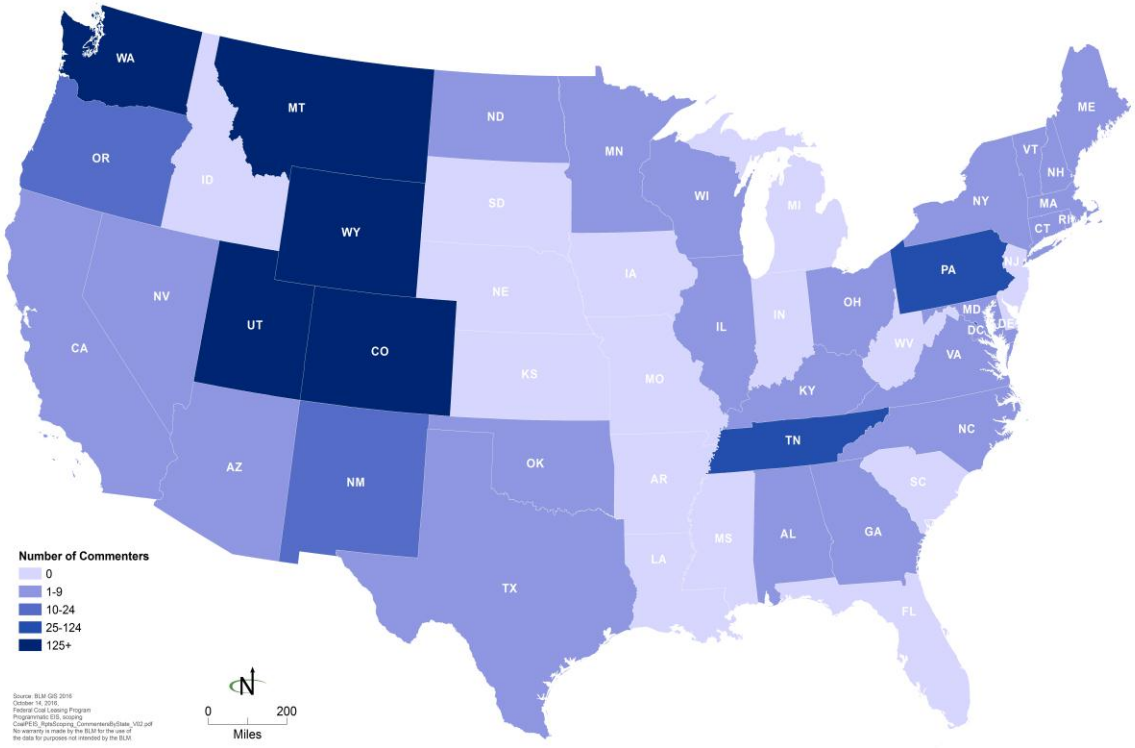

Figure 4-3. Commenters by Geographic Area

Table 4-3
Commenters by Geographic Area

Location	Number of Commenters	Percentage of Total Commenters
Alabama	6	0.5
Arizona	3	0.2
California	7	0.6
Colorado	156	12.6
Connecticut	1	0.1
Georgia	1	0.1
Illinois	3	0.2
Kentucky	9	0.7
Maine	1	0.1
Maryland	2	0.2
Massachusetts	1	0.1
Minnesota	1	0.1
Montana	147	11.9
Nevada	2	0.1
New Hampshire	1	0.1
New Mexico	10	0.8
New York	7	0.6
North Carolina	2	0.2
North Dakota	4	0.3
Ohio	2	0.2
Oklahoma	1	0.1
Oregon	17	1.4
Pennsylvania	25	2.0
Rhode Island	1	0.1
Tennessee	38	3.1
Texas	4	0.3
Utah	131	10.6
Vermont	1	0.1
Virginia	7	0.6
Washington	182	14.7
Washington, DC	16	1.3
West Virginia	1	0.1
Wisconsin	2	0.2
Wyoming	138	11.1
No state information provided	309	25.0
Total Commenters	**1,239**	**100**

Note: Includes unique submissions only. Some submissions had more than one commenter.

4.3 FORM LETTER SUMMARY

In addition to unique submissions, organizations submitted form letters. In total, the BLM received 213,748 form letter submissions from 19 form letter campaigns; details of the form letter submissions are shown in **Table 4-4**, below.

The BLM received over 213,000 copies of form letters in 19 form letter campaigns

A representative example of each form letter was entered into the comment analysis database and substantive comments were categorized as described for unique submissions. Letters that represented slight variations of the form letter without significant additional information were treated as form letters. When additional substantive comments were added to the form letter, these letters were entered into the comment-tracking database as a form letter with added text. The additional substantive comments were categorized according to issue topic categories, as described for unique submissions.

Table 4-4
Form Letter Submissions

Initiating Organization	Number of Submissions
American Coalition for Clean Coal Electricity	1,416
Care 2 Petitions	24,102
Center for Biological Diversity	14,104
Count on Coal MT	675
EarthJustice	36,907
Friends of the Earth and Friends of the Earth Action	9,816
Grand Junction meeting -North Fork Valley Letter	43
Keep Electricity Affordable.org	499
National Wildlife Federation	12,538
NextGen Climate Change	1,552
Physicians for Social Responsibility	1,351
The Sierra Club	98,603
The Wilderness Society	10,518
Unknown- maximize returns on Federal coal	27
Unknown- concerns with increased royalty rates	9
Unknown- reconsider the increase in royalty rates	19
Western Organization of Resource Councils	366
Western Values Project	713
WildEarth Guardians	490
Total submissions	**213,748**

Note: The initiating organizations were identified for all but 3 of the form letters. For letters where no organization was identified, a description of the main letter content is included above.

Petitions were also submitted to the BLM. A petition is a letter typically circulated by an organization and then signed by multiple individuals. In total, the BLM received 91,567 signatures from five petition campaigns; details of petition submissions are included in **Table 4-5**, below. For submissions where an initiating organization was identified, this organization is included. In two instances, no organization was identified; these entries are marked as "unknown."

Table 4-5
Petition Submissions

Initiating Organization	Number of Signatures
Care2 Petition	2,369
The Climate Reality Project	41,987
The Sierra Club	43,559
Unknown	286
Unknown	3,366
Total submissions	**91,567**

4.4 SUMMARY OF COMMENTS

The BLM classified all substantive comments under an identified issue category (note some comments were categorized into more than one issue category) and also tagged comments if they contained references or data or a policy option for consideration. In total, 459 comments contained a reference or data and 130 contained a policy option.

In total, 459 comments contained a reference or data, 130 contained a policy option, and 3,199 related to an issue category.

The BLM identified 33 issue categories relevant to the reform of the Federal coal program. Issue categories were developed based on topics identified in the Notice of Intent and traditional BLM resource topics. The issue categories can be found in **Table 4-6**, below.

Table 4-6 and **Figure 4-4**, Comments by Issues Category, below, show the number and percentage of comments received by issue category. The BLM categorized 3,199 comments in total. The largest number of comments (14.6 percent) was assigned to the fair return/coal revenue category. Other significant categories included socioeconomics (14.0 percent), climate change (8.6 percent), and general comments on coal (8.7 percent). **Section 4.6**, Comment Summaries, provides a detailed analysis of the comments received for each issue category.

Table 4-6
Comments by Issue Category

Issue Category	Number of Comments	Percentage of Issue Comments
1. NEPA process		
1.1 Scoping meeting	23	0.7
1.2 Cooperating Agency relationship	11	0.3
1.3 Range of alternatives	59	1.8
1.4 Other general	151	4.7
2. Air quality	52	1.6
3. Climate change	276	8.6
4. Carbon/greenhouse gas emissions		
4.1 Social cost of carbon	125	3.9
4.2 Carbon capture	16	0.5
4.3 Life cycle emissions	27	0.8
4.4 National carbon reduction goals	109	3.4
5. Coal program topics		
5.1 General comment on coal	278	8.7
5.2 Coal land use planning decisions	33	1.0
5.3 Coal leasing pause	104	3.3
5.4 Specific coal lease application	17	0.5
5.5 Coal leasing process	205	6.4
5.6 Coal bonding	75	2.3
5.7 Fair return/coal revenues	466	14.6
5.8 Coal exports	72	2.3
5.9 Coal reclamation	107	3.3
5.10 Coal mitigation	35	1.1
5.11 Coal transportation/rights-of-way	17	0.5
5.12 Methane capture	11	0.3
5.13 Surface owner rights	12	0.4
6. Environmental justice	18	0.6
7. Public health and safety	124	3.9
8. Socioeconomics	449	14.0
9. Tribal interests and concerns	18	0.6
10. State's interests and concerns	15	0.5
11. Visual resources	2	0.1
12. Water resources	40	1.3
13. Biological resources	91	2.8
14. Other resource impacts	33	1.0
15. Renewable Energy	128	4.0
Total Comments	**3,199**	**100**

Note: Some comments were coded in more than one category.

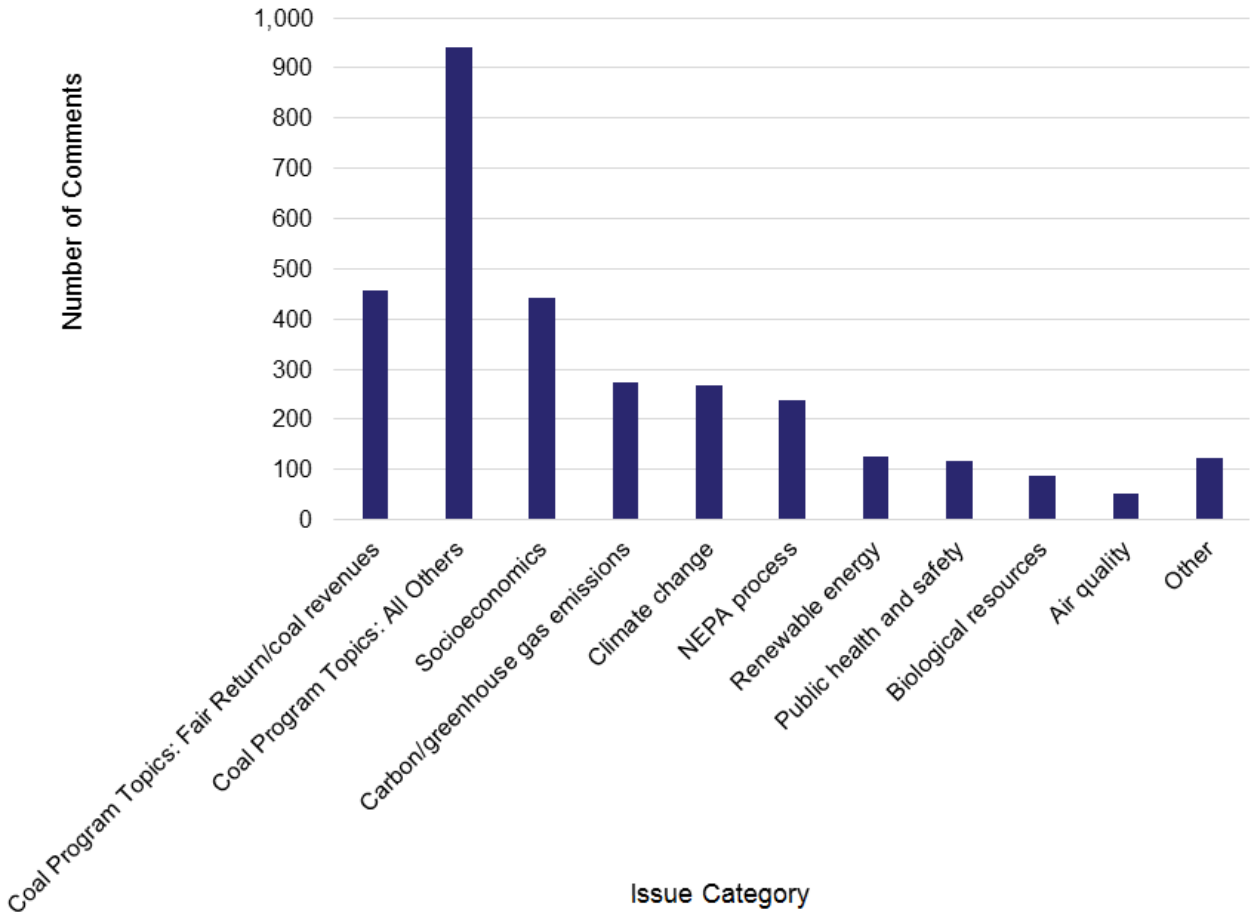

Figure 4-4. Comments by Issues Category

4.5 ISSUES TO BE ADDRESSED PER THE NOTICE OF INTENT

As noted in **Section 2.4**, the Notice of Intent identified issues likely to be addressed in the PEIS. A cross-walk[13] of issue codes and issue topics identified in the Notice of Intent is included in **Table 4-7**. Comments related to the procedural requirements of the NEPA process did not correspond directly with the Notice of Intent issue topics and are not included here. Some comment issues fell within more than one Notice of Intent issue topic.

[13] Table showing the relationship between two other tables.

Table 4-7
Issue Cross-Walk

Notice of Intent Issue	Comment Issue Category
How, when, and where to lease	5.2. Coal Land Use Planning Decisions, 5.4. Specific Coal Lease Applications, 5.5. Coal Leasing Process, 5.6. Coal Bonding, 5.9. Coal Reclamation, 5.13. Surface Owner Rights
Fair return	4.1. Social Cost of Carbon, 5.5. Coal Leasing Process, 5.7. Fair Return/Coal Revenues
Climate impacts	3. Climate Change, 4.1. Social Cost of Carbon, 4.2. Carbon Capture, 4.3. Life Cycle Emissions, 4.4. National Carbon Reduction Goals, 5.12. Methane Capture
Other impacts	2. Air Quality, 5.11. Coal Transportation, 7. Public Health and Safety, 9. Tribal Interests and Native American Religious Concerns, 10. State's Interests and Concerns, 11. Visual Resources, 12. Water Resources, 13. Biological Resources, 15. Other Resource Impacts
Socioeconomic Considerations	4.1. Social Cost of Carbon, 6. Environmental Justice, 8. Socioeconomics
Exports	5.8 Coal Exports
Energy needs	5.1. General Comments on Coal, 5.3. Coal Leasing Pause, 15. Renewable Energy

4.6 COMMENT SUMMARIES

The following sections include a summary of the comments received organized by comment type and issue category. A complete listing of comments can be found in **Appendix D**, Comments by Issue Category.

4.6.1 Data and References

The BLM received approximately 449 comments that included data for consideration or citations to references for review. In addition, many commenters attached reference materials, white papers, or other data to their submissions for review. The BLM has considered this information in the development of this Scoping Report and will conduct an in-depth review of this information as part of the development of the PEIS, as relevant. To aid review of this material, the agency has compiled an annotated bibliography, providing an overview of the recommended literature and other documents (see **Appendix E,** Annotated Bibliography).

4.6.2 Policy Options

Approximately 130 comments suggested options for updating or revising Federal coal leasing and permitting policies. Many commenters suggested options for ensuring a fair return to taxpayers from Federal coal leasing. Examples of these options included updating the process and factors for the BLM's determinations of FMV, increasing or decreasing the royalty rate, updating the process and factors for setting bonus bid amounts, and changing the BLM's leasing process to increase competition. Additional comments suggested options for updating the Federal coal program to help achieve US

carbon emission reduction goals. Options suggested to meet this objective included quantifying greenhouse gas emissions and the social cost of carbon, limiting the amount of Federal coal leased according to a carbon budget, using Federal revenues to incentivize clean energy technologies, and requiring mitigation of climate impacts. Some commenters advocated for increasing coal exports, while others suggested that exporting Federal coal should not be allowed.

Other commenters suggested options for improving protection and management of public lands in the coal program, such as updating the coal unsuitability criteria, increasing mitigation requirements, strengthening bonding requirements, and increasing reclamation requirements. Some commenters submitted options for facilitating the economic transition of communities currently dependent on Federal coal development. These options included ideas for allocating Federal funding to support programs like community services, career re-training, and miner pensions. Some commenters suggested that the BLM end the coal leasing program altogether, while others suggested streamlining the leasing program to maximize leasing.

Table 6-1, Options Proposed for Analysis by Policy Objective, outlines the reform options that the BLM is proposing to carry forward for analysis in the PEIS and use as the basis for alternatives development. The options are organized by the policy objectives described in the Need for Federal Action in **Section 6.1.1**. Some options suggested by commenters are not proposed to be carried forward for analysis in the PEIS. **Chapter 5** explains the BLM's rationale for eliminating these options from further consideration.

4.6.3 Issue 1 NEPA Process

Scoping Process

Commenters expressed concern over the locations of the scoping meetings. They stated that meetings should be held in states and communities where coal mining occurs. Specifically, additional meetings were requested in Wyoming and Montana. Some commenters also felt that meetings should be held in areas likely to feel the impacts of climate change. In addition, some commenters stated that the "first-come, first-served" system used at meetings did not allow everyone an opportunity to speak.

Cooperating Agency Relationship

Commenters stressed the importance of including local governments and other Department of the Interior agencies as cooperators during the NEPA process. Specifically, Campbell County, Wyoming, and the State of Wyoming requested Cooperating Agency status.

Range of Alternatives

Commenters suggested many different alternatives and their elements to consider during the PEIS process. Some suggestions included no new Federal

coal leasing, reduction in royalty rates, greenhouse gas mitigation and reduction, new leasing framework, a no action alternative, a transition to renewable energy, and consideration of the social cost of carbon in royalty rates.

One commenter stated that the BLM should consider a true range of alternatives, rather than setting up alternatives at extreme ends of the spectrum. Another commenter stated that a no action alternative would be inconsistent with current climate change policy and that it should be rejected.

NEPA Process—Other General

Commenters expressed concern over the purpose and need for the BLM's reform of the Federal coal program. Some stated that rationale for program review is unfounded and current regulations are adequate, and the BLM has denied reasons for review in the past. Other commenters stated that the PEIS is appropriate and that the program is due for a reform.

Commenters noted the following specific concerns:

- Evaluation of the coal program at a landscape level is redundant, because federally mined coal already includes NEPA at multiple stages.
- In recently completed reviews, the Inspector General of the Department of the Interior and the GAO had only modest recommendations to improve the coal management program, and there were not enough to suggest a PEIS.
- The BLM does not have the authority to reform the Federal coal program, because other laws and agencies have set the regulations. Specifically, commenters argued that the Mineral Leasing Act requires that coal should be mined for maximum economic recovery, that the BLM does not have the authority to adjust mineral royalty rates, and that fees or taxes that apply to the sale of coal into export markets violate the Export Clause of the Mineral Leasing Act.

Commenters also noted a concern that interim actions undertaken by the DOI might prejudice the ultimate decision. Additional immediate measures for transparency were recommended. In addition, the commenters requested that the BLM pause consideration of any pending or new royalty rate reduction requests or approval of any coal lease or mining plan that would lead to underground mining activities requiring degasification systems, until completion of the PEIS.

Commenters had the following suggestions when conducting the NEPA analysis:

- Ensure sufficient cumulative impacts analysis, including a discussion of oil and gas development and state and private coal development. Review recommendations for approaching substitution impact.
- Limit the PEIS to a 3-year process to avoid delays, and ensure that the scoping report is released by the end of 2016.
- Consider recently finalized regulations and decisions and their impacts on coal mining (e.g., Clean Water Act Rule, Clean Power Plant (CPP), land use plan amendments for greater-sage grouse protection).
- Provide transparency throughout the NEPA process.
- Prepare comprehensive GIS and maps of coal resources and other key data, and make this information available for public review.
- Design a PEIS that could be tiered to and help facilitate a more streamlined leasing process and include specific guidelines on the NEPA process for obtaining a lease.
- Prepare a Reasonably Foreseeable Development Scenario.
- Quantify all coal impacts.
- Involve the Office of Surface Mining Reclamation and Enforcement (OSMRE) and other relevant state and Federal agencies in the NEPA process.

4.6.4 Issue 2 Air Quality

Commenters stated concern for the impacts that coal mining, burning, and transport can have on air quality, including an increase of pollutants and particulate matter in the air. This would result in poor air quality and unsafe conditions, such as soot, smog, and acid rain due to decreased air quality. Commenters also noted that the secondary impacts of poor air quality, including impacts on visibility, impacts on oceans and aquatic life, and impacts on public health. Some commenters also noted that the combustion of coal exports in other countries impacts North American air quality.

Some commenters suggested that the Clean Air Act (CAA) and other regulations have hurt the coal mining industry and require precisely blended coal to account for natural variations in different coal sources. One commenter stated that many mines do not meet the standards set by the Clean Air Act.

4.6.5 Issue 3 Climate Change

Commenters expressed concern about the contribution that coal mining and coal use have on climate change and stated that most coal must stay unmined if we are to avoid the worst effects of climate change. Commenters stated that burning coal extracted from public lands represents a significant contribution to greenhouse gas emissions and climate change.

Commenters also expressed concerns about specific direct, indirect, and cumulative impacts related to climate change, including the following:

- Water supply shortages
- More intense severe weather events
- More frequent and intense wildfire
- Impacts on human health
- Impacts on other uses of public lands
- Rising sea levels
- Shorter season for snow sports and reduced snowpack and ice formation
- Ocean acidification and impact on the fishing industry
- Heat waves
- Changing plant and wildlife habitat and ranges
- Invasive species outbreaks
- Extended ranges of disease carriers, like mosquitos and ticks

One commenter stated that climate damages from coal are 5 to 6 times greater than the value of coal, and that more coal has already been leased than is possible to burn without exceeding carbon budgets to meet climate objectives. One commenter suggested modeling climate impacts by alternative and their effect on royalty revenue, coal prices, energy markets, and energy substitution effects. Some commenters stated that climate change should not be considered during the PEIS process, due to the following reasons:

- Human-caused climate change has not been proven and cannot be accurately predicted.
- Climate change is already covered under NEPA and the existing leasing process.
- Coal's impact on climate change is offset by the protection that coal allows humans through affordable heating and cooling, sturdy buildings, and drought protection.

Commenters suggested that the PEIS should evaluate all fossil fuels and their relation to climate change taking into consideration both upstream and downstream greenhouse gas emissions, and that mitigation strategies for climate change should be employed. One commenter stressed the importance of an alternative that balances climate considerations with future energy demands. Commenters stated that the idea of a perfect substitution (replacement of Federal coal with coal from other sources) is not supported by recent findings and that the BLM should not use that assumption in climate change analysis.

4.6.6 Issue 4 Carbon/Greenhouse Gas Emissions

Issue 4.1 Social Cost of Carbon

Commenters stated that the social cost of carbon should be evaluated when reforming the Federal coal program, suggesting the following:

- The social costs of carbon should be built into coal royalties to reflect the true cost of climate change.
- Social costs should be used to quantify climate impacts of alternatives.
- Annual climate costs of the Federal coal program far outweigh benefits of fossil fuel production.
- A large increase in rates would result in a great benefit to climate and more revenue.
- The cost of coal would be much higher, if accounting for the social cost of carbon.
- Renewable energy is cheaper than coal, when considering the social cost of carbon.

Commenters also noted that there is a recent court decision supporting the use of the social cost of carbon. Commenters also provided specific direction for including the social cost of carbon, recommended models for social cost of carbon analysis, and alternative measures of quantifying carbon cost and other externalities.

Other commenters stated opposition to imposing a social cost of carbon for the following reasons:

- A carbon change large enough to dramatically curtail Federal coal production could be in violation of the dual mandate to balance environmental goals with Federal revenue generation.
- The social cost of carbon estimates are unrealistically high and technically unsound.
- The BLM does not have the authority to impose a social cost of carbon.
- Imposing the social cost of carbon would have limited effectiveness due to substitution to non-Federal coals or other fossil fuels and due to lack of pass through to end user.
- The social cost of carbon has not undergone notice-and-comment rulemaking.
- Imposing a carbon fee would be double regulation/taxing.

- Imposing a social cost of carbon on producers would increase electricity prices.
- Implementing the social cost of carbon may not be successful, due to lack of competition. If Federal coal auctions are not competitive, firms may lower bids to offset the social cost of carbon.

Issue 4.2 Carbon Capture

Commenters stated the following regarding carbon capture related to the PEIS:

- Greenhouse gas emissions associated with coal use can be negated with flue-steam capture.
- Money applied to renewable energy subsidies should be invested in developing carbon capture.
- Storage and carbon capture technology is necessary in order to meet climate goals.

Commenters also noted concerns over the lack of Federal aid in developing carbon capture technology. They cited specific states and coal industries that have examples of efficient power plants and sequestration technology.

Issue 4.3 Life-Cycle Emissions

Commenters stated that the PEIS should analyze greenhouse gas emissions and associated impacts from all stages of coal mining and usage. Specifically, consequential life-cycle analysis methods were recommended over attributional life-cycle analysis methods. Other commenters stated that the BLM's review of the Federal coal program is not the appropriate time to analyze life-cycle emissions, since the BLM cannot determine how the coal will be used, and life-cycle analysis studies are inadequate.

Issue 4.4 National Carbon Reduction Goals

Commenters expressed concern regarding how the Federal coal program will align with the Administration's greenhouse gas reduction goals reflected in the Paris Agreement and the CPP. Specifically commenters focused on whether continued levels of US coal production was consistent with the Paris Climate Agreement and the commitment to stay under 2 degrees Celsius of warming, and questioned whether coal exports undermine the commitment to end reliance on coal by 2020.

Commenters also cited studies, suggesting that new Federal coal leasing at any significant level is inconsistent with climate goals. Commenters suggested creating a "carbon budget" to help meet emissions reduction goals and implementing a carbon adder for upstream emissions to help meet climate commitments. Commenters also stated that not combusting coal is critical to meeting climate goals and that the BLM should finalize the coal mine methane rule-making, because of the potent impact methane has on climate change.

4.6.7 Issue 5 Coal Issue Topics

Issue 5.1 General Comment on Coal

General comments on coal fell under two main categories: commenters who requested a complete cessation of new leases, a reduction in coal mining, or increased regulation of coal mining on Federal lands and those who favored limited modifications to the coal program, continued coal mining, or expansion of coal mining on Federal lands.

Commenters requesting a reduction in mining provided the following rationales and opinions:

- The Federal coal program has not been modified in many years and is due for a reform.
- There is reduced demand for coal due to market and policy conditions and mining on Federal lands needs to be phased out.
- The environmental impacts of coal outweigh the beneficial uses.
- Coal mining contributes to climate change and greenhouse gas emissions.
- A sufficient amount of coal is already leased.

Some commenters also noted the importance of analyzing the impacts from all stages of the coal life. One person noted that current leases should be rescinded. Another person stated that it is better to continue mining on current operations than to start new operations, because new mines and disturbance will have a greater impact.

Commenters who favored maintaining or expanding Federal coal mining provided the following rationales and opinions:

- Coal is a low cost energy source and is necessary to provide reliable and affordable electricity.
- Investments should be made in clean coal technology over alternative energy sources.
- Companies will turn to mining on private lands if Federal lands cannot be mined.
- Studies prepared for Federal coal mining provides valuable information about other natural resources.
- The coal industry is already over regulated.
- Coal demand is cyclical, so recent studies of coal demand may not be representative.
- The US has "cleaner" coal than other countries.

- The low cost energy derived from coal improves the quality of life and allows other industries to be competitive.

Issue 5.2 Coal Land Use Planning Decisions

Commenters stated that, when making coal land use planning decisions, the BLM should consider other land uses on public lands and lands with environmentally sensitive or special habitat value. Commenters requested that the BLM review and revise unsuitability criteria, implement unsuitability screening criteria at the land use planning level, and document the screening process. Specific areas suggested as unsuitable for leasing were those where the hydrological balance cannot be restored to pre-mining conditions and areas where coal development should be avoided due to high conflicts with wildlife, fisheries, water, air, and protected lands.

Issue 5.3 Coal Leasing Pause

Some commenters expressed support for the coal leasing pause, stating that it should be extended or made permanent and reasoned that a sufficient amount of coal has already been leased. Other commenters stated opposition to the coal leasing pause. They stated that it should be removed because it negatively impacts the economy, violates other laws, and is an attempt by the administration to stop coal mining. They said that pending leases already include a lengthy NEPA evaluation and should not be subject to the moratorium.

In addition, some commenters stated that the BLM has underestimated the time lag that would be produced by a moratorium. They requested that there be a guarantee that the moratorium would not go beyond the stated 3 years. Others stated that the assumption that a 20-year supply of coal is already under lease, as noted in Order 3338, is based on faulty information.

Issue 5.4 Specific Coal Lease Applications

Commenters stated concern over both the environmental impacts of leasing and the economic impacts of delays for specific coal lease applications, including at the following: Alton Mine, Bull Mountain Mine, Greens Hollow Coal tract (SUFCO Mine), and the Williams Draw tract (Lila Canyon Mine). Commenters also stated that analysis for one recently leased mine, the Narley Mine No. 3 mine, was inadequate. In addition, commenters provided input on particular coal mining regions. They stated that coal from the North Fork Valley produces less pollution and should be selectively mined and that the Powder River Basin should be recertified as a coal producing region.

Issue 5.5 Coal Leasing Process

Many commenters stated concerns for the current leasing process. Some stated that the leasing process takes too long and should be streamlined to remove redundancy and unnecessary barriers to development. Other commenters suggested specific changes to the leasing process in order to limit environmental impacts and to ensure a fair and transparent leasing process. Commenters suggested the following changes:

- Discontinue the lease-by-application (LBA) approach, because it does not encourage competitive bids.
- Provide more public notification of pending lease applications, minimum bids, and other leasing decisions.
- Examine leasing at the coal reserve level and reinstate coal producing regions in which regional planning takes into account market conditions and environmental impacts.
- Expand coordination with adjacent Federal landowners before leasing.
- Increase competition among coal companies for Federal coal leases.
- Lease only to companies that demonstrate they are resilient to expected market fluctuation.
- Make companies pay upfront at the time of lease for reclamation and evaluate unmet reclamation obligations before making additional leases.
- Incorporate elements from the Solar PEIS and Oil and Gas Master Leasing Plans into the coal leasing process, such as analyzing appropriate areas to lease on a regional scale.
- Cap coal tonnage or British thermal units and accept bids only until this cap is met.
- Focus lease offerings near existing tracts to limit additional disturbance.
- Wait for adequate market demand and set minimum bid prices.
- Consider lease prices reflecting the opportunity value involved in purchasing an option to mine a public resource in the future, when coal prices may recover from current lows.
- Apply maximum economic recovery standards and prepare a reasonably foreseeable development scenario.

Other commenters said that the current leasing system is sufficient and stated the following:

- The BLM should not exclude operators with greater than 10 years of reserves due to the length of the leasing process and other permitting.
- The BLM should retain the industry-nominated systems, as industry representatives are informed about future market needs.
- Note that conducting lease sales at set times in the past (such as quarterly) did not attract sufficient bids.

- Consider delaying collection of bonus bids until mining begins on the leases and allow a royalty credit for the capital costs to establish a mining operation to increase competition for bids.
- Leave the determination of where to lease to the field office at the local planning level.
- The BLM should acknowledge that bidding by adjacent mine operators is economically logical, due to reduced capital costs and that it does not represent a noncompetitive process.
- The BLM should acknowledge that it has the ability to adjust the lease nomination to ensure adequate competition.
- The BLM should acknowledge that the LBA process and leases with one bid are fair, because the government sets a minimum price.

Issue 5.6 Coal Bonding

Commenters expressed concern over the amount of outstanding self-bonded reclamation liability and the self-bonding process in relation to Federal coal leasing, stating that it does not protect taxpayers and allows many companies to avoid reclamation.

Other commenters stated that changes to the self-bonding and reclamation regulations are in conflict with Surface Mining Control and Reclamation Act (SMCRA), and another suggested that the BLM does not have the authority to interfere with the States' ability to regulate surface coal mining and reclamation operations or to apply its discretionary authority over the bonding of such operations. In addition, one commenter stated that the leasing moratorium will impact the bonding of reclamation liability by reducing companies' revenue.

Commenters recommended the following specific changes to coal bonding:

- Eliminate self-bonding.
- Suspend approval of self-bonding for companies filing for bankruptcy.
- Charge a set amount for cost-recovery, based on the type of mine and application at the time of leasing.
- Require coal companies to put down a large deposit at the time of leasing.
- Impose full-cost bonding.
- Hold companies liable for failure to meet reclamation requirements.
- Require companies to purchase insurance to cover reclamation costs.

- Do not permit new leases for companies until all of their mines have been reclaimed.
- Work with the OSMRE to strengthen self-bonding regulations.

Issue 5.7 Fair Return/Coal Revenues

Commenters expressed concern over the current royalty rates and return to taxpayers. Many commenters stated that royalty rates should be raised, because coal companies are not paying a fair return to taxpayers and exploiting loopholes to undervalue coal. Commenters noted that current rates have been in place for 30 years, and it is time for a review. Some commenters stated that Federal coal sales represent nearly 41 percent of the total domestic production, which artificially lowers market prices, further reducing the amount of royalties received. Commenters also supported specific changes to royalty rates, including the following:

- Increase transparency and public input when determining market values.
- Use royalty rates for coal that match rates for offshore oil and gas.
- Assess royalties on the net delivery price of coal.
- Impose a cap on transportation deductions.
- Develop a comprehensive, coal-specific, costs test analysis tool that would quantify and monetize the full range of damages caused by coal and the true avoided cost value of renewables when used to replace coal.
- Factor in life-cycle and external costs.
- Consider using the social cost of carbon.
- Ban companies from selling coal to subsidiaries to depress rates (captive transactions).

Other commenters stated that there is no rationale to support raising royalty rates and that royalty rates should be decreased. Their concern over raising royalty rates were for the following reasons:

- Many companies currently pay a significant share of revenues in the form in royalties, taxes, and fees.
- The coal market is declining, and companies are already facing economic pressure.
- There is no empirical evidence to support the notion that increasing Federal coal royalty rates will increase Federal coal revenues.
- Coal companies already pay fair rates that benefit many local communities in a struggling economy.

- Coal exports are not a valid basis for reevaluating valuation regulations or royalty rates.
- Higher rates will render many Federal coal operations uneconomic.
- Higher rates will shift emphasis to use of private coal and thereby reduce royalties collected.
- Higher royalty rates will decrease production and return.
- Higher royalty rates will increase the costs of electricity due to companies transferring increased costs to consumers.

Commenters stressed the importance of considering all components of return when evaluating fair return numbers. One commenter stated that wind and solar subsidies should be considered with determining coal rates, and another suggested conducting a full cost-benefit analysis.

Other comments recommended that the BLM reinstate the Royalty Policy Committee and that the Department of the Interior eliminate the current FMV criteria and replace it with a new partnership model between government agencies and private industry.

Issue 5.8 Coal Exports

Commenters stated support for Federal coal exports for the following reasons: the BLM would benefit from exporting coal and allowing for a greater return, exports are a lucrative market, exports would help other countries meet their energy needs, and countries would find other coal sources if they were not supplied with US coal. One commenter suggested that the government should assist coal producers in accessing international markets.

Other commenters stated opposition for coal exports for the following reasons:

- Burning coal for domestic use, as opposed to exporting it for foreign use, is cleaner and more efficient.
- Coal exports will discourage other countries from investing in renewable energy sources.
- Exporting federally subsidized coal artificially drives down the price of coal in the global market.
- The United States should not mine public lands to supply other countries with coal.
- It is only the BLM's objective to sell Federal coal to aid in meeting the nation's energy needs.
- Burning coal overseas will still impact domestic air quality and undermine climate policy.

Commenters suggested that impacts related to coal transportation must be evaluated when considering exports, additional fees should be imposed for Federal coal that is shipped out of the United States, and the United States should look at how other federally owned minerals are valued and apply that standard to coal.

Commenters also stated that the PEIS must fully analyze and assess the reasonably foreseeable impacts of coal exports that may occur as a result of future coal management.

One commenter stated that exports need to be considered in market demands, while others stated that exports are so low that even aggressive expansion would have no effect on Federal coal production.

Issue 5.9 Coal Reclamation

Commenters stated concern over the coal mine reclamation process, citing the following issues:

- Many mines on Federal lands have still not been reclaimed.
- Reclamation standards are elusive.
- Mining companies get by with no reclamation, due to self-bonding.
- It takes many years for mine reclamation to reach original flora and fauna conditions.
- Reclaimed lands are often susceptible to invasive or nonnative species.

Commenters also suggested the following:

- There should be no new leasing until existing mines are reclaimed and comply with environmental standards.
- A company's history with reclamation should be considered when determining new leases.
- Coal companies should be held responsible for reclamation responsibilities.
- Reclamation planning should begin at the time of the lease.
- Coal companies should be required to put up adequate funds for reclamation.
- Mine reclamation should be as contemporaneous as possible.
- Mine workers should be trained in restoring public lands.
- Reclamation standards should be revised.

Other commenters stated that claims that mining companies do not reclaim lands are unfounded and that reclaimed lands are often more productive and can support multiple uses, such as livestock grazing and wildlife habitat. One commenter stated that the BLM does not have the authority to monitor reclamation.

Issue 5.10 Coal Mitigation

Commenters stated support for identifying and analyzing mitigation strategies in the Draft PEIS, specifically suggesting that a new mitigation protocol be developed, compensatory mitigation be implemented, mitigation measures be applied to existing leases, greenhouse gas offset acquisition be required by lessees, and a mitigation fund from coal lease payments be established.

One commenter suggested that the existing climate is a finite resource, so mitigation measures to combat climate change are necessary under the Presidential Memorandum Mitigating Impacts from Natural Resource Development. Another commenter stated support for protecting essential habitat areas and waterways before relying on mitigation measures. One commenter questioned whether any mitigation can offset environmental impacts from coal mining and development.

Issue 5.11 Coal Transportation

Commenters expressed concern for the impacts that transportation of coal can have on air quality, water resources, biological resources, visual resources, public health, noise, quality of life, and traffic in local communities. Commenters specifically stated concern for coal dust from trains and long traffic jams at train crossings.

Commenters request that the PEIS provide a detailed analysis and assessment of how Federal coal is transported from mines to the source of consumption and provide the public with information and analysis on what the impacts of this transport are likely to be.

Issue 5.12 Methane Capture

Commenters stated that the PEIS should incorporate reduction strategies for mitigating methane emissions. One commenter stated that there should be a pause on production from mines that require a degasification system to vent methane, and others suggested that the BLM should move forward with the Mine Methane Waste Rule. A few commenters also noted that methane hydrates are a potential energy source.

Issue 5.13 Surface Owner Rights

Commenters stated that the PEIS should incorporate protections for surface owners, including addressing the uncertainty of future mining beneath private land and consideration of surface landowners in split-estate transactions.

4.6.8 Issue 6 Environmental Justice

Some commenters stated that low-income populations will be disproportionately affected by the loss of jobs and the increase in electricity prices as result of Federal coal reform. Others stated that low-income populations, the elderly, children, and communities of color would be disproportionately subjected to adverse environmental, health, and economic impacts from coal mining, downstream activities, and climate change effects.

4.6.9 Issue 7 Public Health and Safety

Commenters stated that coal miners suffer health impacts, including respiratory diseases, increased incidence of cancer, and traumatic injury resulting from unsafe mine conditions. In addition, commenters cited concern for the impacts on public health and safety for those who live or work near coal extraction sites, including exposures to toxic pollutants in air and water, such as selenium, benzene, mercury, and arsenic.

Commenters noted that additional, more widespread impacts on human health, including increased risk of respiratory disease, heart disease, and neurological disorders, occur from coal-fired power plant emissions and from health effects related to warming temperatures and climate change. Some commenters also noted that increased health risks are present for children, pregnant women, and senior citizens. Commenters suggested that coal companies should be held accountable for external costs and poor health effects related to mining and stated that all steps of the coal life cycle are harmful to human health.

4.6.10 Issue 8 Socioeconomics

Many commenters noted the positive economic impacts that coal mining has had on their communities, including employment, income, and tax and royalty revenue. Commenters also discussed the public projects and services funded by coal revenues.

Conversely, one commenter stated that coal communities are some of the poorest in the nation, and another suggested that Federal coal subsidies unfairly disadvantage coal producers and result in decreased economic contributions. Another commenter stated that federally leased coal mining is less labor intensive than private coal mining and creates fewer jobs.

Commenters stated that Federal coal reforms, such as increased royalty rates, could result in potential bankruptcies for coal companies and socioeconomic impacts, including the following:

- Direct loss of jobs and income in the coal mining industry
- Loss of secondary jobs supported by the industry and employee spending in coal mining communities

- Increased electricity prices, due to higher costs of less reliable alternative energy sources and the subsequent impact of less disposable income to spend elsewhere
- Loss of social benefits that come with providing affordable and reliable power to other industries at all hours (e.g., healthcare and the military)
- Jobs shifting to other countries when domestic coal is no longer competitive

Some commenters also noted that declining coal production would result in disproportionate economic impacts on rural communities.

Other commenters stated that climate change and environmental degradation resulting from coal mining affects certain industries, such as tourism and recreation. Others suggested that coal mining increases health care costs and associated decreases in workforce productivity and that traffic, noise, and pollution impact the quality of life for coal mining communities. Some commenters suggested that transitioning to renewable energy sources now would result in cheaper electricity rates and decreased costs from environmental and health impacts in the long term and would allow for economic diversification in coal mining communities.

Many commenters also recommended that assistance be available to help coal miners transition to other jobs and ensure a just transition of coal-dependent communities to a renewable energy future. One commenter warned that impacts on small businesses must be adequately analyzed to comply with the Regulatory Flexibility Act and the Small Business Regulatory Enforcement Fairness Act.

4.6.11 Issue 9 Tribal Interests and Native American Concerns

Commenters expressed concern for the impacts that coal mining has on tribal interests and suggested the following be considered during the PEIS process:

- Coal mining impacts on climate change and non-industrialized nations
- Requirements for consulting with tribes
- Environmental impacts on tribal lands
- Limits on coal transportation over tribal land
- Restrictions on mining, in view of religious or cultural sites
- Impacts on fishing rights and tribal traditions

Other commenters expressed concern for the impacts that changes in coal regulation would have on tribal funding from coal mining and stated that it

would further impede coal mining. One commenter stated that this would be an infringement on tribal sovereignty.

4.6.12 Issue 10 State's Interests and Concerns

Commenters had suggestions related to state involvement during Federal coal reform, including transferring public lands to the states, involving state officials in policy discussions, considering impacts on state resources and local governments, and revisiting Federal/state lease profit split agreements and setting "appropriate use" parameters. One commenter stated that is important to consider the unique situations in individual states as part of the PEIS process (e.g., amount of coal mined, number of jobs, revenue, etc.).

4.6.13 Issue 11 Visual Resources

Commenters expressed concern for the impact that coal mining has on visual resources and stated distaste for the scarred landscape.

4.6.14 Issue 12 Water Resources

Commenters stated concern for water resource impacts, including the following:

- Contamination of surface and underground water sources and related concerns about contaminated domestic water supplies and impacts on wildlife
- Depletion of groundwater sources and impacts on other land uses
- Failure to properly reclaim the mined area, leading to failed water restoration and the associated water resource risks resulting from climate change, such as drought, flooding, and acidification

One commenter suggested that coal mining does not have an impact on water quality, due to National Pollution Discharge Elimination System permitting procedures in place.

4.6.15 Issue 13 Biological Resources

Commenters stated concern for biological resource impacts, including the following:

- Habitat fragmentation
- Impacts from river sedimentation
- Disturbance of vegetation and wildlife habitats and susceptibility of mined areas to invasive species
- Dangerous metals and compounds impacts on wildlife
- Construction and transportation impacts on wildlife

Many commenters also noted concerns with impacts on aquatic and avian wildlife caused by climate change, including habitat loss and ocean acidification. Conversely, some commenters stated that wildlife coexists with mining operations and often thrives on reclaimed mine lands.

One commenter stated that the BLM is required to initiate consultation with the Fish and Wildlife Service and the National Marine Fisheries Service at the PEIS level.

4.6.16 Issue 14 Other Resource Impacts

Commenters stated that the analysis should be at multiple scales and should consider impacts on additional resources and resource uses, such as night skies, geological risks like subsidence, other land uses, such as agriculture, and wilderness characteristics. Some commenters stated that reclaimed coal mines have a beneficial impact on grazing, and others noted impacts on adjacent lands, including National Parks, such as Bryce Canyon.

4.6.17 Issue 15 Renewable Energy

Commenters stated support for investing in renewable energy programs over coal mining operations, due to the decreased environmental impact and efforts to mitigate climate change. They suggested implementing programs to help coal miners transition to renewable energy jobs. Commenters also stated that there is enough coal currently under lease to last through a transition to renewable energy.

Other commenters expressed opposition to renewable energy, stating that solar and wind farms have visual impacts, kill wildlife, and still require mining, because they need rare earth minerals. Commenters also stated that solar and wind energy cannot be supported in the eastern the United States, due to lack of available space; also, it is not an economically feasible, reliable, or consistent energy source. In particular, commenters stated that government subsidies are required to make renewable energy competitive with fossil fuels and that these forms of energy result in reduced tax and royalty contributions. One commenter suggested embracing microgrids instead of large grid interconnections.

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CHAPTER 5
FEDERAL COAL LEASING PROGRAM

The following chapter describes the Federal coal program and provides baseline information intended to provide context for the consideration of program reform opportunities. This chapter includes: authorities, other Federal agency roles and responsibilities, historical information, state of the coal industry information, coal leasing and production data, market projections for coal, greenhouse gas emissions, socioeconomic considerations, and an overview of the Federal coal leasing process. It is important to note that Secretarial Order 3338 specifically stated that the Order does not apply to the coal program on Indian lands, as that program is distinct from the BLM's program and is subject to the unique trust relationship between the United States and federally recognized Indian tribes and government-to-government consultation requirements, nor does it apply to any action of the Office of Surface Mining Reclamation and Enforcement or the Office of Natural Resources Revenue.

5.1 AUTHORITIES

The Mineral Leasing Act of 1920, as amended (30 USC 181 et seq.), authorizes and governs leasing of public lands for developing deposits of coal, oil, natural gas, and other minerals. The Mineral Leasing Act gives the BLM responsibility for managing coal leasing on approximately 570 million acres of mineral estate that is owned by the Federal government, where coal development is permissible. Depending on the location, the surface estate of these lands is managed by the BLM, United States Forest Service, private landowners, state landowners, or other Federal agencies. Regulations that govern the BLM's coal leasing program may be found in Parts 3000 and 3400 of Title 43 of the CFR. As described below, other Federal and state agencies are responsible for regulating the environmental effects of coal mining, issuing permits to operators, collecting fees from the development of Federal coal, mine reclamation, and ensuring the health and safety of mine operations.

The Federal Coal Leasing Amendments Act (FCLAA) of 1976, as amended, (P.L. 94-377; 90 Stat. 1083–1092) updated sections of the Mineral Leasing Act, focusing on issues related to FMV and speculation. The FCLAA repealed the noncompetitive preference right leasing system for coal and required all new leases to be sold in a competitive bidding process. The FCLAA banned the BLM from accepting any bid less than the estimated FMV of the lease. It tightened diligent development and continuous operation requirements, and made enforcement of these provisions nondiscretionary. The FCLAA also established the principle of Maximum Economic Recovery, and facilitated the consolidation of leases into logical mining units for maximum economic recovery. To help with recovery of less accessible coal, the law authorized the BLM to make carefully justified and controlled modifications to a company's royalty rate or lease terms.

The FLPMA (43 USC 1701 et seq.) establishes the broad framework under which BLM manages public lands today. FLPMA established a unified, comprehensive, and systematic approach to managing and preserving public lands in a way that protects "the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." It established the principles of land use planning to guide the BLM in making its land management decisions. This framework required Federal land managers to balance conflicting demands on the land: productivity, environmental values, recreational opportunities, and economic return. FLPMA also required that the BLM ensure receipt of FMV in return for private extraction of public resources, and tasked the agency with considering likely future land uses, environmental concerns, and the protection of lands with wilderness characteristics when making long-term management decisions.

The SMCRA of 1977 (30 USC 1201 et seq.) is the primary Federal law that regulates the environmental effects of coal mining in the United States. SMCRA essentially created two programs: one for reclaiming pre-SMCRA abandoned mine lands and the other for regulating active coal mines. Title IV of SMCRA established the Abandoned Mine Reclamation Fund, supported by a fee on every ton of coal produced, to reclaim mine lands abandoned before the passage of SMCRA. Title V of SMCRA sets minimum performance standards for environmental protection and public health and safety that apply to surface coal mining and reclamation operations, surface effects of underground coal mining operations, and surface coal mining in special areas or in special circumstances (such as steep slope mining). A person who proposes to conduct surface coal mining and reclamation operations (which include surface effects of underground mining by definition) must apply for and receive a permit, which incorporate provisions of SMCRA and regulations (or the state equivalent), and must post performance bonds to cover the costs of reclamation.

In general, SMCRA establishes a program of cooperative federalism that allows a state or tribal regulatory authority (RA) to assume primary jurisdiction

(primacy) over the regulation of surface coal mining and reclamation operations within its borders once its regulatory program has been approved by the Secretary of the Interior. SMCRA requires that a state or tribal program demonstrate that the state's or tribe's rules and regulations are consistent with regulations issued by the Secretary pursuant to SMCRA. The OSMRE is responsible for ensuring that SMCRA is being enforced directly in Federal program states and tribes and through oversight of primacy states and tribes in order to ensure that each state and tribal RA is enforcing its counterparts to the Federal regulations.

The Energy Policy Act of 2005 (PL 109–58, 119 Stat. 594-1143) included five sections related to the Federal coal program, which involved increasing the cumulative acreage allowed for coal lease modifications, establishing a new mechanism to extend a logical mining unit beyond 40 years, providing new bonding provisions for payment of the remaining balance of a deferred bonus bid, changing the requirements for advance royalty payments, and changing the timing for development plan submission. Draft BLM regulations have been developed to implement those sections but have not yet been finalized (78 FR 49080-103, August 12, 2013). The BLM issued the following interim guidance documents to implement the Energy Policy Act of 2005:

- Advance royalty guidance (Energy Policy Act of 2005 Section 434) is provided in BLM-WO-IM-2006-127.[14]
- Deferred bonus bids guidance (Energy Policy Act of 2005 Section 436) is provided in BLM-WO-IM-2006-045.[15]
- Guidance regarding increased acreage for lease modification (Energy Policy Act of 2005 Section 432), which increased the limitation for lease modifications from 160 acres to 960 acres, is provided in BLM-WO-IM-2006-004.[16]

5.2 OTHER FEDERAL AGENCY ROLES AND RESPONSIBILITIES

The OSMRE within the Department of the Interior is responsible for carrying out the requirements of SMCRA in cooperation with states and tribes. OSMRE ensures that coal mines are operated in a manner that protects citizens and the

[14]BLM. 2006. Instruction Memorandum No. 2006-127 Interim Guidance for Implementation of the Energy Policy Act of 2005 for Federal Coal Lease Advance Royalty. March 24, 2006. Washington, DC. Available at https://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2006/im_2006-127__.print.html

[15]BLM. 2005. Instruction Memorandum No. 2006-045. Interim Guidance for Implementation of The Energy Policy Act of 2005 [P.L.109-58] for Federal Coal Lease, Deferred Bonus Bonds. November 25 2005. Washington, DC. Available at https://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2006/im_2006-045__.print.html

[16]BLM. 2005. Instruction Memorandum No. 2006-004. Interim Guidance for Implementation of the Energy Policy Act of 2005 [P.L. 109-58] for Federal Coal Leasing. Washington, DC. September 30, 2016. https://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2006/im_2006-004__.html

environment during mining and assures that the land is restored following mining. The OSMRE and the approved State RAs oversee the issuance of mine permits and reclamation bonding. SMCRA provides, however, that approval of mining plans under the Mineral Leasing Act cannot be delegated to the State RAs (30 USC 1273(c)). As a result, OSMRE is responsible for making a recommendation to the Secretary as to whether to approve, disapprove, or approve with conditions a mining plan or mining plan modification (30 CFR part 746). As part of this process, OSMRE notifies the BLM of any mine permit application on Federal lands and provides an opportunity for the BLM's input before it makes a recommendation to the Assistant Secretary of the Interior, Land and Minerals Management. SMCRA also requires OSMRE to work to mitigate the effects of past mining by pursuing reclamation of pre-SMCRA abandoned coal mines. However, despite remarkable achievements in reclamation of many abandoned coal mine sites that existed prior to the enactment of SMCRA, there remain more than $4 billion worth of high priority health and safety coal-related abandoned sites in OSMRE's Abandoned Mine Land Inventory System (e-AMLIS) to be reclaimed.

The Office of Natural Resource Revenue (ONRR) within the Department of the Interior manages and ensures full payment of revenues owed for the development of the nation's energy and natural resources on the Outer Continental Shelf and onshore Federal and Indian lands. The ONRR collects, accounts for, and verifies natural resource and energy revenues due to states, American Indians, and the US Treasury, which includes product valuation. The ONRR coordinates with other Department of the Interior entities, including the BLM, Bureau of Indian Affairs, and Bureau of Ocean Energy Management (BOEM) to support the Department's management of oil, gas, coal, and other natural resources. The BLM works closely with the ONRR to ensure that the coal lessees are reporting coal production, sales, and inventory, which serve as the basis for revenue collection. The ONRR will notify the BLM if revenues are not being paid, and the BLM will enforce the terms and conditions of the lease, which may result in lease cancellation procedures.

The Mine Safety and Health Administration (MSHA) within the Department of Labor is delegated the responsibility of enforcing the Federal Mine Safety and Health Act of 1977, as amended, (30 USC 801 et seq.) and the Mine Improvement and New Emergency Response Act of 2006 (P.L. 109-236; 120 Stat. 493-505). MSHA works to prevent death, illness, and injury from mining and to promote safe and healthful workplaces for US miners. The agency develops and enforces safety and health rules for all US mines, and it provides technical, educational, and other types of assistance to mine operators. MSHA works cooperatively with industry, labor, and other Federal and state agencies to improve safety and health conditions for all miners in the United States. The BLM coordinates closely with MSHA in approval of the Resource Recovery and Protection Plans (R2P2) for each lease to assure the R2P2 are consistent with MSHA safety requirements and approved safety plans.

Other surface management agencies participate in the Federal coal leasing process. As previously stated, the Mineral Leasing Act gives the BLM responsibility for managing coal leasing on the mineral estate that is owned by the Federal Government. Depending on the location, the surface estate of these lands could be managed by the BLM, United States Forest Service, private landowners, state landowners, or other Federal agencies. The BLM is required to receive consent or concurrence from the appropriate surface management agency before issuing a lease or approving an exploration plan (43 CFR, Subparts 3425.3[b], 3482.2[a][1]). This occurs most frequently with coal reserves underlying National Forest System lands. In these cases, the BLM is required to apply any stipulations provided by the Forest Service to a lease or reject the lease application if the Forest Service does not give its consent.

5.3 HISTORICAL PERSPECTIVE

Prior to passage of the Mineral Leasing Act of 1920, the Coal Lands Acts of 1864 and 1873 provided for the public auction of lands containing coal for private ownership and extraction. The passage of the Mineral Leasing Act took place in the context of a larger national debate about public land management. Until that point, Federal land policy had consistently been aimed at encouraging economic development of natural resources. Homesteading, railroad grants, state land grants, forestry programs, and the patenting process all sought to stimulate settlement, especially in more sparsely populated western lands. By the early 20th century, however, an opposing philosophy of managed development asserted that the public deserved compensation for private profit made on Federal land. The Mineral Leasing Act was the first in a series of laws that sought to balance development with revenue collection and management of leasing scale and location by the Federal government.

In 1920, the Mineral Leasing Act consolidated management of Federal coal resources with oil, natural gas, and certain other minerals and established a system of managed leasing of minerals on Federal lands. This allowed the government and tribes to retain control of public and tribal minerals and property while still encouraging development of the mineral resources they contained. This new program established the expectation that the public should be compensated for minerals mined on public land, and granted the Federal government control over the location and scale of that mining. It introduced the concepts of setting leasing levels, competitive bidding, and production royalties. The Mineral Leasing Act, along with amendments to the Act, forms the basis of the current Federal coal program.

From the passage of the Mineral Leasing Act to the early 1960s, low demand led to very little Federal coal leasing. The coal that was produced was typically in small quantities for railroad or local use, reflecting the absence of any large-scale demand for western coal. The 1960s saw an uptick in Federal coal leasing as interest in western coal began to increase. While from 1920 to 1960 Federal coal leasing averaged slightly more than 4 leases per year, the 1960s averaged 31

leases issued per year. However, many of these leases were speculative. By 1973, over 70 percent of the Federal coal leases ever issued had not produced any coal.

Public opposition to new hydroelectric dams and nuclear power that occurred in the 1960s combined with the formation of the Organization of the Petroleum Exporting Countries (OPEC) spurred increases in oil and gas prices, which positioned coal as the principal power plant fuel in the United States. Additionally, the passage of the CAA of 1970 created new incentives for cleaner burning, low-sulfur western coal. Utilizing this low-sulfur coal allowed coal-fired power plants to attain the standards set forth in the CAA of 1970 without the need to install costly flue-gas desulfurization units. The shift to western coal also spurred the construction and operation of a number of mine mouth power plants (i.e., power plants built on site at the coal mine) in part due to the cost benefits of shipping electricity through power lines compared with shipping coal by rail.

The interest in the vast reserves of western Federal coal brought new scrutiny to the management of the resource. As noted above, many leases in the west were being held in speculation and had not produced any coal. Concerns regarding speculation and nonproductive leases, as well as a lack of a clear regulatory framework, motivated the Department of the Interior to place a moratorium on Federal coal leasing in May 1971. Congress passed both FCLAA in 1976 and SMCRA in 1977. These two acts fundamentally changed the authorizing framework for the Federal coal program, thus requiring a programmatic review of the Federal coal leasing program to establish a new implementing regulatory structure. In 1979, the BLM published the Final Programmatic Environmental Statement Federal Coal Management Program.[17] The final rulemaking was published on July 19, 1979 (44 Fed. Reg. 42584). The results of this effort provided the framework for a largely revised coal leasing program, including guidance for the administration of existing leases, the processing of Preference Right Lease Applications, and the review of Federal lands to determine unsuitability for certain types of mining. The new final regulations established standards and procedures for determining when, where, and how to lease Federal coal (principally through competitive sales under a regional leasing program) and implemented FCLAA, as well as those aspects of SMCRA that were under the BLM's authority. As a result of these reforms, the moratorium was lifted in January of 1981.

The Powder River Basin of Wyoming held its first regional coal lease sale under the new program in 1982. However, irregularities with the sale led to questions as to whether the BLM had realized a FMV for the leases. These concerns prompted Congress to create the Commission on Fair Market Value Policy for

[17] The 1979 programmatic review document was titled "Programmatic Environmental Statement." The subsequent supplement used the more modern terminology "Programmatic Environmental Impact Statement."

Federal Coal Leasing (known as the Linowes Commission) chaired by economist David F. Linowes, who had recently chaired Congress's Commission on the Fiscal Accountability of the Nation's Resources. Congress instituted another leasing moratorium during the Linowes Commission's review, which concluded 90 days after the publication of the Commission's report in February 1984.[18] The report provided 36 recommended changes to the Federal coal leasing program, some of which were gradually implemented over the next several years, while others were not. A key recommendation of the Linowes Commission was that "[t]he government should establish and announce in a timely fashion a coal leasing schedule to promote predictability and stability of federal leasing actions. In doing so, the government should have the flexibility to change the timing of lease sales and the quantity of coal offered based on its assessment of market conditions." The BLM published a Supplement to the Final Programmatic EIS of 1979 in October 1985 in response to these recommendations.

As a result of the Commission's report, the Department of the Interior revised the coal regulations to incorporate a two-tiered leasing structure. In certified coal producing regions where exploration and new mining was occurring, the BLM, through the Regional Coal Teams, would select tracts for lease sale. In areas outside of coal producing regions, mining companies would apply for specific tracts of lands to be leased (i.e., LBA), generally adjacent to their existing mines, also known as maintenance leasing. Notwithstanding this initial effort to inject competition into the lease sale process by planning in advance what resources were offered for sale in a region, the changes were short lived. Between 1987 and 1990, all six coal producing regions were "decertified" by the BLM, which cited considerations such as weak current and projected coal market conditions, the level of leasing interest in Federal coal and new mine development, public input, and views expressed by the Regional Coal Teams and the affected governors.[19] This had the effect of replacing the competitive regional leasing process with the LBA process.[20] Today, there are no regional

[18] The coal leasing moratorium was not lifted upon publication of the Commission's report. Interior Secretary William P. Clark extended the suspension of coal leasing (with exceptions for emergency leasing and processing preference right lease applications, among other things) while the Interior completed its comprehensive review of the program. This review included proposed modifications to be made by the Department in response to the Linowes Commission, as well as other reports. Secretary Clark announced on August 30, 1984, that the Department of the Interior would prepare an EIS supplement to the 1979 Final Environmental Statement for the Federal Coal Management Program. The Department issued the Record of Decision for the PEIS supplement in January 1986, in the form of a Secretarial Issue Document. This document recommended continuation of the leasing program with modifications. In conjunction with those modifications, Secretary Donald Hodel lifted the leasing moratorium in 1987.

[19] BLM Handbook, H-3420-1, *Competitive Coal Leasing*, allows a lead state director to request decertification of a designated coal production region if this is the course recommended by the Regional Coal Team. A proposal to decertify a designated coal production region must be announced in the *Federal Register* (H-3420-1, Rel. 3-325).

[20] BLM. 1999. Public Participation in Coal Leasing. Final Rule. *Federal Register* Vol 52. Pp. 239-240. September 28, 1999. Available at https://www.blm.gov/nhp/news/regulatory/3400-3420/3400-20f.pdf

lease sales, and all new leasing is done through either the LBA process or lease modifications.

The Federal coal program remained relatively unchanged throughout the 1990s and 2000s. During that time, the Powder River Basin became the primary area of Federal coal leasing and production, and Federal coal commanded a much larger share of national coal production. The Federal coal program was last reviewed in 2013 by the Department of the Interior OIG and the GAO in two separate audits.[21,22] The OIG and GAO focused their specific recommendations on improving existing agency procedures (such as how to conduct FMV appraisals), however, both reviews made clear that Federal coal lease sales continue to suffer from a fundamental lack of competition under the LBA process. While BLM LBA sales are conducted through a competitive bidding process, the GAO noted that in fact, of the 107 tracts leased from 1990 to 2012, "sales for 96 (about 90 percent) involved a single bidder…which was generally the company that submitted the lease application. More than 90 percent of the lease applications BLM received were for maintenance tracts used to extend the life of an existing mine or to expand that mine's annual production." Combined, the audits resulted in 21 recommended changes to the BLM's coal program covering coal leasing and exports, inspection and enforcement activities, transparency of the process, and timely processing of royalty rate reduction applications. The BLM addressed all 21 recommendations in new BLM guidance (including two new manuals and handbooks[23]) and development of additional mine inspector and valuation training.

Many stakeholders expressed concerns that BLM's corrective actions, while helpful, were insufficient to rectify fundamental weaknesses in the program. To further explore these concerns, Secretary Jewell and the BLM hosted a series of listening sessions in March 2015 across the country to hear from the public their views on what, if any, reforms were seen as needed to the Federal coal program.

In response to the broad range of issues raised over the course of the past few years and through the listening sessions, on January 15, 2016, Secretary Jewell issued Order 3338 (see **Section 2.2**). The Order directs the BLM to carry out the following:

1. A formal, comprehensive review of the Federal coal program through a discretionary programmatic EIS under NEPA

[21] OIG. 2013. Final Evaluation Report-Coal Management Program. CR-EV-BLM-0001-2012. June 11, 2013 Available at https://www.doioig.gov/sites/doioig.gov/files/CR-EV-BLM-0001-2012Public.pdf;
[22] GAO. 2013. Coal Leasing: BLM Could Enhance Appraisal Process, More Explicitly Consider Coal Exports, and Provide More Public Information. GAO-14-140. Published December 18, 2013. Publicly Released February 4, 2014. Available at http://www.gao.gov/products/GAO-14-140.
[23] US EIA. 2016. Changing US Energy Mix Reflects Growing Use of Natural Gas, Petroleum, and Renewables. July 21, 2016. Available at http://www.eia.gov/todayinenergy/detail.php?id=27172

2. A pause on significant new coal leasing decisions on public lands while the programmatic review is underway, with limited, enumerated exemptions and exclusions
3. A series of good government reforms to improve transparency and program administration, including establishing a public database to account for the carbon emissions from fossil fuels on public lands

5.4 STATE OF THE COAL INDUSTRY

According to the US Energy Information Administration (EIA), US coal consumption declined by more than 12 percent in 2015, relative to 2014, and is now at its lowest level since 1982.[24] New mine starts are very rare, and mining generally occurs in mature basins where there are active mines with known additional reserves. When existing mines need to secure additional coal reserves, it is generally to maintain current production levels necessary to fulfill existing contracts. The greatest percentage of Federal coal can be classified as "thermal" coal and is used for electrical generation. Approximately 33 percent of the nation's electricity was produced from coal in 2015. Coal produced from Federal leases is generally sold into the domestic market, and at this time, only a small share of coal produced in Federal coal producing states is exported. For instance, coal exports from the Powder River Basin (where most Federal coal is located) were approximately 10 million tons (2.5 percent) out of the 404 million tons produced in 2015.[25] The reasons for a softening market are varied, but include a reduction in coal-fired generating capacity is primarily due to the decrease in natural gas prices, the aging coal fleet, and expanded requirements that coal plants install pollution controls. There has been an increase in coal companies filing for bankruptcy, which began in 2012 and recently included three of the nation's largest producing companies.

5.4.1 Energy in the United States

Coal has been a significant contributor to total US energy consumption since the industrial revolution when steam-powered ships and railroads dominated transportation. In the latter half of the 1800s, coal was first used to generate electricity.[26] However, its role has decreased substantially over the past century (see **Figure 5-1**). At the beginning of the 20th century, coal provided for 75 percent of all US energy consumption with biomass and hydroelectric generation also providing significant sources of energy. By the mid-20th century coal had dropped to 36 percent of total US energy consumption in large part due to the role of increased demand for petroleum and mass production of the automobile. As natural gas consumption quadrupled over the next half century

[24] US EIA. 2016. Changing US Energy Mix Reflects Growing Use of Natural Gas, Petroleum, and Renewables. July 21, 2016. Available at http://www.eia.gov/todayinenergy/detail.php?id=27172
[25] Woods Mackenzie. 2016. Powder River Basin Coal Supply Summary. June 2016.
[26] US Department of Energy. 2013. A Brief History of Coal Use. February 12, 2013. Available at http://www.fe.doe.gov/education/energylessons/coal/coal_history.html

and nuclear energy was developed, coal's share of total energy consumption decreased to 23 percent of total energy consumption by 2000.[27]

Since the turn of the century, energy consumption from natural gas has increased by nearly another 20 percent in large part due to advances in hydraulic fracturing. Renewable energy, such as wind and solar, have also become more cost competitive and widely available over the past 5 years. Energy demand growth has also slowed relative to historical averages due to some shifting from a manufacturing-based economy to a services-based economy and demand side energy efficiency breakthroughs. By 2015, coal constituted just 16 percent of total energy consumption in the United States. Early 2016 data suggest that its share will be even smaller as coal production and consumption reached multi-decade lows throughout the first three quarters of the year.[28]

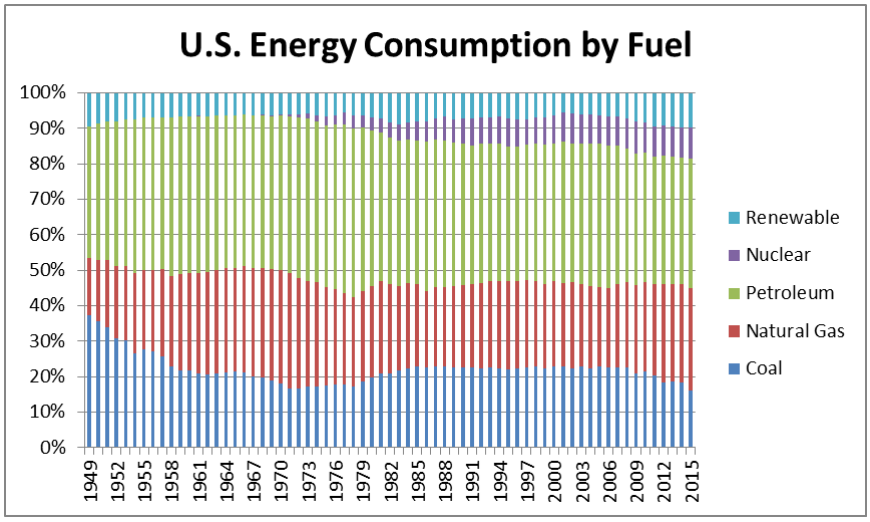

Figure 5-1. US Energy Consumption by Fuel Type

Source: EIA 2016 [29]

5.4.2 Major Coal Basins and Characteristics

Major coal fields of the United States are shown in **Figure 5-2**. For the purposes of this overview in the scoping report, coal mining in the United States is divided into three primary regions: Appalachian, Interior, and Western.[30] In 2015, 42 percent of all coal produced in the United States came from Federal lands. The vast majority of coal mined on Federal lands (more than 99 percent)

[27] US EIA. 2016. October 2016 Monthly Energy Review. Table 1.3. Primary Energy Consumption by Source. Release date October 27, 2016. Available at http://www.eia.gov/totalenergy/data/monthly/#summary
[28] Ibid.
[29] US EIA. 2016. October 2016 Monthly Energy Review. Table 1.3. Primary Energy Consumption by Source. Release date October 27, 2016. Available at http://www.eia.gov/totalenergy/data/monthly/#summary
[30] The regional breakdown in the PEIS may differ from the overview in the scoping report.

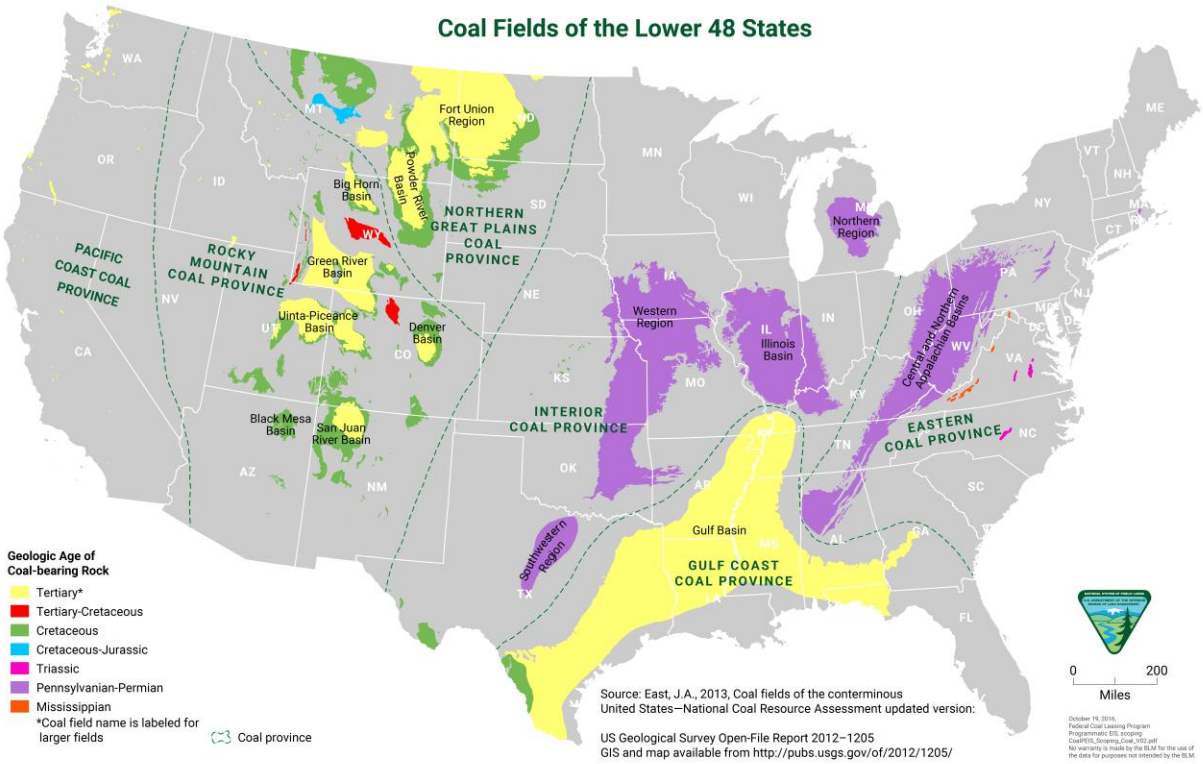

Figure 5-2. Coal Fields of the Lower 48 States

is located in the western region. Of the 306 active Federal leases in 2015, all but six of those leases were located in the western region.[31] More narrowly, nearly 90 percent of the coal mined on Federal lands occurs in the Powder River Basin located in Wyoming and Montana. Any changes to the Federal coal program will have a more direct impact in the western region and Powder River Basin due to this heavy concentration of leases and production from the Federal estate.

As described below, coal has different characteristics in energy content and environmental properties that vary both within and between basins. The variation in the characteristics of coal typical to each basin can be significant, and, therefore, coals are not perfect substitutes for each other. For example, some western coals have less energy content than some eastern counterparts. Therefore, it takes more tons of these western subbituminous coals as compared with eastern bituminous coals to generate a given amount of electricity. Moreover, some power plants are designed to best accommodate certain ranks of coal. Coal switching is possible at most plants, but they may

[31] BLM. 2016. Total Federal Coal Leases in Effect, Total Acres Under Lease, and Lease Sales by Fiscal Year Since 1990. July 7, 2016. Available at http://www.blm.gov/wo/st/en/prog/energy/coal_and_non-energy/coal_lease_table.html

need modifications (such as increased material handling capacity) to accommodate a different coal rank.

Production from the western coal region is largely comprised of the Powder River Basin subbituminous coal and other western bituminous coals. Among coal nationwide, the Powder River Basin is the single largest producing basin. In 2015, approximately 44 percent of United States coal production came from the Powder River Basin.[32] It is generally the lowest cost coal to produce due to thick coal seams reaching up to 400 feet and the proximity of the coal seams to the earth's surface, which allows surface mining generally. The subbituminous coal has lower heat content generally ranging from 8,200 to 8,900 Btu (British thermal units)/lb and lower sulfur content.[33] Due to both its low-heating value per ton and its distance from the eastern United States, where many coal-fired power plants are located, transportation costs become more significant for this basin.

Other Federal coal production occurs in the western bituminous region comprised of mines in Colorado, Utah, Arizona, southwestern Wyoming, and New Mexico. These western bituminous coals generally have higher mining costs due to thinner seams generally in the 5-15 feet range, though they tend to have higher heat content on average than the Powder River Basin coal. Outside of the Powder River Basin states of Wyoming and Montana, Colorado and Utah are the next highest producing coal states on Federal lands. They are generally considered to be high-quality coals, having high energy value and low sulfur content (averaging around 11,000 Btu/lb), and many have a 1.2 pound or less of sulfur dioxide content (SO_2/mmBtu). Like the Powder River Basin, the western bituminous region is mainly utilized as thermal coal as well. However, there is one mine that produces a significant amount of metallurgical coal. Metallurgical coal is generally higher in carbon content and calorific value and is used in the production of steel rather than electricity generation purposes.

The Appalachian region is generally characterized as having three basins: the southern Appalachian, central Appalachian, and northern Appalachian coal basins. Coal produced in these basins generally have higher mining costs than the rest of the country as the coal seams are, on average, thinner and deeper relative to other regions. This results in high strip ratios for surface mines (the amount of material/earth that must be removed in order to remove a unit of coal), which drives up capital and operating cost, or underground mining operations which also drive up costs. The region is predominantly bituminous coal with high energy and low sulfur content. Higher energy content allows power plants to consume less coal to extract a given amount of energy. It also

[32] US EIA. 2016. Coal Production and Number of Mines by State and Mine Type, 2015 and 2014. Annual Coal Report. November 3, 2016. Available at https://www.eia.gov/coal/data.php#production

[33] A small amount of bituminous coal occurs within the Powder River Basin in the Bull Mountain coalfield. See Woods Mackenzie. 2016. Powder River Basin Coal Supply Summary. June 2016.

has the advantage of being located in the east, where the majority of electricity demand and coal generation occurs, making transportation from mine to power plant relatively less expensive. Nevertheless, the Appalachian region is generally characterized as the highest cost coal of the major regions with the southern basin being the highest, followed by central and northern Appalachian basin coals.

The Interior region is largely comprised of the Illinois Basin, Gulf Lignite, and Western Region (Interior) coals. The Illinois Basin is the largest producing basin in this region and is comprised of bituminous coal with slightly less heat content than Appalachian coals on average. The coal seams are most often in the 1- to 10-foot thickness range and are generally located at depths less than 1,000 feet. Coal mining costs are lower in this region relative to the Appalachian due to more favorable seam thickness, mining conditions, and advances in long-wall mining technology. The coal mines also have the advantage of being at the center of the coal transportation network with all four major rail lines having a presence in the area, as well as the Ohio and Mississippi River barge traffic. Gulf lignite coal generally has much lower heat content and is, therefore, usually only transported short distances or used at mine mouth power plants.

The Western Region of the Interior is small in terms of production capacity and coal reserves. It is mainly comprised of Kansas and Oklahoma. These are bituminous coals that have high heat content and high sulfur content with a relatively high extraction cost. Oklahoma has some coal mines located on Federal leases that account for approximately 0.1 percent of Federal coal production.

5.4.3 Maintenance Leasing

Since the last remaining certified coal producing region was decertified in 1990, all Federal coal leasing has been made up of maintenance leases issued through the LBA process where tracts are nominated by an applicant (see **Section 5.3**). The areas where the BLM currently manages leases support a mature industry (i.e., existing mines that are well-established with all necessary infrastructure, equipment, rail facilities, etc.) and where opening new mines has proved to be cost prohibitive. This has led to the majority of existing lease sales only receiving one bid, typically from the operator of a mine adjacent to the new lease. While the Mineral Leasing Act, as amended, requires competitive leasing, the nature of the current coal industry is not generally conducive to multiple bidders bidding against each other for the same tract. The BLM, however, takes a number of steps in the LBA process to create as competitive an environment as possible.

In those unique areas where a lessee for an existing mine applies for a lease and other mines are nearby or adjacent, the BLM routinely reconfigures the proposed lease tract to try to make the tract attractive as a potential maintenance lease for those other nearby or adjacent mines, in addition to the applicant. However, the majority of coal mines do not adjoin or abut another

coal mine, and even if the mines adjoin or abut, the prospective lease might not be reconfigured for increased competition due to local physical limitations in geology and ownership.

The BLM recognizes that to remain truly competitive in a one-bidder environment, the pre-sale estimate of the tract's FMV must not only be factually supported and defensible, but also kept confidential. For a bidder to successfully win a Federal coal lease sale, the bid must meet or exceed the BLM's pre-sale estimated FMV. The BLM follows established appraisal methods in estimating the value, and the Office of Valuation Services (OVS), Division of Mineral Evaluation (DME) reviews each evaluation to assure it follows established procedures, is rational, and is supported by facts.

The BLM's pre-sale estimated FMV functions similarly to a "reserve value" in an auction. The result is that even if a sale receives only one bid, the bidder is "playing against the house" with the BLM's confidential pre-sale FMV estimate representing the lowest possible bid that can be accepted. After the coal lease sale, the BLM reviews the bids received and if none meets or exceeds the pre-sale estimated FMV (as reviewed by OVS), the BLM will reject all bids and may, at its discretion, re-offer a lease sale. Therefore, the lease applicant is cognizant of the real possibility that the years of planning and NEPA review and associated costs may result in not being awarded the lease if they do not provide a sufficient bid.

As seen in **Figure 5-3** below, over the period from 1990 to 2015, the BLM has generally leased Federal coal at approximately the same rate it has been mined. This trend supports the goal of the FCLAA to restrict speculation in Federal coal reserves. Leasing Federal coal at a rate that exceeds the rate at which it has been mined would be an indicator of increased speculation. Since 2012, the amount of Federal coal leased has been significantly less than the amount of Federal coal mined. This drop in leasing levels is reflective of the decline in the US and global coal market (see **Section 5.4.5**).

5.4.4 Reserves

The United States leads the world in demonstrated reserve base for coal. As of 2016, the EIA estimated the United States had 477 billion tons of a demonstrated reserve base with approximately 255 billion tons being identified as recoverable.[34] Recoverable reserves at currently producing mines are approximately 18.3 billion tons.

Averaged across all Federal leases, at the end of 2015, there were approximately 20 years of production of Federal coal reserves under lease, assuming continued production at recent levels (approximately 375,000,000

[34] US EIA. 2016. US Coal Reserves. November 4, 2016. Available at http://www.eia.gov/coal/reserves/

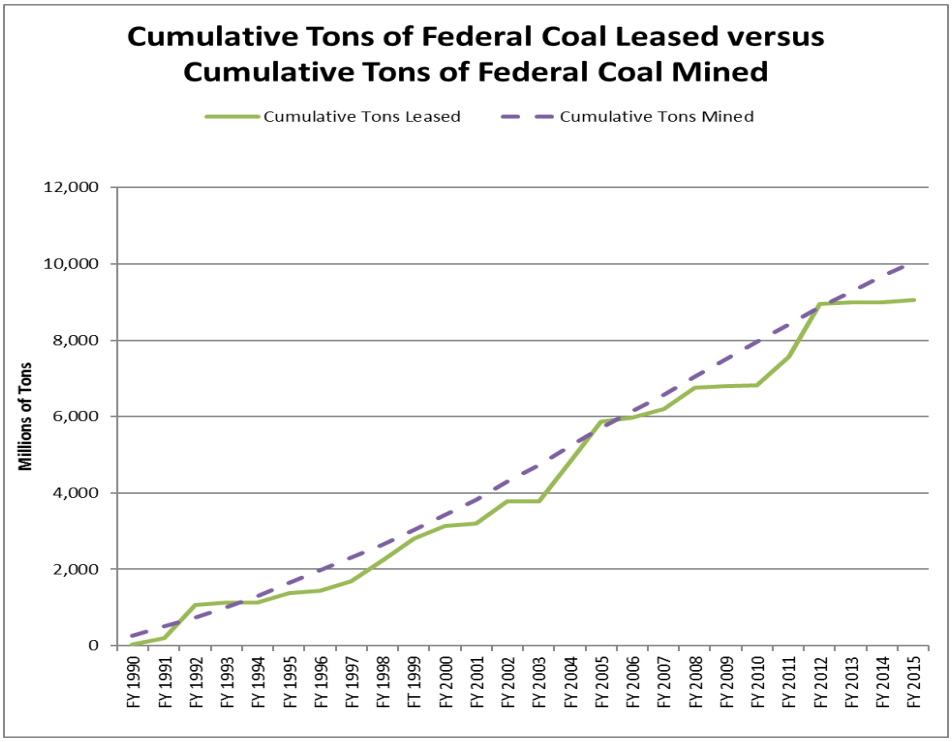

Figure 5-3. Cumulative Tons of Federal Coal Leased Versus Mined
Source: BLM 2016[35]

tons/year in 2015).[36] It is important to put this number into context, however, since it represents an average.

Mines under existing lease in the Powder River Basin, which accounts for nearly 90 percent of the total annual Federal coal production, cumulatively hold approximately 25 years of Federal reserves, assuming current production levels.[37,38,39,40] But for states and especially for individual mines, both within and outside of the Powder River Basin, there is quite a lot of variation in the years of remaining Federal reserves.

For instance, since Kentucky has a relatively small amount of leased Federal reserves (approximately 4.8 million tons) and low annual Federal production

[35] BLM. 2016. Total Federal Coal Leases in Effect, Total Acres Under Lease, and Lease Sales by Fiscal Year Since 1990. July 7, 2016. Available at https://www.blm.gov/wo/st/en/prog/energy/coal_and_non-energy/coal_lease_table.html
[36] Office of Natural Resource Revenue. 2016. Production Data. Available at https://www.onrr.gov/About/production-data.htm;
[37] Ibid.
[38] BLM. 2016. Powder River Basin Coal. May 20, 2016. Available at https://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/deq_aqd.html,
[39] BLM. 2016. Powder River Basin Coal Production. May 6, 2016. Available at https://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/production.html,
[40] BLM. 2014. Powder River Basin Coal Review. August 12, 2014. Available at https://www.blm.gov/wy/st/en/programs/energy/Coal_Resources/PRB_Coal/prbdocs.html

(approximately 29,000 tons in 2016), the state has nearly 160 years of production remaining in Federal coal leases, assuming current production levels. Utah, on the other hand, has approximately 96 million tons of Federal reserves leased with an annual Federal production of about 12 million tons in 2016. This amounts to approximately 8 years of remaining Federal reserves, assuming current production levels.[41]

The BLM estimates that, as of September 2016, there are approximately 7.4 billion short tons of coal reserves available under existing leases (see **Table 5-1**).[42]

Table 5-1
Coal Reserves on Federal Lands

Estimated Recoverable Coal Reserves on Federal Lands (End of FY 2016)	
	Quantity (1000 tons)
Powder River Basin	6,393,976
Colorado	422,678
Utah	96,255
All Other	487,638
Total	**7,400,547**

Source: Department of Interior 2016[43]

5.4.5 Production

The BLM currently administers 306 coal leases encompassing over 462,000 acres in 10 states, with an estimated 7.4 billion tons of recoverable coal. Between 80 and 90 percent of coal produced in the United States is used for domestic electricity generation, with the remainder primarily being exported and used for industrial purposes.[44,45,46] In 2015, US coal production levels experienced one of its steepest declines since recordkeeping began. Production levels decreased from over 1 billion tons in 2014 to just under 0.9 billion tons in 2015.[47]

[41] BLM. 2016. Total Federal Coal Leases in Effect, Total Acres Under Lease, and Lease Sales by Fiscal Year Since 1990. July 7, 2016. Available at https://www.blm.gov/wo/st/en/prog/energy/coal_and_non-energy/coal_lease_table.html

[42] US Department of Interior. 2016. Agency Financial Report Fiscal Year 2016. Available at https://www.doi.gov/sites/doi.gov/files/uploads/doi_fy_2016_afr.pdf

[43] Ibid.

[44] US EIA. 2013. Monthly Generation Data by State, Producer Sector and Energy Source; Months through December 2013. Available at http://www.eia.gov/electricity/monthly/

[45] US EIA. 2013. Electric Power Monthly, September 2013 publication date, data for July 2013. Tables 1.6.A, 1.7.A, and 5.6.A. Available at https://www.eia.gov/electricity/monthly/

[46] In 2015, domestic coal purchases per EIA Form 923 equaled about 85 percent of coal production (MSHA, Form OSM-1).

[47] US EIA. 2015. Annual Coal Report. Coal Production and Number of Mines by State and Mine Type, 2015 and 2014. Available at https://www.eia.gov/coal/data.php#production

Table 5-2 includes Federal coal production data provided by the ONRR for the years 2006, 2010, and 2015, which show a decline of approximately 81 million tons between 2010 and 2015. Coal exports are described in **Sections 5.4.6 and 5.5.3)**.

Table 5-2
Federal Coal Production (tons)

State	2006	2010	2015
Colorado	20,811,927	16,137,065	6,591,181
Montana	18,072,165	17,741,873	14,477,637
North Dakota	3,196,317	338,405*	5,261,915
Oklahoma	725,099	516,450	498,360
Utah	10,097,980	6,219,884	5,469,603
WY	369,856,067	397,535,690	313,790,093
Other*	22,435,709	18,396,804	29,472,084
Grand Total	**445,195,265**	**456,886,171**	**375,560,873**

Source. United States Extractive Industries Transparency Initiative (USEITI). 2015[48]
*"Other" reflects coal produced on Federal leases, but state and county information is withheld in order to not reveal proprietary data. For example, North Dakota production from Mercer County is withheld in 2010 due to proprietary data concerns, and instead placed in the "other" category.

According to the most recent EIA Short-Term Outlook, 2016 coal production is expected to decrease by 138 million tons (15 percent), which would be the largest annual decline based on data going back to 1949.[49] These reductions have been felt most sharply in the Appalachian basin, particularly Central Appalachian coal, but are also observed in other basins with significant declines in the Powder River Basin production. These reduced production levels are driven by a variety of factors, including low natural gas prices, which drives some displacement of coal-fired electric generation by natural gas-fired generation.[50] In addition to low natural gas prices, reduced electricity demand growth, pollution control requirements, and a number of other reasons are cited by the EIA and industry for recent coal plant retirements that totaled 41 gigawatts (GW) between 2010 and 2015.[51,52] The coal plants anticipated to retire between 2015 and 2022 accounted for 30 GW and 56 million tons of 2014 coal deliveries. From the Powder River Basin alone, over 32 million tons of 2014 Powder River Basin deliveries (9 percent) were to plants expected to

[48] United States Extractive Industries Transparency Initiative (USEITI). 2015. Federal Production by Location. Available at https://useiti.doi.gov/downloads/federal-production/
[49] US EIA. 2016. Short-Term Outlook. December 6, 2016. Available at https://www.eia.gov/forecasts/steo/report/coal.cfm
[50] Ibid.
[51] See for example, US EIA. 2014. Planned coal-fired power plant retirements continue to increase. March 30, 2014. Available at http://www.eia.gov/todayinenergy/detail.php?id=15491
[52] US EIA. 2015 Form 860. Schedule 3 "Generator Data (Retired and Canceled Units)

retire by 2022. These drivers, along with other market and regulator drivers, are discussed in more detail below.

Coal prices have fallen in recent years, in large part due to shrinking demand. As annual coal production in 2016 is expected to be more than 24 percent lower than 2014 levels, producers have focused on minimizing coal production costs and closing higher cost mines over the past several years.[53] Lower petroleum prices have also helped reduce mining cost. The nationwide average delivered coal price was $2.38/mmBtu in 2012, but dropped to $2.14/mmBtu by 2016.[54]

5.4.6 Main Drivers of Coal Demand

The demand for US coal is driven by a variety of market and regulatory factors. Electricity demand growth, installed coal-fired generating capacity, the relative prices of alternative fuel sources, coal demand from the domestic metallurgical and industrial markets, net US exports of coal, and existing and proposed environmental rules all affect the future supply and demand for US coals, which in turn affect coal pricing. The price of US coals drives domestic coal production. Several of the market and regulatory drivers impacting coal-fired electricity production and, consequently, demand for US coal production are highlighted below.

Market Drivers

Natural Gas Price

The availability and the price of natural gas is one of the single biggest drivers of US coal demand. As noted above, the bulk of coal demand in the United States stems from electricity generation. As a fuel for electricity generation, coal primarily competes with natural gas generation, as both are dispatchable resources that can be ramped up or down in response to market dynamics. Together, the two fuel sources account for approximately two-thirds of the electricity generated in the United States.

The breakthroughs in the cost and performance of hydraulic fracturing technology in the late 2000s increased the supply of domestic natural gas for electricity generation while lowering the cost. The Henry Hub natural gas spot price dropped significantly following this technology maturation. Prices were near $13.00/mmBtu in June of 2008, but had dropped to less than $3/mmBtu in June of 2015.[55] Natural gas gross withdrawals rose by more than 25 percent over this time frame.[56]

[53] US EIA. 2016. Short-Term Energy Outlook. US Coal Production Figure. December 2016. Available at http://www.eia.gov/forecasts/steo/data.cfm?type=figures
[54] US EIA. 2016. Short-term Energy Outlook. December 6, 2016. Available at http://www.eia.gov/beta/steo/#?v=8
[55] US EIA. 2016. Henry Hub Natural Gas Spot Price. Available at https://www.eia.gov/dnav/ng/hist/rngwhhdd.htm
[56] US EIA. 2016. Natural Gas Gross Withdraws and Production. Available at https://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_a.htm

The lower natural gas price enabled natural gas-fired generation to become more competitive with coal-fired generation. In 2005, coal-fired generation accounted for approximately 50 percent of the domestic electricity generation, and natural gas generation was less than 20 percent. In 2015, with the increased supply and reduced price of natural gas, each fuel constituted approximately one-third of US electricity generation.[57] The reduction in natural gas price also spurred a significant build out in new natural gas-fired combined-cycle power plants. Since the beginning of 2012, 24 GW of new natural gas-fired combined-cycle power plants have been built while less than 5.9 GW of coal-fired power plants have been added to the grid during the same period.[58] New natural gas combined-cycle generation units have seen significant decreases in the expected levelized cost of electricity (LCOE). EIA's Annual Energy Outlook projections for the technology LCOE dropped to below $50/MWh in some regions while the projected LCOE for new conventional coal remains near $100/MWh. The combined drop in fuel cost and generating technology cost for natural-gas generation makes it difficult for new coal generation to compete.[59,60]

Renewable Energy

Wind and solar generation have also grown significantly in recent years and have provided another source of competition for fossil-fuels in electricity generation. These technologies have low variable operating costs and will, therefore, once built, generally be deployed before any fossil-fuel source. The combined total generation from these two sources in 2005 provided less than 1 percent of the country's electricity generation, but represented more than 5 percent by 2015.[61] The growth is driven by improvements in performance and reductions in the cost of the renewable energy technology. Policy measures, such as renewable energy tax credits and state renewable energy portfolio standards, create an additional push for the expansion of renewable energy generation. The 2016

[57] US EIA. 2016. Net Generation for All Sectors, Annual. Electricity Data Browser. Available at http://www.eia.gov/electricity/data/browser/#/topic/0?agg=2,0,1&fuel=vtvv&geo=g&sec=g&linechart=ELEC.GEN.ALL-US-99.A~ELEC.GEN.COW-US-99.A~ELEC.GEN.NG-US-99.A~ELEC.GEN.NUC-US-99.A~ELEC.GEN.HYC-US-99.A~ELEC.GEN.WND-US-99.A~ELEC.GEN.TSN-US-99.A&columnchart=ELEC.GEN.ALL-US-99.A~ELEC.GEN.COW-US-99.A~ELEC.GEN.NG-US-99.A~ELEC.GEN.NUC-US-99.A~ELEC.GEN.HYC-US-99.A~ELEC.GEN.WND-US-99.A&map=ELEC.GEN.ALL-US-99.A&freq=A&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin=

[58] US EIA. 2015. Form EIA 860 Data – Schedule 3, "Generator Data." Available at http://www.eia.gov/electricity/data/eia860/

[59] The White House. 2016. US Mid-Century Strategy for Deep Decarbonization. November 2016. p.26. Available at https://www.whitehouse.gov/sites/default/files/docs/mid_century_strategy_report-final.pdf.

[60] EIA. 2016. Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2016. Available at http://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf

[61] US EIA. 2016. Net Generation for All Sectors, Annual. Electricity Data Browser. Available at http://www.eia.gov/electricity/data/browser/#/topic/0?agg=2,0,1&fuel=vtvv&geo=g&sec=g&linechart=ELEC.GEN.ALL-US-99.A~ELEC.GEN.COW-US-99.A~ELEC.GEN.NG-US-99.A~ELEC.GEN.NUC-US-99.A~ELEC.GEN.HYC-US-99.A~ELEC.GEN.WND-US-99.A~ELEC.GEN.TSN-US-99.A&columnchart=ELEC.GEN.ALL-US-99.A~ELEC.GEN.COW-US-99.A~ELEC.GEN.NG-US-99.A~ELEC.GEN.NUC-US-99.A~ELEC.GEN.HYC-US-99.A~ELEC.GEN.WND-US-99.A&map=ELEC.GEN.ALL-US-99.A&freq=A&ctype=linechart&ltype=pin&rtype=s&maptype=0&rse=0&pin=

Annual Energy Outlook reference case anticipates that renewable energy generation will continue to grow by 3.6 percent per year on average between 2015 and 2040.[62] This growth in renewable energy generation is expected to add to the downward pressure on coal demand. Both wind and solar generation have seen precipitous drops in projected LCOE for new generation, both dropping to averages well below $100/MWh and, therefore, less than new coal, in the latest Annual Energy Outlook reference case.[63]

Electricity Demand

Electricity demand has leveled off in recent years in the wake of the 2009 recession due to both slower economic growth and advancements in demand-side energy efficiency. Demand growth has slowed every decade since the 1950s when it was above 10 percent per year, but it has reached new lows since the 2009 recession with some years even experiencing negative demand growth.[64] The 2016 Annual Energy Outlook reference case anticipates average growth of 0.9 percent from 2015 to 2040.[65] As the largest source for coal demand, this slow rate of electricity demand growth limits the opportunity for increased coal production.

Exports

The high price and high demand for coal in Asian markets at the beginning of the decade has rapidly subsided. The Newcastle, Australia benchmark thermal coal price was approximately $145/ton in 2011, but experienced continued and steady decline down to $53/ton in June of 2016.[66] Slow global economic growth, decoupling of electricity demand with China's gross domestic product, protectionist policies regarding China's domestic coal industry, aggressive air pollution mitigation policies in China's 13th Five-Year Plan that involve promoting non-coal alternatives, and a cancellation of most of the proposed Northwest coal export terminals have combined to significantly lower the expected levels of US coal exports.[67]

Current total US coal export capacity is 234 million tons per year nationwide with 180 million tons being located on the East or Gulf Coast. Most US coal

[62] US EIA. 2016. Annual Energy Outlook. Electricity Supply, Disposition, Prices, and Emissions. Available at http://www.eia.gov/outlooks/aeo/data/browser/#/?id=8-AEO2016&cases=ref2016&sourcekey=0

[63] The White House. 2016. US Mid-Century Strategy for Deep Decarbonization. November 2016. p.26. Available at https://www.whitehouse.gov/sites/default/files/docs/mid_century_strategy_report-final.pdf

[64] US EIA. 2016. Annual Energy Outlook 2016 with projections to 2040. MT-15. August 2016. Available at http://www.eia.gov/forecasts/aeo/pdf/0383(2016).pdf

[65] Ibid.

[66] Williams-Derry, C. 2016. The Rise and Fall of the Asian Coal Bubble. Sightline Institute. Available at http://web.law.columbia.edu/sites/default/files/microsites/climate-change/williams_derry_the_rise_and_fall_of_the_asian_coal_bubble.pdf williams_derry_the_rise_and_fall_of_the_asian_coal_bubble.pdf

[67] Climate Home. 2016. China's Five Year Plan to Radically Tighten Air Pollution Targets. November 3, 2016. Available at http://www.climatechangenews.com/2016/03/11/chinas-five-year-plan-to-radically-tighten-air-pollution-targets/

exports have been non-Federal coals and non-western coals and only use a fraction of this export capacity.[68] In 2015, coal export levels were 74 million tons.[69] Moreover, most of the coal exported is metallurgical coal and is exported from terminals in the eastern United States or the Gulf Coast.[70] Significant ramp-up in coal exports would require increased export infrastructure. Of the six large coal export terminals proposed since 2010 when Asian coal prices were enticing supplier interest, not one has been built or permitted. Moreover, support and permits for all but one of the projects have been withdrawn as international demand has weakened and resistance from local communities has increased. The one remaining project, Millennium Bulk Longview Terminal, is down to just one backer after Arch Coal sold its position in the project in 2016.[71] Moody's financial services notes that export potential will remain capped by port capacity limitations.[72]

Rail Availability

Rail shipments account for 67 percent of the coal shipped in the United States to power plants.[73] Western coal mines are primarily served by the Union Pacific and BNSF carriers, while Norfolk Southern and CSX are the dominant carriers in the eastern United States. In 2015, coal shipments accounted for 37 percent of the freight shipments in the rail industry and about 17 percent of the rail industry revenues.[74] With the fast growth of oil production in the Bakken Shale region, competition for rail space between coal and oil had sharpened in recent years and made it more difficult at times for coal companies to connect with utility consumers. Some power customers are beginning to hedge their coal deliveries by railroads with barge and truck delivery capability. However, in the arid west where most Federal coal is found, transportation distance from the mine is generally too great for truck transportation to be competitive with railways, and waterways are too limited in their occurrence and flowrates for

[68] Institute for Energy Economics and Financial Analysis. 2014. No Need for New US Coal Ports: Data Shows Oversupply in Capacity. November 19, 2014. Available at http://www.ieefa.org/wp-content/uploads/2014/11/Sanzillo-port-capacity.pdf

[69] US EIA. 2016. Today in Energy. US coal exports declined 23% in 2015, as coal imports remained steady. March 7, 2016. Available at http://www.eia.gov/todayinenergy/detail.php?id=25252

[70] US EIA. Coal Data Browser. Export quantity to total world of All coal 2015. Available at http://www.eia.gov/beta/coal/data/browser/#/topic/41?agg=2,1,0&rank=ok&linechart=COAL.EXPORT_QTY.TOT-TOT-TOT.A&columnchart=COAL.EXPORT_QTY.TOT-TOT-TOT.A&map=COAL.EXPORT_QTY.TOT-TOT-TOT.A&freq=A&start=2001&end=2015&ctype=map&ltype=pin&rtype=s&pin=&rse=0&maptype=0

[71] Sightline Institute. 2016. Arch Coal Backs Out of Longview Export Terminal. May 27, 2016. Available at http://www.sightline.org/2016/05/27/arch-coal-backs-out-of-longview-export-terminal/

[72] Zubets-Anderson, A. . 2016. "Bankruptcy and Financing Rating Agency's Perspective." Moody' Investor Service. Presented at the US Coal in the 21st Century: Markets, Bankruptcy, Finance and Law conference. Columbia Center on Global Energy Policy and the Sabin Center for Climate Change Law. September 2016. Summary Available at http://web.law.columbia.edu/sites/default/files/microsites/climate-change/panel_summaries_-_us_coal_in_the_21st_century.pdf

[73] US EIA. 2014. Today in Energy. Railroad deliveries continue to provide the majority of coal shipments to the power sector. June 11, 2014. Available at http://www.eia.gov/todayinenergy/detail.cfm?id=16651

[74] Association of American Railroad. 2016. Railroads and Coal. July 2016. Available at https://www.aar.org/BackgroundPapers/Railroads%20and%20Coal.pdf

barge transport to be viable. If competition for rail space among commodities continues to stiffen, it will put increasing upward pressure on delivered coal prices. The more recent downturn in oil prices and expansion in western rail capacity have alleviated some of the competition for rail space.

Current and Future Policy and Regulatory Drivers

Paris Agreement

On December 12, 2015, 196 Parties to the United Nations Framework Convention on Climate Change (UNFCCC or Paris Agreement) adopted a framework to coordinate climate change mitigation and adaptation efforts. The Paris Agreement aims to limit global warming to less than 2 degree Celsius by limiting the amount of greenhouse gas emissions and by increasing the amount of sequestration. This goal is put into operation through each country's submission of emission reduction goals, referred to as intended nationally determined contributions (INDCs). Countries will report their reduction targets every 5 years starting in 2020. Although emission reduction and climate change abatement strategies are still forthcoming to establish and achieve the INDCs, significant reductions in fossil fuel consumption are one likely component of many such plans and necessary to remain below the 2 degree Celsius target.[75]

The EIA does not yet model the Agreement explicitly in its International Energy Outlook, as it is still awaiting more clarity on implementation strategies. However, as Federal, regional, or state emission reduction programs that reflect parallel carbon dioxide (CO_2) reduction efforts are codified into law through regulations, such as the CPP, Regional Greenhouse Gas Initiative, or Assembly Bill 32, they are captured in the EIA Annual Energy Outlook. The Paris Agreement is anticipated to apply downward pressure to coal consumption both domestically and internationally.

US-China Bilateral Agreement

The US-China Bilateral Agreement announced in November 2014 reflected significant commitments to CO_2 reductions by two of the world's largest CO_2 emitters, as well as two of the largest coal producers, consumers, and holders of reserves. The United States agreed to an emission reductions target of 26-28 percent below 2005 levels by 2025. China committed to peaking emissions around 2030. The two sides intend to cooperate on advanced coal technologies, nuclear energy, shale gas, and renewable energy to help optimize the energy mix

[75] Currently, the United States has committed to reduce net greenhouse gas emissions in the range of 17 percent by 2020 and 26-28 percent by 2025, relative to 2005 levels. This target is consistent with a straight-line emissions reduction pathway from 2020 to deep, economy-wide emission reductions of 80 percent or more by 2050. See International Energy Agency. 2015. Energy and Climate Change. p.150. Available at https://www.iea.org/publications/freepublications/publication/WEO20

and to reduce emissions, including from coal, in both countries.[76] These reduction targets would put additional downward pressure on coal demand.

North America Climate, Clean Energy, and Environment Partnership Action Plan
On June 29, 2016, the leaders of Canada, Mexico, and the United States announced a plan to pursue 50 percent clean power generation collectively by 2025. These carbon-free emissions sources would include renewable energy, nuclear generation, demand reduction through energy efficiency, and potential carbon capture and storage technologies. These carbon-free or low-carbon technologies would reduce the need for some carbon-intensive electricity generating sources, such as coal-fired power plants. The realization of this clean energy target would likely put downward pressure on domestic coal production relative to current projected levels.

Morocco Conference of the Parties (2016) and Mid-Century Strategy
On November 16, 2016, the United States submitted its Mid-Century Strategy for Deep Decarbonization to the United Nations Convention on Climate Change at the Conference of Parties hosted in Morocco.[77] The submission was consistent with the Paris Agreement's requirement to submit climate action plans called INDCs to keep global temperatures from rising by more than 2 degrees Celsius. While not policy prescriptive, the technical document highlights key opportunities and challenges for reducing CO_2 emissions 80 percent below 2005 levels by 2050. The Mid-Century Strategy for Deep Decarbonization illustrates pathways that include a deep decarbonization of the electricity sector that includes a decrease in coal's share of electricity generation. The amount of the decrease is expected to vary significantly depending on the future commercial deployment of carbon capture and sequestration, with enhanced use of carbon capture and sequestration associated with greater use of coal.

Clean Power Plan and the Carbon Pollution Standards
On August 3, 2015, the US Environmental Protection Agency (EPA) finalized the CPP as the first ever US national standards to address carbon pollution from existing power plants. Power plants are historically the largest source of greenhouse gas emissions in the United States, accounting for about 30 percent of the total. Coal has been the dominant fuel for power plants, and coal-fired power plants are, on average, the most carbon-intensive sources of electricity generation.

The CPP requires that states develop and implement plans to ensure the power plants in their state—either individually, together, or in combination with other measures—achieve the emission requirements starting in 2022, with full

[76] The White House. 2016. US-China Joint Announcement of Climate Change. November 11, 2014. Available at https://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change
[77] The White House. 2016. US Mid-Century Strategy for Deep Decarbonization. November 2016. p.26. Available at https://www.whitehouse.gov/sites/default/files/docs/mid_century_strategy_report-final.pdf

implementation by 2030. The rule is also anticipated to trigger additional investment in demand-side energy efficiency, resulting in less overall demand for electricity generation. On February 9, 2016, the US Supreme Court issued a stay of the regulation, halting its implementation until the litigation concludes. On September 27, 2016, oral arguments were held in front of a 10-judge panel at the DC Circuit Court of Appeals.

While the CPP addressed emissions from existing power plants, the EPA also finalized the Carbon Pollution Standards on the same day in 2015 to reduce emissions from new, modified, and reconstructed sources.[78] This rule established standards for electric utility steam-generating units (generally coal-fired), along with stationary combustion turbines, that reflect the degree of emissions limitation achievable and consistent with the Clean Air Act requirements.

Mercury Air Toxics Standard

The EPA Mercury Air Toxics Standard was finalized in 2012, and its compliance requirements began in 2015 and 2016. The rule puts limits on toxic air pollution, including mercury, arsenic, and metals, from fossil-fuel-fired power plants. To comply with the rule's emission standards, many sources would need to install capital-intensive pollution control equipment, such as flue gas desulfurization or dry sorbent injection.

Cross-State Air Pollution Rule

On July 6, 2011, the EPA finalized the Cross-State Air Pollution Rule under section 110 of the Clean Air Act to protect downwind states from upwind sources of air pollution in other states. The rule places limits on the amount of SO_2 and nitrogen oxides (NOx) emissions that the eastern states' power fleet may emit in a given year. It allows for limited emissions trading, but provides a mechanism to ensure that each state meets a specific level of reductions. Phase 1 of the rule went into effect in 2015, and phase 2 is scheduled to go into effect in 2017. In September of 2016, the EPA issued an update to the Cross-State Air Pollution Rule to incorporate the 2008 ozone National Ambient Air Quality Standards, which resulted in different, often tighter, state ozone-season NOx emission limits for some of the affected states. By limiting the emissions of a pollutant associated with combusting coal, the rule is anticipated to put downward pressure on coal demand.

Coal Ash

In December 2014, the EPA finalized national regulations to provide a comprehensive set of requirements for the safe disposal of coal combustion residuals, commonly known as coal ash, from coal-fired power plants. The rule establishes technical requirements for coal combustion residual landfills and

[78] 80 FR 64510

surface impoundments under Subtitle D of the Resource Conservation and Recovery Act.

Effluent Limitations Guidelines
On September 30, 2015, the EPA finalized a revision to the discharge limitations for toxics in power plant wastewater. The rule will likely drive additional investment for some coal steam power plants to reduce current discharge rates to levels commensurate with the new regulatory requirements.

Clean Water Act 316(b)
This EPA rulemaking required certain impingement and entrainment safeguards at power plants for cooling water intake. This rule covered roughly 1,065 existing facilities that are designed to withdraw at least 2 million gallons per day of cooling water. The EPA estimates that 544 power plants are affected by this rule.

State Regulations and Programs
In additional to Federal and international drivers, there are numerous state drivers to reduce greenhouse gas emissions that may affect coal demand as well. For instance, California's Assembly Bill 32 is an economy-wide greenhouse gas emission reduction program for the state aimed at reducing greenhouse gas emissions to 1990 levels by 2020. The regional greenhouse gas initiative is a collective effort among nine New England and Mid-Atlantic states to reduce emissions from the power sector. Many states have clean energy and renewable energy incentives as well. As of late 2015, 29 states and the District of Columbia have renewable energy portfolio standards to support the development of renewable energy. New York State announced in August 2016, a new Clean Energy Standard that requires the utilities to procure 50 percent of the state's electricity from eligible clean energy sources by 2030. Similarly, in March 2016, Oregon adopted legislation that requires two large investor-owned utilities operating in the state to supply 50 percent of the state's electricity from renewable sources by 2040. The law also requires these utilities to phase out electricity from coal by 2030.

5.5 MARKET PROJECTIONS

A variety of government and private sector sources of energy market projections are available and will be considered as the PEIS process continues. Due to the large number of variables and assumptions inherent in forecasting energy markets, projections vary from model to model and from year to year as data is updated. The Energy Information Administration (EIA) notes that multiple organizations issue projections for the coal sector and compares projections for some key metrics in a report.[79] For the purposes of this scoping report, the BLM provides summaries of the projections from models used by the EIA and EPA. These are projections from particular versions and platforms

[79] US EIA. 2016. Annual Energy Outlook 2016. CP7 Available at http://www.eia.gov/outlooks/aeo/section_comparison.cfm

of those models, but the BLM notes that subsequent or alternative versions may contain different projections as assumptions are periodically updated. For instance, a 2017 version of a model may contain information and assumptions not known and, therefore, not included in the 2016 version. These are not predictions, but projections under one reasonable set of assumptions and current best available data.

On September 8, 2016, the Columbia School of Law's Sabin Center also hosted a workshop titled "US Coal in the 21st Century: Markets, Bankruptcy, Finance and Law," with panelist from financial, consulting, non-profit, government, and academic sectors. Panelists generally highlighted the growing market headwinds against coal, primarily due to lower cost gas and renewable generation, and mid- and long-term outlooks that showed coal demand well below historical levels.[80] These findings are consistent with some of the recent modeling and forecasts by the EIA and the EPA discussed below.

5.5.1 Energy Information Administration

The EIA Annual Energy Outlook released in 2016 provides projections for energy markets, including US coal and electricity markets using the National Energy Modeling System model. The most recent version contained a reference case reflecting the known technology and regulatory environment.[81] The outlook contains projections for the energy sectors through 2040. The 2016 reference case included a mass-based version of the CPP implementation. The Annual Energy Outlook projections for US coal consumption, production, and prices from the reference case are discussed below.

In the Annual Energy Outlook 2016 reference case, coal's share of total US electricity generation is projected to drop from 33 percent in 2015 to 21 percent in 2030 and 18 percent in 2040. Total coal production is projected to fall from 896 million tons in 2015 down to 827 million tons in 2022 when CPP compliance begins, and drop down to 664 million tons in 2030 at full CPP compliance.[82]

In the near term, coal generation resumes its role as the largest source of US electricity, but natural gas generation is projected to surpass it by the late 2020s in the reference scenario. Renewable generation is also projected to surpass coal generation by 2030 due to a combination of environmental policies, Federal

[80] A summary of the panel discussions conducted during the US Coal in the 21st Century: Markets, Bankruptcy, Finance and Law workshop, as well as presentations offered by the panelists in PDF and PPT format, can be found in Volume 2 of this scoping report.

[81] The EIA Annual Energy Outlook also includes a variety of side cases that offer projections under alternative market, macroeconomic, and regulatory assumptions.

[82] US EIA. 2016. Annual Energy Outlook 2016 Early Release: Annotated Summary of Two Cases. May 17, 2016. Available at https://www.eia.gov/forecasts/aeo/er/pdf/0383er(2016).pdf

tax incentives, and declining capital cost.[83] The reference case projects 45 GW of US coal-fired power plant retirements in the near term (by end of 2016) due to low natural gas prices and implementation of the EPA's Mercury and Air Toxics Standard. This leaves 226 GW of coal remaining in service in 2016. Another 56 GW of that capacity is projected from coal-fired power plant retirements by 2040, leaving 170 GW of coal-fired power plant capacity in service. The United States is projected to be a small net exporter of coal through the 2040 time horizon.[84]

In the western coal markets, where over 99 percent of Federally mined coal is located, the Annual Energy Outlook reference case projects the most significant decline in coal production, with levels dropping from current levels near 500 million tons to 378 million tons in 2030 and 329 million tons in 2040.[85] This drop accounts for 52 percent of the projected nationwide decline in coal production by 2030.

The 2016 Annual Energy Outlook projects that real average mine mouth coal prices rise due to falling productivity as geological conditions become less favorable. In the reference scenario, 2015 average mine mouth prices of $33.80 per short ton are expected to remain mostly flat at $33.84 through 2030 and then up to $38.68 by 2040.[86,87] For the western states, where coal prices are below the nationwide average due to a variety of factors, including more favorable geology, reference case prices are anticipated to climb from 2015 levels of $18.7 per ton to $19 per ton in 2030 and $21.6 per ton in 2040.[88]

5.5.2 Environmental Protection Agency

The EPA maintains an application of the Integrated Planning Model (IPM) to analyze the impact of power sector regulations. The IPM is a linear programming, least-cost optimization model of the US power sector developed by ICF consulting. It provides forecasts of least-cost capacity expansion and electricity dispatch to meet energy demand subject to market and regulatory

[83] US EIA. 2016. Annual Energy Outlook. Forecast Data. Available at http://www.eia.gov/forecasts/aeo/data/browser/#/?id=8-AEO2016&region=0-0&cases=ref2016&start=2014&end=2040&f=A&linechart=ref2016-d032416a.6-8-AEO2016&sourcekey=0

[84] US EIA. 2016. Annual Energy Outlook 2016 Early Release: Annotated Summary of Two Cases. May 17, 2016. Available at https://www.eia.gov/forecasts/aeo/er/pdf/0383er(2016).pdf

[85] US EIA. 2016. Annual Energy Outlook 2016. Table: Coal Supply, Disposition, and Prices. Available at http://www.eia.gov/forecasts/aeo/data/browser/#/?id=15-AEO2016&cases=ref2016~ref_no_cpp&sourcekey=0

[86] 2015 prices available EIA. 2015. Annual Coal Report. Available at http://www.eia.gov/coal/annual/pdf/acr.pdf. Projected 2030 and 2040 prices available in US EIA 2016. See: US EIA. 2016 Annual Energy Outlook in Coal Supply, Disposition, and Prices Table. Available at http://www.eia.gov/outlooks/aeo/data/browser/#/?id=15-AEO2016&cases=ref2016&sourcekey=0

[87] Projected 2030 and 2040 prices available in US EIA 2016. See: US EIA 2016. Annual Energy Outlook in Coal Supply, Disposition, and Prices Table. Available at http://www.eia.gov/outlooks/aeo/data/browser/#/?id=15-AEO2016&cases=ref2016&sourcekey=0

[88] US EIA. 2016. Annual Energy Outlook 2016. Coal Production and Minemouth Prices by Region. Available at http://www.eia.gov/outlooks/aeo/data/browser/#/?id=94-AEO2016&cases=ref2016~ref_no_cpp&sourcekey=0

factors. It captures a wide range of issues related to the power sector, including fuel markets such as coal. The model is widely used by the government and industry to assess policy and market influences.[89]

The EPA's Regulatory Impact Analysis for the CPP was informed by IPM modeling conducted that reflects market and regulatory outlooks, as well as the final CPP emission limitations.[90] This scenario includes projections on coal production and consumption through a 2050 time frame, as coal is an instrumental commodity to power sector operations, and, thus, its demand is shaped by power-sector regulations. The EPA application of IPM to reflect the CPP provides projections for the power sector comparable to the Annual Energy Outlook reference scenario. The IPM projections are specific to US thermal coal markets.

In the EPA's modeling of the mass-based CPP, nationwide coal generation was projected to be 28 percent and 25 percent of electricity generation in 2030 and 2040, respectively. These levels reflected more demand-side energy efficiency and more renewable generation relative to today's levels, which allow for a more balanced nationwide generation portfolio. This coal-fired generation totaled 1,144 Terawatt hours (TWh) in 2030 and 1,092 TWh in 2040 and corresponded to about 685 and 692 million tons of US coal production in those same years.[91]

Under this model, renewable electricity generation is projected to be a larger share of total electricity generation by 2040. There is also a significant amount of coal-fired power plant retirements due to an aging fleet, more competitive capital cost for competing technologies, lower gas prices, and lower demand growth. The EPA modeling projects 174 GW remaining in service in the CPP scenario in 2030 and 170 GW in 2040.

In the western coal basins, the EPA application of IPM projected coal production decreasing from current levels of 484 million tons to 317 million tons in the CPP scenario by 2030. The decrease is driven, in part, by increased inter-basin competition as eastern interior coal becomes more competitive due to advances in low-cost, long-wall mining technologies and because of less consumer sensitivity to the higher sulfur content of interior coal as more plants install flue-gas desulfurization equipment.

[89] US EPA. 2013. Documentation for Base Case v.5.13 Modeling Framework. Chapter 2: Modeling Framework. November 27, 2013. Available at https://www.epa.gov/airmarkets/documentation-base-case-v513-modeling-framework

[90] US EPA. 2015. Regulatory Impact Analysis for the Clean Power Plan Final Rule. Table 3-11. October 23, 2015. Available at https://www.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf

[91] The uptick in production in spite of the drop in coal-fired power plant electricity generation is due to increased demand from industrial sources and exports in 2040.

Projected coal prices are similar to the Annual Energy Outlook 2016 outlook. For western coals they are in the $20/ton to $24/ton range, and nationwide they are in a $35/ton to $40/ton range for years 2030 to 2040.[92] Western coal prices remain the lowest in the country on a per ton and a per Btu basis among all major coal producing regions reflecting the high productivity and low production cost characteristic of that region.[93]

5.5.3 Coal Exports

Global coal pricing is US dollar-denominated. As the US dollar strengthens relative to other currencies, US coal becomes more expensive relative to coal exported from competing countries. As the US dollar weakens, US coal becomes relatively more competitive.

Coal exports accounted for a small share, approximately 8 percent, of total US coal production in 2015 at 74 million tons.[94,95] The majority of that export is metallurgical coal, primarily used for industrial purposes, which comes from non-Federal lands. The amount of thermal coal, the predominant coal type produced on Federal lands, exported was 28 million tons or approximately 3 percent of total US production in 2015.[96] The 2016 EIA Annual Energy Outlook projections for total coal export going forward are relatively flat through 2030 and then increase upward by approximately 20 million tons, from current levels of 74 million tons, and constitute approximately 15 percent of total US production in 2040.[97] The US thermal coal portion of coal exports is projected to follow a similar trajectory but increase at a higher rate, reaching 56 million tons or approximately 9 percent of total production by 2040.[98] This uptick from 2015 levels is partially due to reduced US demand. But even with the reduced US demand, these projected steam coal export levels reflect a relatively small portion of US production and do not exceed 2012 tonnage export levels.[99]

In all scenarios examined, projected coal exports have declined from prior year projections and are anticipated to remain a small source of demand for US coal

[92] All EPA IPM coal prices are listed in $ per short ton.
[93] US EPA. 2015. Analysis of the Clean Power Plan. August 3, 2015. Available at https://www.epa.gov/airmarkets/analysis-clean-power-plan
[94] US EIA. 2015. Annual Coal Report 2015. November 2016. Available at http://www.eia.gov/coal/annual/pdf/acr.pdf
[95] US EIA. 2016. Today in Energy. US coal exports declined 23% in 2015, as coal imports remained steady. March 7, 2016. Available at http://www.eia.gov/todayinenergy/detail.php?id=25252
[96] US EIA. 2016. Coal Data Browser. Available at http://www.eia.gov/beta/coal/data/browser/#/topic/41?agg=2,1,0&rank=ok&linechart=COAL.EXPORT_QTY.TOT-TOT-TOT.A&columnchart=COAL.EXPORT_QTY.TOT-TOT-TOT.A&map=COAL.EXPORT_QTY.TOT-TOT-TOT.A&freq=A&start=2001&end=2015&ctype=map&ltype=pin&rtype=s&pin=&rse=0&maptype=0
[97] US EIA. 2016. 2016 Annual Energy Outlook. Available at http://www.eia.gov/forecasts/aeo/data/browser/#/?id=15-AEO2016&region=0-0&cases=ref2016~ref_no_cpp&start=2013&end=2040&f=A&sourcekey=0
[98] US EIA. 2016. Annual Energy Outlook 2016. Table: World Steam Coal Flows by Importing Regions and Exporting Countries. Available at http://www.eia.gov/forecasts/aeo/data/browser/#/?id=96-AEO2016&cases=ref2016&sourcekey=0
[99] US EIA. 2016. Imports Data. Available at http://www.eia.gov/coal/data.php#imports

production. US coal export is generally viewed as a swing supplier of international markets, meaning it is one of the last suppliers to serve international markets after other exporting countries are at capacity, and one of the first exporting countries to pull back supply as demand goes down. Export demand has a significant degree of uncertainty related to currency valuations, international economic growth, climate policy, and trade protectionist policies from importing countries. In addition, the upward reaches of US steam coal export are limited in the near and medium term by export terminal capacity in the northwestern United States.[100]

5.6 GREENHOUSE GAS EMISSIONS

Greenhouse gas emissions trap heat in the atmosphere and, as emissions and atmospheric concentrations have increased, are associated with an increase of 1.5 degrees Fahrenheit in average global temperatures over the past century.[101] These increases in global mean temperature drive changes in climate and weather patterns. CO_2 is the most abundant form of greenhouse gas. CO_2 enters the atmosphere through the burning of fossil fuels, such as coal, natural gas, and oil, and accounts for 82 percent of total US greenhouse gas emissions in 2014. Other greenhouse gases, such as methane, are emitted during the production of fossil fuels. Each greenhouse gas has a different atmospheric lifetime and radiative forcing (heat trapping) potential. Their emission volumes can be converted to a CO_2 equivalent (CO_2e) to normalize the greenhouse effect across different pollutants.

In 2014, total US emissions were 6,870 million metric tons of CO_2e.[102] Electricity generation was the largest greenhouse gas emitting sector in the United States, accounting for 30 percent, or 2,081 million metric tons, of CO_2e in 2014.[103] US coal production and combustion were responsible for more than 1,720 million metric tons, or about 25 percent, of US greenhouse gas emissions.[104] Most of these coal-related emissions (1,570 million metric tons) occur at the point of combustion within the electricity sector. Industrial CO_2e emissions from coal combustion added another 75 million tons of CO_2e. Coal extraction activities (without considering combustion emissions) account for

[100] Zubets-Anderson, A. . 2016. "Bankruptcy and Financing Rating Agency's Perspective." Moody' Investor Service. Presented at the US Coal in the 21st Century: Markets, Bankruptcy, Finance and Law conference. Columbia Center on Global Energy Policy and the Sabin Center for Climate Change Law. September 2016. Summary Available at http://web.law.columbia.edu/sites/default/files/microsites/climate-change/panel_summaries_-_us_coal_in_the_21st_century.pdf

[101] US EPA. 2016. Climate Change: Basic Information. Available at https://www.epa.gov/climatechange/climate-change-basic-information

[102] US EPA. 2016. Greenhouse Gas Inventory Report: 1990-2014. Table 2-11. April 15, 2016. Available at https://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Main-Text.pdf

[103] Ibid.

[104] Ibid.

approximately 68 million metric tons of CO_2e.[105] Abandoned underground coal mines added another 6.3 million metric tons of CO_2e emissions.

The domestic electricity sector drives between 80 and 90 percent of the US coal consumption each year. Coal combustion for electricity is more carbon intensive than other fossil fuels, accounting for 75 percent of the CO_2 emissions from the electricity sector even though it accounts for only 39 percent of the total electricity generated in 2014.[106]

With respect to federally owned coal, as stated, 42 percent of total US coal production occurred on Federal lands in 2015.[107,108] Using data available at the time, a report by Stratus Consulting states that in 2012 the combustion of Federal coal and coalbed methane emissions resulting from Federal coal production together accounted for nearly 770 million metric tons of CO_2e emissions, or over 10 percent of total US greenhouse gas emissions.[109] Estimates by BLM using more recent data suggest that as of 2014, CO_2 emissions attributable to federal coal accounted for 11 percent of total US greenhouse gases and a recent report noted that they account for 13 percent of all US energy-related CO_2 emissions.[110]

Greenhouse gas emissions associated with coal production can generally be divided into two broad categories: upstream emissions associated with the mining and transportation of the coal, and downstream emissions associated with the combustion of the coal. The greenhouse gas implications of each category are discussed below.

5.6.1 Upstream Emissions

Measuring the level and source of greenhouse gas emissions from coal production and consumption starts with emissions released during coal mining. These upstream greenhouse gas emissions primarily occur in the form of methane released from coal seams to the atmosphere in the coal mining

[105] US EPA. 2016. Inventory of US Greenhouse Gas Emissions and Sinks: 1990 – 2014. April 15, 2016. pp.1-17. Available at https://www.epa.gov/sites/production/files/2016-04/documents/us-ghg-inventory-2016-main-text.pdf

[106] US EIA. 2015. Table 1.1. Total Electric Power Industry Summary Statistics, 2015 and 2014. Available at http://www.eia.gov/electricity/annual/html/epa_01_01.html.
Although 2015 US greenhouse gas inventory data is not yet available, 2015 EIA generation data suggest that coal generation dropped to 33 percent of total electricity generation. See EIA 2016. 2016 Annual Energy Outlook. Table IFI-3. November 2016. Available at http://www.eia.gov/forecasts/aeo/pdf/0383(2016).pdf

[107] US Extractive Industries Transparency Initiative. 2015. Full dataset. Table 1. Available at https://useiti.doi.gov/downloads/federal-production/

[108] US EIA. 2016. Annual Coal Report. November 3, 2016. Available at http://www.eia.gov/coal/annual/

[109] Stratus Consulting. 2014. Greenhouse Gas Emissions from Fossil Energy Extracted from Federal Lands and Waters: An Update. Prepared for The Wilderness Society. December 23, 2014. Available at https://cdn.americanprogress.org/wpcontent/uploads/2015/03/WildernessSociety_GHGEmissions_12-23Revisions.pdf

[110] Gillingham et. al. 2016. Federal Minerals Leasing Reform and Climate Policy. The Hamilton Project. Brookings. December 2016.

process. Methane is a potent greenhouse gas that has approximately 25 times more warming potential than carbon dioxide over a 100-year life period. It is the second-most prevalent greenhouse gas from human activities in the United States and accounts for approximately 10 percent of all US greenhouse gases. Coal mining accounts for approximately 9 percent of total US methane emissions.[111] The amount of average methane release associated with removing a ton of coal varies significantly depending on whether it occurs at an underground or at a surface mine. Underground mines contain more methane, as they are under more geological pressure. In 2015, the United States had 305 underground coal mines and 529 surface mines operating.[112] Using EPA and EIA data results in estimates for the amount of greenhouse gas emissions from coal mine methane and post-mining processing per ton of coal mined of 0.02 tons of CO_2e per ton of coal mined for surface mines and approximately 0.16 tons of CO_2e per ton of coal mined for underground mines.[113,114]

While methane is the largest greenhouse gas source from coal production, other mining operations add to the emission total. Diesel, which emits CO_2 when combusted, is a primary energy source for mining operations and is often used to move coal by trucks on-site. Electricity, most often dependent on the combustion of a fossil fuel, is also used to power mine operations. Coal production-associated emissions are small relative to emissions associated with combustion, averaging 2.7 percent of the lifecycle CO_2 emissions.[115]

Transportation of coal from the mine to the point of consumption, generally a power plant, is another significant source of greenhouse gas emissions. Coal is most frequently transported by rail, but river barges and trucks play a significant role as well. These modes of transportation rely on diesel fuel, which emits CO_2 when combusted. The greenhouse gas emissions associated with transportation are more significant for western coals, where more than 99 percent of Federal coal is located, as they have a greater distance to travel on average to reach their end use. In Wyoming, approximately 90 percent of the coal is shipped out of the state by rail. Transportation-associated emissions are small relative to emissions associated with combustion, averaging 1.7 percent of coal's lifecycle

[111] US EPA. 2016. Overview of US Greenhouse Gas Emissions. Available at https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane
[112] US EIA. 2016. Annual Coal Report. Table 1. November 3, 2016. Available at http://www.eia.gov/coal/annual/
[113] Based on emissions data at https://www.epa.gov/sites/production/files/2016-04/documents/us-ghg-inventory-2016-main-text.pdf at page 160
[114] Coal production data from US EIA. 2016. Annual Coal Report. Table 1. November 3, 2016. Available at http://www.eia.gov/coal/annual/
[115] Foley, J. H. and P. Howard. 2016. Illuminating the Hidden Cost of Coal. New York University School of Law Institute of Policy Integrity. p. A-13. Available at http://policyintegrity.org/files/publications/Hidden_Costs_of_Coal.pdf

CO_2 emissions.[116] However, when taking into account specific mine location and transportation distance and method, the share of greenhouse gas emission associated with transportation from a particular mine or basin may be higher.

5.6.2 Downstream Emissions

The most significant greenhouse gas impacts associated with coal occur at the point of combustion, estimated at 95.6 percent of coal's lifecycle CO_2e emissions.[118] As stated, coal is the most CO_2 emissions-intensive fossil fuel, accounting for over 70 percent of CO_2 emissions from the power sector.

Coal's carbon intensity is significantly higher than natural gas's carbon intensity at the site of combustion. Taking into account the heat rate of coal plants versus that of natural gas combined-cycle plants, the average emission rate of a coal plant at 2,215 lbs of CO_2/MWh is more than double that of a gas-fired combined-cycle plant at 902 lbs of CO_2/MWh. Coal-fired electricity generation has been the most significant contributor to CO_2 emissions from the power sector, and that is projected to continue under the latest Annual Energy Outlook reference case scenarios. CO_2 content can vary significantly on a per ton basis for different coal types, such as subbituminous or bituminous. However, on an energy basis, CO_2 emission factors from coal are fairly consistent across coal types and geography, occupying a narrow range of 205 – 215 lbs CO_2 per mmBtu.[117]

In 2015, Federal coal accounted for 42 percent of total US coal production at 375 million tons with nearly all of this supplying the US electricity generation. Greenhouse gas emissions from coal-fired electricity generation have been decreasing due primarily to market drivers reducing coal-fired electricity consumption in recent years and are expected to reach new lows in 2016.

Future coal production will likely be influenced by these same market drivers as well as existing state, regional, and Federal policies that partially address some of the externalities associated with CO_2 emissions at the point of combustion. These include programs like California's Assembly Bill 32, the Northeast's Regional Greenhouse Gas Initiative, and the EPA's CPP. A small amount of Federal coal is also exported and combusted outside of the United States, but export markets are limited as is port capacity. As discussed in more detail in **Section 5.5.3**, exports are anticipated to remain a small portion of demand for US coal in future years.[118]

[116] Spath, P. L., M. K. Mann, and D. R. Kerr. 1999. Life Cycle Assessment of Coal-fired Power Production. Report no. NREL/TP-570-2511). National Renewable Energy Lab. June 1999. Golden, Colorado. Available at http://www.nrel.gov/docs/fy99osti/25119.pdf

[117] US EIA. 2016. Frequently Asked Questions. How much carbon dioxide is produced when different fuels are burned? June 14, 2016. Available at https://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11

[118] US EIA. 2016. 2016 Annual Energy Outlook. Table: Coal Supply, Disposition, and Prices. Available at http://www.eia.gov/forecasts/aeo/data/browser/#/?id=15-AEO2016&region=00&cases=ref2016~ref_no_cpp&start=2013&end=2040&f=A&sourcekey=0

5.6.3 Quantifying Greenhouse Gas Emissions on Federal Lands

As part of Secretarial Order 3388, the Secretary instructed the Department of the Interior, through the USGS, to establish and maintain a public database to account for the annual carbon emissions from fossil fuels developed on Federal lands. Although not complete, this data source is under development and will be one potential database informing the Draft and Final PEIS.

The USGS is designing this database to report both emissions and sinks for CO_2, methane, and nitrous oxide resulting from the coal production on Federal lands by state. The database aims to combine ONRR, BLM, and BOEM data along with EPA emissions data to estimate total greenhouse gas emissions from fossil fuel extracted on Federal lands. It also aims to use USGS data to measure biological sequestration on Federal lands that serve as emissions sinks. By subtracting the sequestration estimates from the emission estimates, this tool can provide a net emissions value for Federal lands. An initial public release of the data is expected in mid-2017. This data will provide additional refinement and verification of coal lifecycle emission estimates.

5.7 SOCIOECONOMIC CONSIDERATIONS

The PEIS will evaluate a number of potential changes to the Federal coal program. Some of these potential changes could have impacts on the livelihoods and fiscal soundness of coal-dependent communities, particularly those near the Powder River Basin, due to the heavy concentration of leases and production from the Federal lands there. Appalachian coal communities could also be affected, as changes in the demand for predominantly western Federal coal in turn can affect the market for Appalachian coal. This section provides baseline socioeconomic information relevant to the PEIS.

5.7.1 Communities Dependent on Coal Extraction

Community Impacts

Viewed globally, the development potential of energy resources has been interpreted through two very different frameworks. The positive view holds that investment in mineral extraction literally unlocks buried treasure, leading to a "virtuous cycle of socioeconomic change."[119] A more skeptical view (the "resource curse") suggests that the wealth generated by mineral extraction may not be shared locally and that an emphasis on resource extraction may deter development in other economic sectors. Recent research is clarifying the conditions that encourage local and regional economic gains from mining activity.[120]

[119] Bridge, G. 2004. "Contested Terrain: Mining and the Environment". *Annual Review of Environment and Resources* 29, no. 1(2004): 225.
[120] Cust, J. and S. Poelhekke. 2015. "The Local Economic Impacts of Natural Resource Extraction". *Annual Review of Resource Economics* 7(1): 251–68.

Since World War II, US coal mining employment has been in a long-term decline, falling from 533,000 jobs in 1948 to 78,000 in 2000.[121] Technological change, resulting in rising productivity per worker, has been the primary driver of the decline.[122] The downward trend was interrupted by a demand-driven employment boom in the 1970s (employment rose 74 percent in the period 1970 – 1980), followed by a bust in the 1980s.[123] The employment boom resulted not only from an increase in coal mining operations, but also from construction of a number of coal-fired generating plants (see **Figure 5-4**).

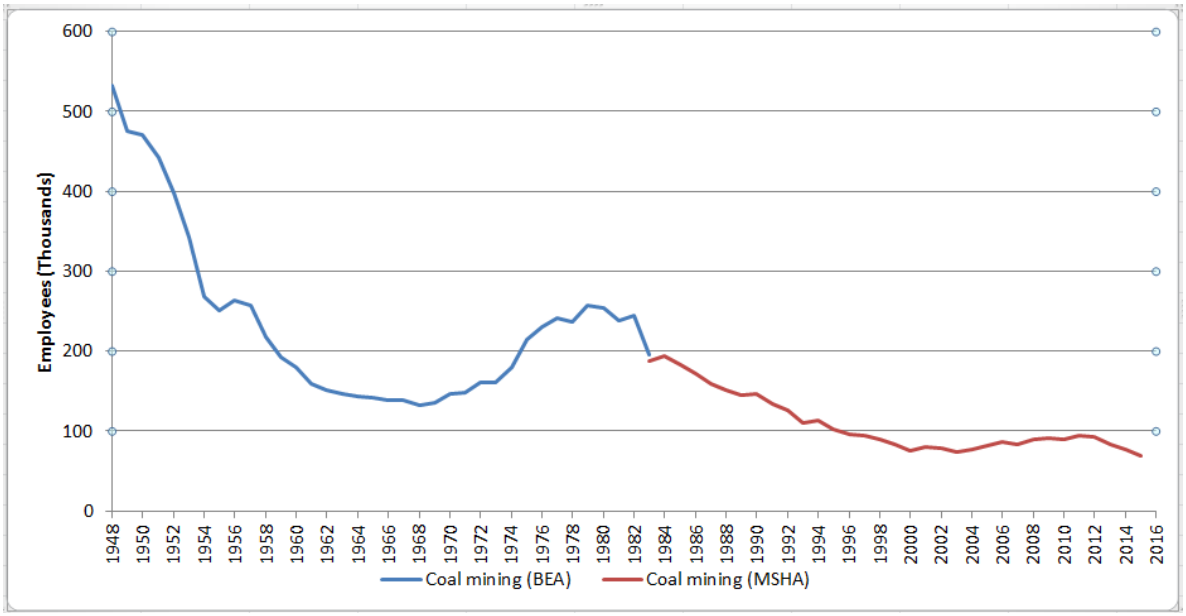

Figure 5-4. Coal Mining – Employment, 1948 – 2015

Sources:
Bureau of Economic Analysis 2016[124]
MSHA 2016[125]

Most studies of the community-level effects of US coal mining expansion come from this boom/bust cycle of the 1970s and 1980s. Many communities underwent rapid change. As a result of construction of the coal-fired Intermountain Power Project—with a proposed capacity of 3,000 megawatts—

[121] Bureau of Economic Analysis. 2016. National Income and Products Accounts (NIPA) Tables 6.4A and 6.4C. Available at: http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&903=192.
[122] Betz, M. R., M. Farren, and L. Lobao. 2015. "Coal Mining, Economic Development, and the Natural Resources Curse". *Energy Economics* 50(107):105-116. Available at https://mpra.ub.uni-muenchen.de/58016/
[123] Ibid.
[124] Bureau of Economic Analysis. 2016. National Income and Products Accounts (NIPA) Tables 6.4A and 6.4C. Available at: http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1#reqid=9&step=3&isuri=1&903=192.
[125] MSHA (United States Department of Labor Mine Safety Health Administration). 2016. Coal Mine and Employment Data. Accessed September 2016. Available at http://arlweb.msha.gov/OpenGovernmentData/OGIMSHA.asp.

the population of Delta, Utah rose from 1,930 people in 1980 to 6,670 in 1984 at the height of construction, and declined to 3,000 by 1990.[126]

Many boomtowns experienced an acute shortage of infrastructure and services, particularly housing. Studies from the 1970s painted a negative picture of widespread social disruption, sometimes termed the "Gillette Syndrome." Effects included "dramatic increases in divorce, depression[,] . . . criminal activity, mental disorders, and other social problems."[127] Later research suggested a more complex picture, recognizing recovery and adaptation to changing circumstances, in addition to tempering the overly negative characterization of social change under rapid energy development.[128]

As shown in **Figure 5-5**, there are major regional differences in the trends of both coal employment and production. Nationwide coal industry employment fell some 50 percent between 1987 and 2014 while nationwide production rose slightly. The dramatic change is in western coal production. Western production doubled between 1987 and 2008, but then began to decline. It is the far lower labor intensity of western coal operations, dominated by the Powder River Basin, over eastern coal that made it possible for production to increase while national employment fell dramatically (see **Section 5.4.5** for more information).[129] Today the western coal industry, faced with declining employment, is following the trend seen earlier in Appalachia and other eastern coal regions.[130]

Many of the social effects of abruptly lower coal production noted from the bust of the 1980s are evident today as part of a longer-term decline in coal employment and production. Simple models of the economy assume labor mobility; as jobs disappear in one region or sector, workers relocate to more favorable labor markets. For a variety of reasons, the reality is far more complex; many factors work to keep people in place, even after mines have cut back production or closed. In coal country, as in many other rural areas centered on resource extraction, communities reflect a distinctive way of life that involves social ties and cultural values as much as economic activities. The

[126] Brown, R. B., S. F. Dorins, and R. S. Krannich. 2005. "The Boom-bust-recovery Cycle: Dynamics of Change in Community Satisfaction and Social Integration in Delta, Utah". *Rural Sociology* 70 (1):31. Available at http://www.sublettewyo.com/ArchiveCenter/ViewFile/Item/71

[127] Smith, M. D., R. S. Krannich, and L. M. Hunter, "Growth, Decline, Stability, and Disruption: A Longitudinal Analysis of Social Well-Being in Four Western Rural Communities". *Rural Sociology* 66(3):427.

[128] Brown, R. B., S. F. Dorins, and R. S. Krannich. 2005. "The Boom-bust-recovery Cycle: Dynamics of Change in Community Satisfaction and Social Integration in Delta, Utah". *Rural Sociology* 70(1):31. Available at http://www.sublettewyo.com/ArchiveCenter/ViewFile/Item/71

[129] US EIA. 2016. Coal data browser. Coal produced per labor hour. Available at http://www.eia.gov/coal/annual/pdf/table21.pdf.

[130] For example, coal production in the western United States was 6.5 percent lower in 2015 relative to 2014. See US EIA. 2015. 2015 Annual Coal Report. Available at http://www.eia.gov/coal/annual/.

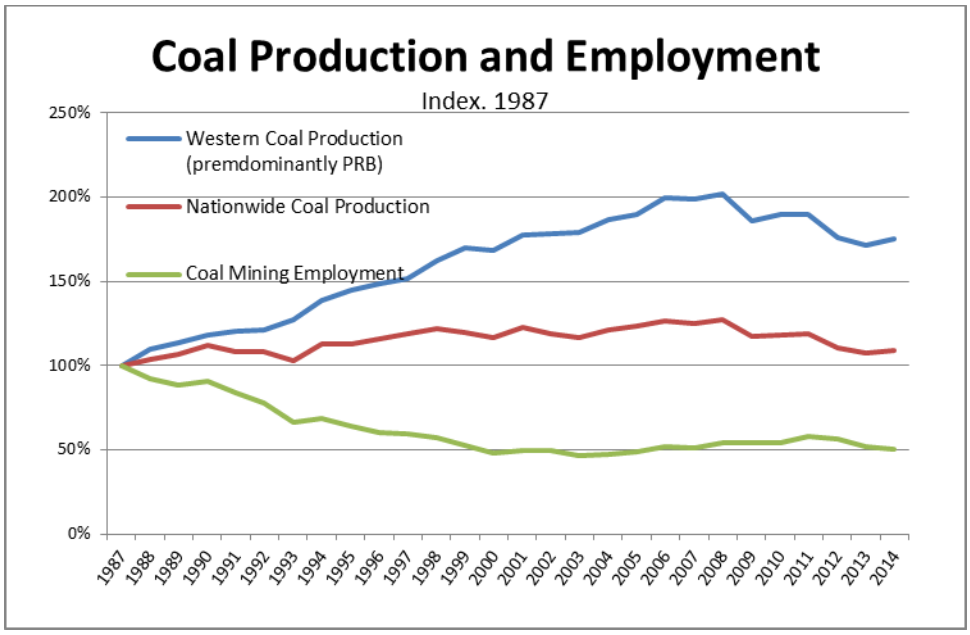

Figure 5-5. Coal Employment and Production, 1987 – 2015

Sources:
Employment: MSHA 2016[131]
Production (1987-2011): US EIA 2012[132]
Production (2012-2015): US EIA 2016[133]

way of life in coal communities is based on ties of employment and friendship, ties of family across multiple generations, and ties to place. As one author wrote of the anthracite mining towns of northeastern Pennsylvania:

"The people remaining in these towns – half or one-third the 1920 number – have a powerful sense of belonging just where they are."[134]

Renewable energy and natural gas are rapidly gaining ground relative to coal as the sources for generating electricity. But there is no assurance that this shift can provide a lifeline to struggling coal-dependent communities or workers who are unwilling to relocate. Notwithstanding these challenges, commitment to place and community can be a very positive force in finding a path to a more resilient and diversified local economy. There are numerous case studies of formerly coal-reliant Appalachian communities that have used economic

[131]MSHA (United States Department of Labor Mine Safety Health Administration). 2016. Coal Mine and Employment Data. Accessed September 2016. Available at http://arlweb.msha.gov/OpenGovernmentData/OGIMSHA.asp.
[132] US EIA. 2012. Annual Energy Review, Table 7.2: Coal Production, 1949-2011. Available at: https://www.eia.gov/totalenergy/data/annual/showtext.php?t=ptb0702
[133] US EIA. 2016. Annual Coal Report, Table 1. Coal Production and Number of Mines by State and Mine Type. Available at: http://www.eia.gov/coal/annual/
[134] Marsh, B. 1987. "Continuity and Decline in the Anthracite Towns of Pennsylvania". *Annals of the Association of American Geographers* 77(3):337. Available at http://www.facstaff.bucknell.edu/marsh/anthracite_towns.pdf

development strategies that invest in local and regional assets—such as human capital, infrastructure, entrepreneurs, and emerging industry clusters—to successfully diversify their economies.[135]

Demographic and Employment Data for Areas Supplying Coal

As described above, coal production occurs in three broad regions: Appalachian, Interior, and Western. Because the vast majority of coal from Federal lands is produced in the western region, this section divides the western region into 13 subregions, based on the coal supply regions used in the EPA Base Case v5.13.[136] **Table 5-3**, below, describes the 15 regions and subregions, and includes both Federal and non-Federal coal resources. A map is shown in **Figure 5-6**.

Table 5-3
Coal Supply Regions

Region	Subregion	Description	Number of Counties
Appalachian	None	Includes portions of Pennsylvania, West Virginia, Ohio, Maryland, Virginia, Eastern Kentucky, Tennessee, and Alabama	193
Interior	None	Includes portions of Indiana, Illinois, Western Kentucky, Missouri, Kansas, Oklahoma, Texas, Arkansas, and Louisiana	206
Western	CG	Colorado, Green River	44
	CR	Colorado, Raton	1
	CU	Colorado, Uinta	5
	UT	Utah	8
	ME	Montana, East	1
	ND	North Dakota	22
	MP	Montana, Powder River	3
	MT	Montana, Bull Mountain	14
	AZ	Arizona	1
	NS	New Mexico	2
	WG	Western Wyoming	4
	WH	Wyoming Northern Powder River Basin	1
	WL	Wyoming Southern Powder River Basin	3

[135] Center for Regional Economic Competitiveness, 2014. Economic Diversity in Appalachia. Statistics, Strategies, and Guides for Action. Prepared for Appalachian Regional Commission. February 2014. Available at https://www.arc.gov/assets/research_reports/EconomicDiversityinAppalachiaCompilationofAllReports.pdf

[136] The EPA maintains an application of the IPM to analyze the impact of power sector regulations. IPM is a linear programming, least-cost optimization model of the US power sector developed by ICF consulting. It provides forecasts of least-cost capacity expansion and electricity dispatch to meet energy demand subject to market and regulatory factors. It captures a wide range of issues related to the power sector, including fuel markets such as coal. The model is widely used by government and industry to assess policy and market influences.
See US EPA. 2013. Documentation for EPA Base Case v.5.13 Using the Integrated Planning Model. EPA #450R13002. Available at https://www.epa.gov/sites/production/files/2015-07/documents/documentation_for_epa_base_case_v.5.13_using_the_integrated_planning_model.pdf

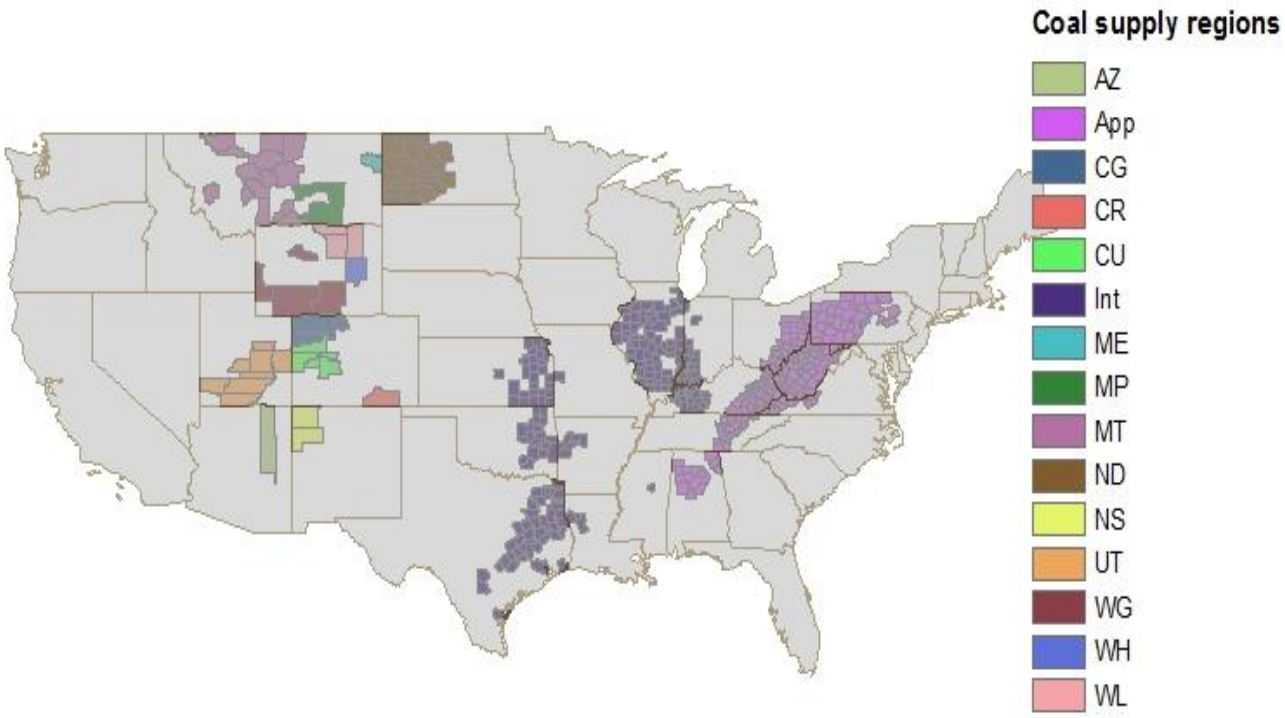

Figure 5-6. Coal Supply Regions

Table 5-4 presents population, wage, and income information for the 15 coal supply regions and the United States. As the data show, these parameters vary widely across regions. Employment growth between 1970 and 2014 ranged from half of the national rate (e.g., in the Appalachian, Rocky Mountain CR, and Western Montana MT regions) to over three times the national rate (e.g., Rocky Mountain CU region). Personal income growth showed similar trends. With a few exceptions, average annual wages were at or below the national average in 2015. However, with the exception of the Rocky Mountain CU region, the average annual wages for mining (except oil and gas), for regions reporting this variable, substantially exceeded the national and regional average wages.

Table 5-4
Sociodemographic Characteristics of Coal Supply Regions

	App.	Int.	CG	CR	CU	UT	ME	ND	MP	MT	AZ	NS	WG	WH	WL	Total US
Population 2014 (thous.)[1]	11,851	22,017	45	14	269	124	12	325	27	191	108	198	84	14	87	318,857
Pop. Change 1970 - 2014 (%)[1]	5.2	35.7	125.1	-11.2	172.3	116.8	17.8	33.5	37.1	8.4	124.1	105.5	83.9	132.2	138.0	56.5
Employment Change 1970 - 2014 (%)[1]	43.4	75.8	286.2	48.8	316.6	198.1	114.0	165.1	72.5	41.7	251.5	205.5	138.5	246.8	252.5	103.6
Personal Income Change 1970- 2014 (%)[1]	97.0	142.2	421.3	114.6	458.9	256.5	220.7	311.5	125.8	72.4	339.4	311.7	279.1	411.5	378.1	181.7
Avg. annual wages, all sectors 2015 ($)[2]	44,119	54,410	44,814	36,858	42,710	33,935	53,989	58,176	44,193	36,814	37,576	41,229	52,833	51,482	50,438	52,937
Avg. annual wages, mining (except oil & gas), 2015 ($)[2]	76,564	79,780	82,172	N/A	48,151	74,122	86,435	84,652	N/A	N/A	N/A	N/A	100,587	N/A	85,693	74,695
Coal wages/all wages (%)	173.5	146.6	183.4	N/A	112.7	218.4	160.1	145.5	N/A	N/A	N/A	N/A	190.4	N/A	169.9	141.1
Receiving transfer payments (2014) (%)[3]	24.5	16.4	10.7	32.4	15.3	23.2	8.4	9.9	26.1	20.5	40.3	25.3	11.9	13.3	11.6	17.2

N/A: information not disclosed for the region
Information represents the most recent data available from the following sources:
1. Bureau of Economic Analysis 2015[137]
2. Bureau of Labor Statistics 2016[138]
3. Bureau of Economic Analysis 2015[139]

[137] Bureau of Economic Analysis, Regional Economic Accounts 2015; from Economic Profile System (EPS) Summary Profile, p. 2. Headwater Economics EPS tool available at: https://headwaterseconomics.org/tools/economic-profile-system/about/
[138] Bureau of Labor Statistics, Quarterly Census of Employment and Wages, 2016; from EPS Mining Profile. p. 5. Headwater Economics EPS tool available at: https://headwaterseconomics.org/tools/economic-profile-system/about/
[139] Bureau of Economic Analysis, Regional Economic Accounts, 2015; from EPS, Non-Labor Income Report. p. 1. Headwater Economics EPS tool available at: https://headwaterseconomics.org/tools/economic-profile-system/about/

Table 5-5 presents coal mine employment in 2014 and 2015 and total employment in 2014 for each region. The Appalachian and Interior regions accounted for about 80 percent of the total coal employment across all the regions. The proportion of employment associated with coal varies across regions and was highest in the Montana MP and Wyoming WL regions. While these data provide a useful overview of where coal employment exists, the role of coal employment may be more significant at local levels. The subsequent section explores this point.

Figure 5-7 displays coal mine employment trends between 2000 and 2015 for the three broad supply regions. This figure demonstrates that the larger downward trend in employment beginning around 2011 has been driven primarily by coal employment reductions in the Appalachian region.

Table 5-5
Coal Mine Employment by Supply Region

	Coal Mine Employment, 2015[1]	Coal Mine Employment, 2014[1]	Total Employment, 2014[2]	Percent Coal Employment, 2014
Appalachian	39,471	46,891	6,235,437	0.8
Interior	14,636	16,073	13,167,982	0.1
CG	909	926	35347	2.6
CR	15	24	7764	0.3
CU	575	724	175592	0.4
UT	1,308	1,413	70,377	2.0
ME	12	12	9864	0.1
ND	1,313	1,292	285,040	0.5
MP	1,317	1,306	14,255	9.2
MT	0	0	109,350	0.0
AZ	403	387	40585	1.0
NM	1,133	1,175	93,120	1.3
WG	1,026	1,021	53,626	1.9
WH	611	569	9,583	5.9
WL	5,016	5,039	60,366	8.3

Information represents the most recent data available from the following sources:
1. MSHA. 2016[140].
2. Bureau of Economic Analysis. 2015[141]

[140] MSHA (United States Department of Labor Mine Safety Health Administration). 2016. Coal Mine and Employment Data. Accessed September 2016. Available at http://arlweb.msha.gov/OpenGovernmentData/OGIMSHA.asp.
[141] Bureau of Economic Analysis. 2015. A25N: Total Full-Time and Part-Time Employment by NAICS Industry. Available at https://www.bea.gov/itable/index.cfm

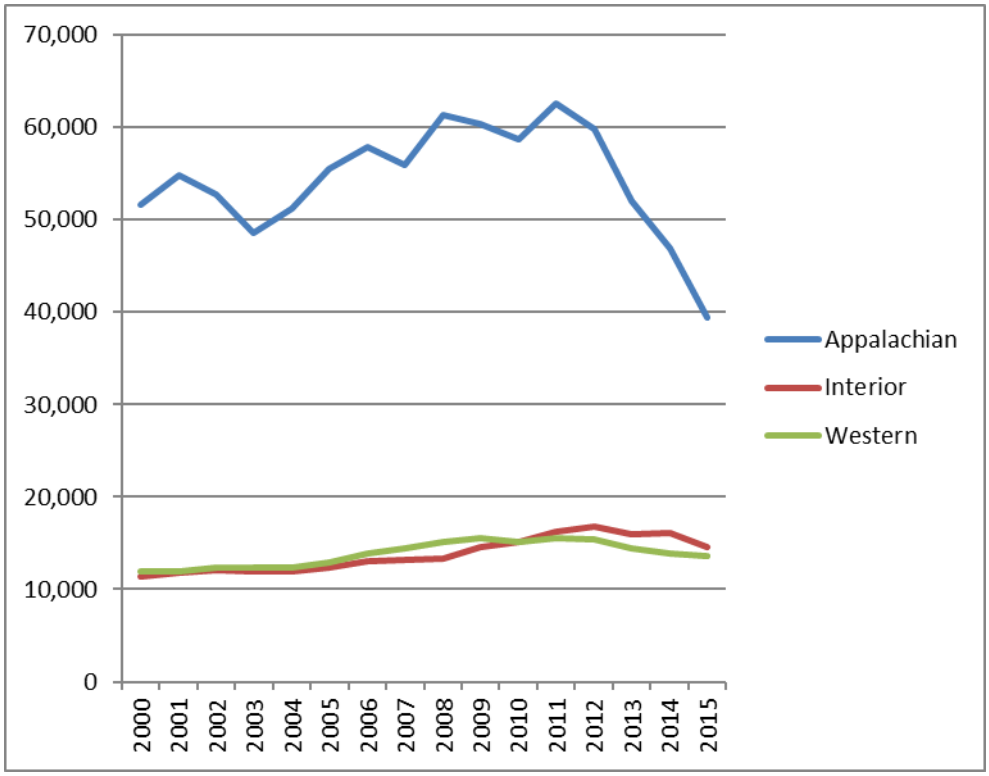

Figure 5-7. Coal Mine Employment, 2000 – 2015 by Supply Region

Source: MSHA 2016[142]

County-level Socioeconomic Variability

The previous section provides an aggregate view of broad coal-producing regions. Assessing the likely effects on counties and communities from changes to coal leasing policy requires some recognition of their economic and demographic variability. A contrast of three coal-producing counties reveals some of the relevant variation (see **Table 5-6**). These counties include:

- Boone County, WV. With some of the highest production in West Virginia, this county exemplifies the coal conditions of Appalachia, dominated by private mineral holdings.[143]
- Campbell County, WY. In the Powder River Basin, this county has the highest coal production in Wyoming.[144]

[142] MSHA (United States Department of Labor Mine Safety Health Administration). 2016. Coal Mine and Employment Data. Accessed September 2016. Available at http://arlweb.msha.gov/OpenGovernmentData/OGIMSHA.asp.
[143] US EIA. 2014. Annual Coal Report 2014, Table 2. Coal Production and Number of Mines by State, County, and Mine Type, 2014. November 3, 2016. Available at http://www.eia.gov/coal/annual/pdf/table2.pdf
[144] US EIA. 2014. Annual Coal Report 2014, Table 2. Coal Production and Number of Mines by State, County, and Mine Type, 2014. November 3, 2016. Available at http://www.eia.gov/coal/annual/pdf/table2.pdf

Table 5-6
County Comparison Table

	Boone Co., WV	Campbell Co., WY	Delta Co., CO
Population change, 1970 – 2014[1]	-5.8%	270.3%	95.3%
Employment change, 1970 – 2014[1]	34.5%	459.9%	155.5%
Personal income change, 1970 – 2014[1]	59.1%	739.9%	244.8%
Coal / total employment 2014[2]	29.2%	14.9%	2.4%
Ratio 2016 / 2000 coal employment (2000 =100%)[2]	34.8%	136.2%	47.6%
Average annual wages, all sectors, 2015[3]	$45,905	$57,426	$33,178
Average annual wages, mining (except oil & gas), 2015[3]	$79,239	$85,936	$73,181[4]
Coal wages / all wages	173%	150%	221%
Bachelor degree or higher, 2010-2014[5]	9.1%	19.2%	18.9%
Receiving transfer payments (2014)[6]	34.1%	9.0%	25.4%

Information represents the most recent data available from the below sources
1. Bureau of Economic Analysis 2015[145]
2. Bureau of Economic Analysis 2014[146]
3. Bureau of Labor Statistics 2016[147]
4. For Delta County, data for mining wages (except oil and gas) is not available; overall mining wages are shown.
5. Census Bureau[148]
6. Bureau of Economic Analysis. 2015[149]

- Delta County, CO. On the Gunnison River's North Fork, this county has a relatively more diverse economic base, but coal jobs remain important.

Since 2000, the level of coal sector employment in the three counties has diverged (see **Figure 5-8**). In 2015, Campbell County coal employment was 157 percent of the employment of 2000. Delta County, after doubling the 2000 employment level in 2013, by 2015 had declined to 104 percent of its 2000 level, while in Boone County's coal sector employment stood at 66 percent of its earlier level. While the statistics are abstractions, local examples better convey the extent of the decline. From a 2016 news story in Delta County, Colorado:

[145] Bureau of Economic Analysis. 2015. Regional Economic Accounts 2015. From Economic Profile System (EPS) Summary Profile, p. 2. Headwater Economics EPS tool available at: https://headwaterseconomics.org/tools/economic-profile-system/about/
[146] Bureau of Economic Analysis. 2014. GDP & Personal Income Regional Data, 1970-2014. http://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=27&isuri=1&7022=49&7023=7&7024=non-industry&7025=4&7026=08029&7001=749&7028=-1&7083=levels&7029=49&7090=70&7031=08000. United States Department of Labor, Employment/Production Data Set (Yearly).
[147] Bureau of Labor Statistics.2016. Quarterly Census of Employment and Wages. From EPS Mining Profile, p. 5. Headwater Economics EPS tool available at: https://headwaterseconomics.org/tools/economic-profile-system/about/
[148] Census Bureau. 2016. Quick Facts. Available at http://www.census.gov/quickfacts/table/PST045215/08029,56005,54005,00
[149] Bureau of Economic Analysis. 2015, Regional Economic Accounts. From EPS Non-Labor Income Report, p. 1. Headwater Economics EPS tool available at: https://headwaterseconomics.org/tools/economic-profile-system/about/

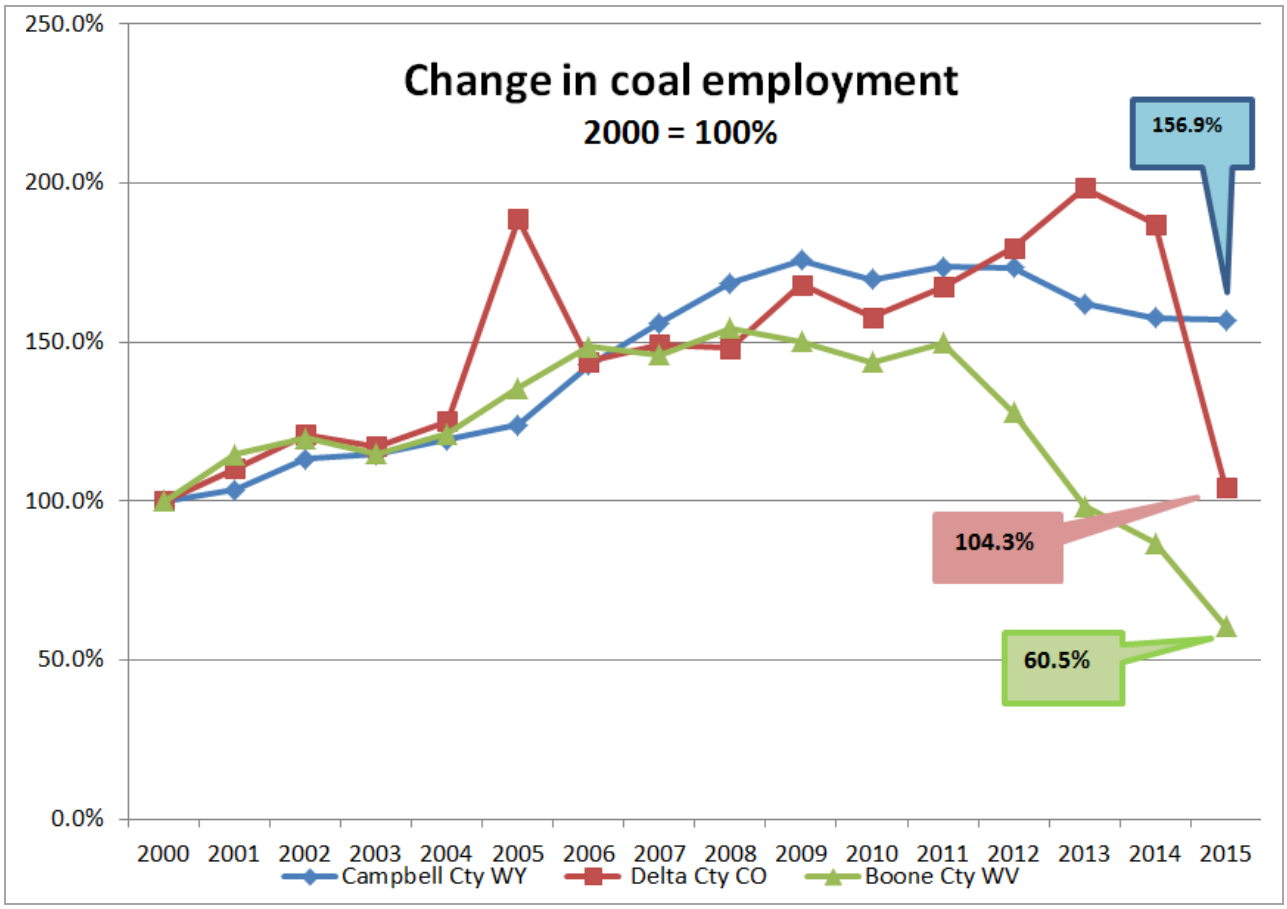

Figure 5-8. Change in Coal Employment

Sources:
MSHA. 2016[150]
Bureau of Economic Analysis. 2014[151]

"Bowie Resource Partners said Friday that depressed coal prices have forced it to idle the Bowie #2 Mine near Paonia in the latest mine closure to hit Colorado's Western Slope. BRP, through its subsidiary Bowie Resources LLC, employed 108 full-time workers and one contractor at the facility. The closure is another big economic blow to Delta County, whose coal industry employment has dropped from 1,200 positions to less than 400 since 2013. That doesn't include the hundreds of support jobs in fields like construction and logging that helped keep the county's mines running. 'The coal mines are very

[150] MSHA (United States Department of Labor Mine Safety Health Administration). 2016. Employment/Production Data Set (Yearly). Available at http://arlweb.msha.gov/OpenGovernmentData/OGIMSHA.asp.
[151] Bureau of Economic Analysis. 2014, GDP & Personal Income Regional Data, 1970-2014. Available at http://www.bea.gov/itable/iTable.cfm?ReqID=70&step=1#reqid=70&step=27&isuri=1&7022=49&7023=7&7024=non-industry&7025=4&7026=08029&7001=749&7028=-1&7083=levels&7029=49&7090=70&7031=08000.

critical to the economy of Delta County. We have lost two-thirds of those jobs in the last three years,' said Robbie LeValley, Delta County administrator."[152]

The loss of coal jobs can have an outsized effect on communities, because the coal industry pays far higher than average wages. In the three counties, average coal wages were between 150 percent and 221 percent of average wages in all sectors. The proportion of jobs provided by mining, in contrast, varies greatly across the three counties, ranging from nearly 30 percent in Boone County in 2014 to less than 3 percent in Delta County.

Industries Related to Coal Production

Beyond the local economic activity directly supported by coal operations (e.g., employment at coal operations), additional economic activity, including secondary or multiplier effects and upstream effects (e.g., economic activity associated with the sale of coal such as rail transportation and electricity generation), can be linked to coal operations. Multiplier effects arise from the fact that local businesses, households, and governmental agencies purchase goods and services from one another. These effects include indirect impacts (economic activity affected by sectors that supply inputs to coal operations) and induced impacts (economic activity affected by income expenditures, such as expenditures on groceries or housing of employees in both the coal sector and supplying sectors).[153]

The magnitude of multiplier and upstream economic effects varies by region. A February 2015 study by the University of Wyoming's Center for Energy Economics and Public Policy estimated these additional economic effects for Wyoming.[154] The study found that, in 2012, for every coal mining operation job in Wyoming, an additional 1.32 jobs were supported in Wyoming as a result of indirect and induced economic effects. Rail and electric generation associated with coal supported an additional 7,105 jobs in Wyoming (including indirect and induced economic effects). This upstream employment represented approximate 30 percent of the "total coal economy" in Wyoming.

The Utah Governor's Office of Energy Development commissioned a similar analysis focused on multiplier effects and found that for every coal mining operation job in Utah, an additional 1.21 jobs were supported in Utah as a result

[152] Svaldi, A. 2016. "Delta County Loses Another Big Coal Mine with Closure of Bowie #2". *The Denver Post.* February 26, 2016. Available at: http://www.denverpost.com/2016/02/26/delta-county-loses-another-big-coal-mine-with-closure-of-bowie-2/

[153] Leontief, W. W. 1986. *Input-Output Economics.* 2nd ed., New York: Oxford University Press.

[154] Godby, R., R. Coupal, D. Taylor, and T. Considine. 2015. The Impact of the Coal Economy on Wyoming. University of Wyoming, Center for Energy Economics and Public Policy. Prepared for the Wyoming Infrastructure Authority. February 2015. Available at: http://www.uwyo.edu/cee/_files/docs/wia_coal_full-report.pdf

of indirect and induced economic effects.[155] An economic study of coal in Colorado concluded that, in 2012, about 1.44 indirect and induced jobs were supported for every coal sector job in Colorado as a whole, and 1.04 indirect and induced jobs in northwest Colorado for every northwest Colorado coal mining job.[156]

5.7.2 Externalities Associated with Coal

An externality is defined as a side effect or consequence of an industrial or commercial activity that affects other parties without this being reflected in the cost of the goods or services. There are a number of externalities cited in conjunction with coal production, transportation, and consumption.[157,158,159] Environmental, social, and economic values that can be particularly vulnerable near coal-fired power plants or along coal transportation networks include those related to air quality, water quality, noise, and wildlife populations. Ecosystem services associated with these values provide many market and nonmarket benefits. While the costs of these externalities may not be fully reflected in the fiscal terms of Federal coal leases, it is important to note that there are a number of Federal, state, and local laws and regulations that control such impacts.

Coal mining can produce several production-related externalities, including the emission of greenhouse gases; air and water pollution, including associated negative health effects; and water use. Methane, a potent greenhouse gas, is released when gases trapped in coal seams are released when they are cut to extract coal. Running equipment (drills, bulldozers, and trucks) causes additional types of air pollution, in addition to greenhouse gas emissions, particularly criteria pollutants (i.e., carbon monoxide, lead, ground-level ozone, particulate matter, nitrogen dioxide, and sulfur dioxide). Coal mining can affect water quality and, thus, human health, livestock, fishing stocks, and aquatic species. In addition, coal mining can use a significant amount of water for dust

[155] Utah Governor's Office of Energy Development. 2015. Energy and Energy-related Mining in Utah, An Economic and Fiscal Assessment. May 2015. Available at Energy and Energy-related Mining in Utah, An Economic and Fiscal Assessment.

[156] Hovarth, G. 2014. Measurement of Economic Activity for Coal Industry and Electrical Power Generation Industry in the Yampa-White River Region of Northwest Colorado. Funding provided by the Economic Development Council of Colorado. Prepared for the Craig/Moffat Economic Development Partnership, Rio Blanco County, and Steamboat Springs Economic Development Council. Available at http://cber.co/wp-content/uploads/2014/05/Economic-Impact-of-Coal-Industry-in-the-Yampa-White-River-Region-of-Colorado.pdf

[157] For review of externalities associated with coal production, see Hein, J. F., and P. Howard. 2015. "Illuminating the Hidden Costs of Coal: How the Interior Department Can Use Economic Tools to Modernize the Federal Coal Program". Institute for Policy Integrity. New York University School of Law. December 2015. Available at http://policyintegrity.org/files/publications/Hidden_Costs_of_Coal.pdf

[158] Epstein, P. R. et al. 2011. "Full cost accounting for the life cycle of coal". *Ann. N.Y. Acad. Sci.* 1219(2011):73-98. Available at http://www.chgeharvard.org/sites/default/files/epstein_full%20cost%20of%20coal.pdf

[159] Lashof, D. 2007. Coal in a Changing Climate. Natural Resources Defense Council (NRDC). NRDC Issue Paper. February 2007. Available at https://www.nrdc.org/sites/default/files/coalclimate.pdf

control, extraction (i.e., to cool equipment and prevent fire), and processing (e.g., coal washing).

The transportation of coal requires large amounts of energy and includes some risks. According to a study by the Institute for Policy Integrity at New York University, in the United States, coal companies transport 70 percent of their product by rail, approximately 10 percent by truck, 10 percent or more by waterways, and the rest using a variety of means including conveyor belts and slurry pipelines.[160] Transportation of coal can result in multiple externalities, including increased risk to public health through accidents and air pollution, emission of greenhouse gases, and noise.

The combustion of coal can contribute to air quality externalities, as the burning of coal results in emissions of nitrogen oxides, sulfur dioxide, the particulates PM_{10} and $PM_{2.5}$, and mercury, all of which can affect air quality and public health.[161] Importantly, the greenhouse gas emissions associated with coal consumption contribute to global climate change.[162] According to the National Research Council, "Emissions of CO_2 from the burning of fossil fuels have ushered in a new epoch where human activities will largely determine the evolution of Earth's climate. Because CO_2 in the atmosphere is long lived, it can effectively lock Earth and future generations into a range of impacts, some of which could become very severe. Therefore, emission reduction choices made today matter in determining impacts experienced not just over the next few decades, but in the coming centuries and millennia."[163]

In 2009, based on a large body of robust and compelling scientific evidence, the EPA Administrator issued the Endangerment Finding under CAA section 202(a)(1).[164] In the Endangerment Finding, the Administrator found that the current, elevated concentrations of greenhouse gases in the atmosphere—already at levels unprecedented in human history—may reasonably be anticipated to endanger public health and welfare of current and future generations in the United States. We summarize these adverse effects on public health and welfare briefly here.

[160] Hein, J. F., and P. Howard. 2015. "Illuminating the Hidden Costs of Coal: How the Interior Department Can Use Economic Tools to Modernize the Federal Coal Program". Institute for Policy Integrity. New York University School of Law. December 2015. Available at http://policyintegrity.org/files/publications/Hidden_Costs_of_Coal.pdf
[161] Lashof, D. 2007. Coal in a Changing Climate. Natural Resources Defense Council (NRDC). NRDC Issue Paper. February 2007. Available at https://www.nrdc.org/sites/default/files/coalclimate.pdf
[162] US EPA. 2016. Climate Change: Basic Information. Available at https://www.epa.gov/climatechange/climate-change- basic-information
[163] National Research Council. 2011. Climate Stabilization Targets. Missions, Concentrations, and Impacts over Decades to Millennia. p. 3. Available at https://www.nap.edu/catalog/12877/climate-stabilization-targets-emissions-concentrations-and-impacts-over-decades-to
[164] US EPA. 2009. Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act. Final Rule. 74 FR 66496. December 15, 2009. Available at https://www.gpo.gov/fdsys/pkg/FR-2009-12-15/pdf/E9-29537.pdf

Public Health Impacts

Climate change caused by human emissions of greenhouse gases threatens the health of Americans in multiple ways. By raising average temperatures, climate change increases the likelihood of heat waves, which are associated with increased deaths and illnesses. While climate change also increases the likelihood of reductions in cold-related mortality, evidence indicates that the increases in heat mortality will be larger than the decreases in cold mortality in the United States. Compared with a future without climate change, climate change is expected to increase ozone pollution over broad areas of the United States, especially on the highest ozone days and in the largest metropolitan areas with the worst ozone problems, and thereby increase the risk of morbidity and mortality. Climate change is also expected to cause more intense hurricanes and more frequent and intense storms and heavy precipitation, with impacts on other areas of public health, such as the potential for increased deaths, injuries, infectious and waterborne diseases, and stress-related disorders. Children, the elderly, and the poor are among the most vulnerable to these climate-related health effects.

Public Welfare Impacts

Climate change impacts touch nearly every aspect of public welfare. Among the multiple threats caused by human emissions of greenhouse gases, climate changes are expected to place large areas of the country at serious risk of reduced water supplies, increased water pollution, and increased occurrence of extreme events such as floods and droughts. Coastal areas are expected to face a multitude of increased risks, particularly from rising sea level and increases in the severity of storms. These communities face storm and flooding damage to property, or even loss of land due to inundation, erosion, wetland submergence, and habitat loss.

Impacts of climate change on public welfare also include threats to social and ecosystem services. Climate change is expected to result in an increase in peak electricity demand. Extreme weather from climate change threatens energy, transportation, and water resource infrastructure. Climate change may also exacerbate ongoing environmental pressures in certain settlements, particularly in Alaskan indigenous communities, and is very likely to fundamentally rearrange US ecosystems over the 21st century. Though some benefits may balance adverse effects on agriculture and forestry in the next few decades, the body of evidence points toward increasing risks of net adverse impacts on US food production, agriculture, and forest productivity as temperature continues to rise. These impacts are global and may exacerbate problems outside the United States that raise humanitarian, trade, and national security issues for the United States.

New Scientific Assessments and Observations

Since the administrative record concerning the Endangerment Finding closed following the EPA's 2010 Reconsideration Denial, climate change impacts have

continued to intensify, with new records being set for a number of climate indicators, such as global average surface temperatures, Arctic sea ice retreat, CO_2 concentrations, and sea level rise. Additionally, a number of major scientific assessments have been released that further improve understanding of the climate system and further strengthen the case that greenhouse gases endanger public health and welfare both for current and future generations. These assessments from the Intergovernmental Panel on Climate Change (IPCC), the US Global Change Research Program, and the National Research Council (NRC) include:

- IPCC's 2012 Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation and the 2013–2014 Fifth Assessment Report (AR5)
- The US Global Change Research Program 2014 National Climate Assessment, *Climate Change Impacts in the United States* (NCA3)
- The NRC's 2010 *Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean* (Ocean Acidification); 2011 *Report on Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia* (Climate Stabilization Targets); 2011 *National Security Implications for US Naval Forces* (National Security Implications); 2011 *Understanding Earth's Deep Past: Lessons for Our Climate Future* (Understanding Earth's Deep Past); 2012 *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future;* 2012 *Climate and Social Stress: Implications for Security Analysis* (Climate and Social Stress); and 2013 *Abrupt Impacts of Climate Change* (Abrupt Impacts) assessments.

The findings of the recent scientific assessments confirm and further strengthen the conclusion that greenhouse gases endanger public health, now and in the future. The NCA3 indicates that human health in the United States will be impacted by "increased extreme weather events, wildfire, decreased air quality, threats to mental health, and illnesses transmitted by food, water, and disease-carriers such as mosquitoes and ticks." The most recent assessments now have greater confidence that climate change will influence production of pollen that exacerbates asthma and other allergic respiratory diseases such as allergic rhinitis, as well as effects on conjunctivitis and dermatitis. Both the NCA3 and the IPCC AR5 found that increasing temperature has lengthened the allergenic pollen season for ragweed, and that increased CO_2 by itself can elevate production of plant-based allergens.

The NCA3 also concludes that children's unique physiology and developing bodies contribute to making them particularly vulnerable to climate change. Impacts on children are expected from heat waves, air pollution, infectious and waterborne illnesses, and mental health effects resulting from extreme weather events. The IPCC AR5 indicates that children are among those especially

susceptible to most allergic diseases, as well as health effects associated with heat waves, storms, and floods. The IPCC finds that additional health concerns may arise in low-income households, especially those with children, if climate change reduces food availability and increases prices, leading to food insecurity within households.

Both the NCA3 and IPCC AR5 conclude that climate change will increase health risks facing the elderly. Older people are at much higher risk of mortality during extreme heat events. Pre-existing health conditions also make older adults susceptible to cardiac and respiratory impacts of air pollution and to more severe consequences from infectious and waterborne diseases. Limited mobility among older adults can also increase health risks associated with extreme weather and floods.

The new assessments also confirm and further strengthen the conclusion that greenhouse gases endanger public welfare, and emphasize the urgency of reducing greenhouse gas emissions due to their projections that show greenhouse gas concentrations climbing to ever-increasing levels in the absence of mitigation. The NRC assessment Understanding Earth's Deep Past projected that, without a reduction in emissions, CO_2 concentrations by the end of the century would increase to levels that the Earth has not experienced for more than 30 million years.[165] In fact, that assessment stated that "the magnitude and rate of the present greenhouse gas increase place the climate system in what could be one of the most severe increases in radiative forcing of the global climate system in Earth history."[166] Because of these unprecedented changes, several assessments state that we may be approaching critical, poorly understood thresholds. As stated in the assessment, "As Earth continues to warm, it may be approaching a critical climate threshold beyond which rapid and potentially permanent—at least on a human timescale—changes not anticipated by climate models tuned to modern conditions may occur."

The NRC Abrupt Impacts report analyzed abrupt climate change in the physical climate system and abrupt impacts of ongoing changes that, when thresholds are crossed, can cause abrupt impacts for society and ecosystems. The report considered destabilization of the West Antarctic Ice Sheet (which could cause 3–4 meters (9-12 feet) of potential sea level rise) as an abrupt climate impact with unknown but probably low probability of occurring this century. The report categorized a decrease in ocean oxygen content (with attendant threats to aerobic marine life); increase in intensity, frequency, and duration of heat waves; and increase in frequency and intensity of extreme precipitation events (droughts, floods, hurricanes, and major storms) as climate impacts with moderate risk of an abrupt change within this century.

[165] National Research Council. 2011. *Understanding Earth's Deep Past. Lessons for Our Climate Future*. p.1. Available at https://www.nap.edu/catalog/13111/understanding-earths-deep-past-lessons-for-our-climate-future
[166] Ibid., p.138.

The NRC Abrupt Impacts report also analyzed the threat of rapid state changes in ecosystems and species extinctions as examples of an irreversible impact that are expected to be exacerbated by climate change. Species at most risk include those whose migration potential is limited, whether because they live on mountaintops or fragmented habitats with barriers to movement, or because climatic conditions are changing more rapidly than the species can move or adapt. While the NRC determined that it is not presently possible to place exact probabilities on the added contribution of climate change to extinction, they did find that there was substantial risk that impacts from climate change could, within a few decades, drop the populations in many species below sustainable levels, thereby committing the species to extinction. Species within tropical and subtropical rainforests, such as the Amazon, and species living in coral reef ecosystems were identified by the NRC as being particularly vulnerable to extinction over the next 30 to 80 years, as were species in high-latitude and high-elevation regions.

Since the 2009 Endangerment Finding, the USGCRP NCA3, and multiple NRC assessments have projected future rates of sea level rise that are 40 percent larger to more than twice as large as the previous estimates from the 2007 IPCC 4th Assessment Report due in part to improved understanding of the future rate of melt of the Antarctic and Greenland Ice sheets. These assessments continue to recognize that there is uncertainty inherent in accounting for ice sheet processes. Additionally, local sea level rise can differ from the global total depending on various factors. The east coast of the US in particular is expected to see higher rates of sea level rise than the global average. The NCA3 states that "five million Americans and hundreds of billions of dollars of property are located in areas that are less than four feet above the local high-tide level," and the NCA3 finds that "[c]oastal infrastructure, including roads, rail lines, energy infrastructure, airports, port facilities, and military bases, are increasingly at risk from sea level rise and damaging storm surges."[167]

Events outside the US, as also pointed out in the 2009 Endangerment Finding, will also have relevant consequences. The NRC Climate and Social Stress assessment concluded that it is prudent to expect that some climate events "will produce consequences that exceed the capacity of the affected societies or global systems to manage and that have global security implications serious enough to compel international response." The NRC National Security Implications assessment recommends preparing for increased needs for humanitarian aid; responding to the effects of climate change in geopolitical hotspots, including possible mass migrations; and addressing changing security needs in the Arctic as sea ice retreats.

[167] Melillo, J. M., T. Richmond, and G. W. Yohe, Eds. 2014. *Climate Change Impacts in the United States: The Third National Climate Assessment.* US Global Change Research Program, p. 9. Available at http://www.globalchange.gov/browse/reports/climate-change-impacts-united-states-third-national-climate-assessment-0

These assessments and observed changes make it clear that reducing emissions of greenhouse gases across the globe is necessary in order to avoid the worst impacts of climate change, and underscore the urgency of reducing emissions now. Moreover, due to the time lags inherent in the Earth's climate, the NRC Climate Stabilization Targets assessment notes that the full warming from any given concentration of CO2 reached will not be fully realized for several centuries, underscoring that emission activities today carry with them climate commitments far into the future.

5.7.3 Fiscal Implications of Coal

Federal, state, and local governments collect revenues from coal operations through various taxes, fees, and royalties. This section summarizes the revenue mechanisms and describes how revenues are disbursed.

Revenue and Disbursement Associated with Federal Royalties, Bonus Bids, and Rents

The Federal government receives revenue from coal leasing in three ways:

- Bonus bids
- Rental fees
- Production royalties

These revenues are collected and disbursed by the ONRR. In addition to these three channels, the ONRR also collects and tracks "other revenues" that consist of advance royalty payments, minimum royalty payments, estimated royalty payments, settlement agreements, and interest. Over the last 10 years, average annual revenues from coal leasing have amounted to slightly more than $1 billion, representing approximately one-quarter of all revenues associated with onshore Federal minerals collected by the ONRR. **Table 5-7**, below, shows the revenues collected from coal in fiscal year 2015 associated with Federal coal leases by state, as well as the 10-year average by state and revenue type.

Over the last 10 years, almost 90 percent of total revenues collected from coal leases originated in Wyoming. Rent and other revenues generally represent a small proportion of overall revenue with less than 5 percent in any state and less than 0.5 percent of the national total. Bonus bids (36 percent) and royalties (63.6 percent) make up the greatest percentage of overall revenues from coal leasing.[168]

[168] Bonus bids actually make up a relatively small proportion of the total revenue by state (less than 10 percent) with the exception of Wyoming. On average, bonus bids have represented about 40 percent of revenues from leases in Wyoming.

Table 5-7
Summary of Federal Revenues Associated with Coal Leases

State	Fiscal Year 2015 Total	10-year Average				
		Bonus	Other Revenues	Rent	Royalties	Total
Alabama	$87,791	$25,645	-$102,705	$12,120	$3,810,903	$3,745,963
Colorado	$45,946,041	$2,799,763	$307,583	$183,152	$47,004,798	$50,295,297
Kentucky	$158,280	$52,935	$10,200	$15,923	$1,110,040	$1,189,098
Montana	$43,259,597	$3,489,852	$2,137,707	$130,007	$38,823,202	$44,580,768
Oklahoma	$825,481	$80,999	$2,655	$36,382	$723,083	$843,118
North Dakota	$3,483,815	$64,906	$0	$33,176	$1,244,067	$1,342,149
Utah	$34,545,089	$1,338,104	$98,931	$225,425	$28,753,933	$30,416,393
Wyoming	$987,724,580	$372,599,892	$842,377	$555,832	$550,402,368	$924,400,469
Total	**$1,116,030,675**	**$380,452,096**	**$3,296,747**	**$1,192,017**	**$671,872,395**	**$1,056,813,255**

Source: ONRR 2016

The Mineral Leasing Act specifies that 50 percent of Federal revenues from leasable minerals (including coal) are paid to the US Treasury (40 percent appropriated to the Reclamation Fund and 10 percent to the General Fund), and 50 percent are paid "to the State within the boundaries of which the leased land is located or the deposits were derived" (30 USC, Subsection 191[a]). The Act further states that "[i]n determining the amount of payments to the States…beginning in fiscal year 2014 and for each year thereafter, the amount of such payments shall be reduced by 2 percent for any administrative or other costs incurred by the United States in carrying out the program authorized by this chapter, and the amount of such reduction shall be deposited to miscellaneous receipts of the Treasury" (30 USC, Subsection 191[b]). Thus, States effectively receive 49 percent of the revenues collected on leases within their state. The Act also recommends that "the legislature of the State may direct giving priority to those subdivisions of the State socially or economically impacted by development of minerals leased under this Act, for (i) planning, (ii) construction and maintenance of public facilities, and (iii) provision of public service" (30 USC, Subsection 191[a]). Given this recommendation, states have broad discretion in using these funds, and each state distributes them differently.

For example, Wyoming distributes mineral royalty and bonus payments to a range of funds, including the School Foundation Fund, School Construction Fund, Highway Fund, General Fund, and Budget Reserve Account. Portions of these payments are also distributed directly to cities and towns; cities, counties, and special districts capital construction; the community college commission; and the University of Wyoming. **Table 5-8**, below, summarizes the distribution of payments in Wyoming in fiscal year 2015 for payments associated with all Federal mineral leases (including coal). Based on the current level of revenues generated from coal leases, approximately 60 percent of the total distribution could be attributed to coal.

Table 5-8
State of Wyoming's Distribution of Federal Mineral Revenues

Funds / Recipient	Fiscal Year 2015
Cities & Towns	$18,562,500
Cities, Counties & Special Districts Capital Const.	$13,050,000
Foundation Fund	$251,827,747
School Capital Construction	$215,609,844
School Districts – Grants	$5,346,000
Highway Fund / State Roads	$66,472,500
1% General Fund	$2,000,000
University of Wyoming	$13,365,000
Community College Commission	$1,600,000
Budget Reserve Account	$326,149,640
Total	**$913,983,231**

Source: Wyoming State Treasurer's 2015 Report (p. 52)

Funds distributed directly to cities and towns are generally based on population. The funds allocated to cities, counties, and the special districts capital construction account allow for grants or loans to district construction projects when specific circumstances are met. As shown in the table, a substantial proportion of the funds are allocated to schools. The Foundation Fund is a major revenue source to the Wyoming's Department of Education's annual budget and supports K-12 funding throughout the state.

Other Federal Taxes and Fees Associated with Coal Production

In addition to Federal revenues in the form of royalties, rents, and bonus bids, all coal mining operations are subject to:

- A per ton reclamation fee established by SMCRA, as amended
- The Black Lung Excise Tax enacted under Black Lung Benefits Revenue Act of 1977

Reclamation Fee

Title IV of the SMCRA established an Abandoned Mine Reclamation Fund (Fund)[169] that is administered by OSMRE. The primary source of revenue for the Fund is a reclamation fee paid by operators of coal mining operations. Currently, the fees are $0.28 per ton of non-lignite coal produced by surface coal mining and $0.12 per ton of non-lignite coal produced by underground mining or 10 percent of the value of the coal at the mine, whichever is less. The fee for lignite coal is 8 cents per ton or 2 percent of the value of the coal at the mine, whichever is less. SMCRA specifies how the collected funds are used, including "reclamation and restoration of land and water resources adversely affected by past coal mining" and grants to states to accomplish the purposes of Title IV (30 USC, Subsection 1231[c]).

[169] 30 USC, Section 1232

In addition, interest is earned on the Fund, which is used to make transfers to three health care plans that are part of the United Mine Workers of America Health and Retirement Fund (30 USC, Subsection 1231[e]). Since SMCRA's enactment in 1977, the OSMRE has collected over $10.5 billion in fees and distributed more than $8.0 billion for grants to states and tribes, transfers to the health care plans, and its own operation of the national program to reclaim land and waters damaged by coal mining before SMCRA's passage.[170] In fiscal year 2015, OSMRE collected about $195 million in fees, and the average between fiscal year 2011 and fiscal year 2015 was just over $220 million annually.[171]

Black Lung Excise Tax

The Black Lung Excise Tax became effective in 1978 with the passage of the Black Lung Benefits Reform Act that enacted the Black Lung Disability Trust Fund. The departments of Labor, Treasury, and Health and Human Services jointly administer the fund. Currently, the excise tax is $1.10 per ton on underground-mined coal and $0.55 cents per ton on surface-mined coal, in either case not to exceed 4.4 percent of the sale price.[172] Between 2009 and 2014, the average annual collections from this excise tax were approximately $595 million.[173] The Department of Labor's Division of Coal Mine Workers' Compensation administers the Black Lung Program and uses funds to compensate "coal miners who are totally disabled by pneumoconiosis arising out of coal mine employment, and to survivors of coal miners whose deaths are attributable to the disease" and provide "eligible miners with medical coverage for the treatment of lung diseases related to pneumoconiosis."[174]

State and Local Taxes and Fees Associated with Coal Production and Operations

State and local governments collect revenues from coal mining operations through a variety of channels. This section provides an overview of these revenue streams.

Severance Taxes

Many states collect severance taxes from the production of non-renewable mineral resources, regardless of the surface land owner. Severance tax rates vary by state and can be based on value or volume. Not all states collect

[170] Office of Surface Mining Reclamation and Enforcement. 2016. Reclaiming Abandoned Mine Lands. Available at: http://www.osmre.gov/programs/AML.shtm

[171] Office of Surface Mining Reclamation and Enforcement. 2016. Grant Distribution. Available at: http://www.osmre.gov/resources/grants.shtm

[172] Department of Labor. 2016. Fiscal year 2016 Detailed Budget Documentation - Black Lung Disability Trust Fund. Available at: https://www.dol.gov/general/budget/index-2016

[173] Internal Revenue Service. 2016. Federal Excise Taxes Reported to or Collected by the Internal Revenue Service, Alcohol and Tobacco Tax and Trade Bureau, and Customs Service, by Type of Excise Tax. November 22, 2016. Available at: https://www.irs.gov/uac/soi-tax-stats-historical-table-20

[174] Department of Labor. 2016. About the Black Lung Program. Available at: https://www.dol.gov/owcp/dcmwc/.

severance taxes, and, for those that do, the approach and level of the severance tax rate varies widely. Many of the states allow for some deductions and exceptions on severance taxes. Along with variation in the collection of severance taxes, the distribution of these revenues to state and local funds varies widely.

Taxes on Production and Property

In addition to severance taxes, many states collect tax revenues based on the value of coal produced in a given year, or the value of the real and personal property of coal operations.

An ad valorem tax is one based on the monetary value of an item, including property. States that have an ad valorem tax on coal production may refer to the tax as a gross products or gross proceeds tax, based on the total value of the item. Property taxes are ad valorem taxes applied to real and personal property. Real property generally refers to fixed property, such as land and buildings (e.g., the land in which a coal mining operation is located and any fixed structures). Personal property typically refers to property that can be moved, such as most equipment and vehicles used in the mining process. It is important to note that Federal land is exempt from real property tax. However, any improvements on Federal lands associated with a private operation are typically subject to property tax.

Ad valorem taxes on coal production and property associated with coal mining are primarily collected by local governments and some states. These taxes are typically set by taxing entities at the state and local level, including counties, cities, towns, school districts, and special districts (e.g., hospital district, soil and water conservation district, regional transportation authority, etc.). Commonly, the county treasurer is responsible for the collection of these taxes and then distributes the collections back to the taxing entities.

Other Local Taxes

Two additional tax revenue sources may exist that are applied to coal operations. One source, which would not apply to Federal coal leases, would be royalty and rents collected by states from state-owned coal resources. The other is sales and use taxes. Capital investment and other operating expenses at coal operations may generate additional state and local revenues.

5.8 FEDERAL COAL LEASING PROCESS

The BLM is the Federal agency that is responsible for leasing Federal coal. As previously discussed, the BLM coordinates with other Federal, state, and local agencies and governments that may be affected by coal-related activities and with representatives of industry and environmental groups that may be affected by how Federal coal is leased and managed. The BLM leases coal through a competitive sales process using a fixed royalty-variable cash bonus bidding system. The BLM prepares the paperwork necessary to evaluate tracts for sale,

holds the lease sale using sealed bidding procedures, and evaluates the high bids received to determine if they constitute FMV.

5.8.1 Land Use Planning

The first major step in the Federal coal leasing process is land use planning. Decisions resulting from the land use planning process identify lands acceptable for further consideration for coal leasing. These areas are identified after reviewing all lands in the planning area using the four screens established by the Federal coal management program in 1979 and memorialized in Federal regulations. The four screens are:

1. Identification of areas with coal development potential - areas are eliminated from coal leasing consideration if they do not possess coal development potential (43 CFR, Subparts 3420.1-4[e][1]).
2. Determining if lands are unsuitable for coal development - areas are eliminated if they contain coal but are judged unsuitable for surface coal mining after the application of 20 coal unsuitability criteria, if exemptions and exception do not apply (43 CFR, Subparts 3420.1-4[e][2]; 43 CFR, Subpart 3461).
3. Multiple use conflict analysis - additional coal areas may be eliminated on multiple use grounds if other resource values are determined to be more valuable than coal (43 CFR, Subparts 3420.1-4[e][3]).
4. Surface owner consultation - potential elimination of split-estate mineral lands where surface mining is proposed and a significant number of qualified surface owners have stated a preference against surface coal mining (43 CFR, Subparts 3420.1-4[e][4]).

Pursuant to the Mineral Leasing Act and BLM regulations, lands cannot be offered for lease if they are not identified by the BLM as acceptable for further consideration for coal leasing. This is also true where lands overlying Federal coal resources are managed by a Federal surface management agency other than the BLM.

5.8.2 Competitive Leasing Processes

Federal coal regulations at 43 CFR, Part 3420 identify two types of competitive leasing processes: regional leasing and lease by application. The BLM no longer employs regional leasing; the last "certified" Federal coal production region, the Powder River Coal Production Region, was decertified in 1990 (see **Section 5.3** for more information).

Regional Coal Leasing

Under the previous regional coal leasing process—which is described in 43 CFR, Part 3420—the BLM would set leasing levels and select potential coal leasing tracts for sale based on land use planning, expected coal demand, and potential environmental and economic impacts. This process required close consultation

with local governments and citizens through a Federal/state advisory board known as a Regional Coal Team. All costs associated with conducting regional leasing were borne by the Federal Government.

Under this process, regional leasing levels were established by the Secretary of the Interior based on recommendations of Regional Coal Teams. Leasing levels were based on the following factors (43 CFR, Subpart 3420.2):

1. Advice from governors of affected states as expressed through the regional coal team
2. The potential economic, social, and environmental effects of coal leasing on the region, including recommendations from affected Indian tribes
3. Expressed industry interest in coal development in the region and indications of the demand for coal reserves
4. Expressed interests for special opportunity sales
5. Expected production from existing Federal coal leases and non-Federal coal holdings
6. The level of competition within the region and recommendations from the Department of Justice
7. US coal production goals and projections of future demand for Federal coal
8. Consideration of national energy needs
9. Comments received from the public in writing and at public hearings
10. Other pertinent factors

The Regional Coal Team would delineate tracts in any areas acceptable for further consideration for leasing whether or not expressions of leasing interest had been received for those areas. Upon completion of tract delineation and preparation of the tract profiles, the Regional Coal Team would rank the tracts in classes of high, medium, or low desirability for coal leasing. Three major categories of consideration would be used in tract ranking: coal economics, impacts on the natural environment, and socioeconomic impacts (43 CFR, Subparts 3420.3-4).

The delineated tracts selected for further study would be analyzed in a regional EIS. These tracts would be grouped into leasing alternatives, with at least one alternative falling into the recommended leasing level range. Before making a final leasing decision, the Secretary would consult with the governors of the affected states, the surface management agencies, and the Department of Justice. The Secretary's final decision would include whether to offer coal for lease and if so, how much coal to offer, when to hold the lease sale (or sales), and how the coal would be offered for sale.

Under the regional leasing process, if a mine were in a situation in which it was running out of reserves to maintain existing production or existing contracts, prior to the next scheduled regional coal lease sale, the regulations allow for the filing of an emergency LBA.[175] Emergency lease sales are held when coal is needed within 3 years to maintain production at existing mines, to meet contractual obligations, or to prevent the bypass of Federal coal.

Lease-by-Application

All current leasing under the Federal coal program is conducted through the LBA process (43 CFR, Subpart 3425; see **Section 5.4.3** for more information). Under this process, coal tracts are applied for by an adjacent mine operator in order to maintain production levels and extend the life of the mine. The processing of LBAs has many steps, some running concurrently, but in general, the broad steps taken prior to offering a tract for sale are:[176]

1. Receipt and initial review of the application for completeness and conformance with the applicable land use plan, and if complete, a cost recovery account is established
2. Ensure adequate data exists to determine the amount and characteristics of coal reserves within (and if applicable outside of) the application boundary (exploration)
3. Develop a preliminary tract delineation
4. Prepare a document to comply with the NEPA, preparing the decision on whether to offer a selected coal tract for sale and which tract to offer
5. Prepare and finalize all reports associated with the presale FMV estimate
6. Offer the selected tract for competitive bid

Review of Application

The application must be filed in the proper BLM State Office (SO) having jurisdiction over the lands and/or minerals involved. Once received, the SO assigns a serial number and reviews the application for completeness, ensuring the lands are properly described and available for lease in the approved Resource Management Plan.[177] The SO notifies the appropriate governor(s) that an LBA has been received. Staff confirms the application conforms to the land use plan, and the lands have been determined to be acceptable for further consideration for coal leasing. If the application is located on lands where the surface is administered by another agency, the BLM must confirm with the

[175] 43 CFR, Part 3420
[176] 43 CFR, Part 3420
[177] Leases within the decertified Powder River Coal Production area will take the application before the Powder River Regional Coal Team to get a recommendation from that team prior to processing.

surface management agency that coal leasing is in conformance with their approved land use plan. If private lands are noted in the application, it should be determined as soon as possible if a qualified surface owner is present, and whether the applicant has received consent to mine.

The applicant for a new Federal coal lease is required to reimburse the BLM for all processing costs incurred by the BLM through a cost recovery account. The processing costs include reimbursement of the BLM's time to provide information for and review of the NEPA document, and time to prepare the geologic, engineering, economic, and valuation documents that establish the presale FMV estimate. Total processing costs will be disclosed in the lease sale notice, and if the successful bidder is not the applicant, that bidder will be required to reimburse the applicant for the cost recovery fees.

Coal Exploration

The BLM must have adequate data to determine the quality and quantity of recoverable coal before a tract can be delineated and recommended for leasing. If geologic information is inadequate, the BLM will ask the applicant to conduct exploration drilling. A BLM-issued exploration license is required to conduct exploration activities on unleased Federal coal. However, the license confers no right to lease the lands where the exploration occurs. Applicants for exploration licenses must provide opportunity for other parties to participate in the exploration, on a pro rata cost share basis. A public Notice of Invitation to Participate is published in the local newspaper as well in the *Federal Register*.

Developing a Preliminary Tract

Production maintenance tracts generally do not contain sufficient recoverable reserves necessary to support an entirely new operation. Recoverable reserves are present only in sufficient quantities to extend the life of an adjacent, existing mine, or to permit expansion of the mine's annual production. The tract nominated for leasing by the applicant may be reconfigured by the BLM for reasons of Public Interest and resource conservation. Some common reasons to reconfigure the tract are in order to achieve maximum economic recovery and reduce the potential for bypass, increase potential value, promote competition, reduce potential impacts on other resources, and accommodate qualified surface owner constraints.

In order to enhance competition among companies, if a portion of an applied for tract lies near a competing mine, the BLM may split lands in an LBA into individual tracts in the hopes a competing mine may place a bid. The BLM will also try to delineate a tract that will enhance FMV. Often the BLM does this by pacing the rate of leasing to match the rate of coal production. Rapid leasing in excess of reserve needs could adversely affect bonus values, and the BLM is obligated not to lease speculative coal resources. The BLM attempts to configure these tracts to contain only those reserves needed to meet

production needs, recover all coal resources, avoid speculation or high grading, and encourage competition.

Preparing the NEPA Document/Decision to Lease

All coal lease applications will undergo NEPA analysis in the form of an environmental analysis or EIS with full public involvement consistent with regulation and policy. The BLM will also invite agencies involved with post-lease decision-making—often the OSMRE, the Forest Service, or other Surface Management Agency—and the State RA to become Cooperating Agencies in preparing the NEPA document.

Through NEPA, the BLM will evaluate the potential direct, indirect, and cumulative environmental and socioeconomic impacts of leasing and developing Federal coal in the application area. The BLM evaluates the environmental impacts of coal mining that would be expected to result if leases are issued for maintenance coal tracts. Although the BLM does not authorize mining by issuing leases for Federal coal, the impacts of mining the coal are considered in the environmental analyses, because it is a logical consequence of issuing a maintenance lease next to an adjacent mine.

Determining Fair Market Value

All successful lease bonus bids must meet or exceed the FMV established by the BLM prior to offering the lease for sale. The estimate of FMV is prepared in accordance with standard appraisal methods and is kept strictly confidential. The term is defined as the "amount in cash, or on terms reasonably equivalent to cash, for which in all probability the coal deposit would be sold or leased by a knowledgeable owner willing, but not obligated to sell or lease to a knowledgeable purchaser who desires but is not obligated to buy" (43 CFR, Subparts 3400.0-5[n]).

The presale estimate of the FMV relies on information about the geology and characteristics of the coal in the application area, the engineering report that considers an optimum mine plan, mining cost associated with extracting the identified reserves in the preferred tract, an economic report that establishes the market for the coal lying within the selected tract, and finally the appraisal/valuation report. The economic report identifies the most likely market(s) for coal lying within the tract, including an evaluation of whether the coal is suitable for export. The BLM is also required by statute and regulation to conduct a public hearing between the Draft and Final EIS to receive comments from the public on the tract proposed for leasing to inform the calculation of the FMV.

The BLM uses a sealed bid system as a measure to ensure FMV is received and the Public Interest is protected. In most instances, particularly in coal areas where lease sales are held on a consistent basis, the BLM keeps the presale estimate of FMV, and the information used to establish this value, confidential even after a lease sale is complete.

Conducting the Sale and Issuing the Lease

Once a decision is made to move forward and offer a coal tract for competitive sale, an announcement will be made in proposed and final sale notices in the *Federal Register* that give the time, date, and procedures of the lease sale and description of the coal to be offered. Other methods of notifying the public of the sale may also be employed.

The lease sale begins with receipt of sealed bids. All sealed bids are opened at the public lease sale. The apparent high bid is accepted contingent upon it meeting or exceeding the BLM's presale estimate of FMV, adjudication requirements (bidders must meet regulatory requirements necessary to be qualified to hold a Federal coal lease), and the appropriate fees and payments being attached.

Before a lease is issued, the lessee must furnish a bond in an amount determined by the agency to ensure compliance with the terms and conditions of the lease and to provide a bond to cover the remaining balance of the bonus bid.[178] A sale panel consisting of a mineral appraiser/economist, geologist, mining engineer, and Washington Office delegate will review the apparent high bid to determine if it has met or exceeded the presale FMV.

If the apparent high bid meets the FMV and the bidder is qualified to hold a Federal coal lease, the recommendation is sent before the BLM Authorized Officer, who will accept the bid and send the provided information to the Department of Justice for antitrust review. Upon hearing from Department of Justice, the Authorized Officer will either issue or reject the lease.

Should the apparent high bid not meet the FMV, the BLM Authorized Officer will send notice rejecting the bid and the right to appeal. The notice also allows a bidder to request the BLM to reoffer a tract if they waive their right to appeal. If no bid is received during the reoffer, the decision to hold the sale is complete, and the BLM Authorized Officer will close the case with no further action.

Public Interest

Throughout the coal leasing process, the BLM takes into careful consideration whether leasing the applied for lands would be in the public interest (30 USC, Sections 181-287, 351-359; 43 CFR, Subparts 3425.1, 3472.1). The regulations state the BLM must reject an application if "leasing of the land covered by the application, environmental or other sufficient reasons, would be contrary to the public interest" (43 CFR, Subparts 3425.1-8[a][3]). Many, often competing, interests must be considered in arriving at a Public Interest determination,

[178] Lessees are required to pay the bonus bids in five equal installments beginning with the first payment due at the time of the lease sale and the remaining payments due on the following four anniversary dates of the lease. Per the Energy Policy Act of 2005, if a successful bidder can demonstrate they have a history of timely payments, the requirement to cover any outstanding balance with a bond can be waived.

including, but not limited to, the applicant's request; the environmental impacts; the economic benefit to the local, state, and national economy; rights of qualified surface owners; ensuring a fair return for the use of the public resources; and conservation of the public resource (BLM Manual 3435).

The Federal Coal Lease

A Federal coal lease grants the right to explore for, extract, remove, and dispose of some or all of the coal deposits that may be found on the leased lands. After a lease is issued, the BLM will review and approve a Resource Recovery and Protection Plan, which describes how maximum economic recovery of the coal resource will be achieved. The BLM does not, however, approve any mining activities. A Federal coal lease is granted on the condition that the lessee will obtain the appropriate permits and licenses from other Federal, state, and local agencies. Before the lessee may initiate any mining activity, as required by SMCRA, OSMRE or the state RA must approve a permit. In addition, the Assistant Secretary, Land and Minerals Management, after receiving a recommendation from OSMRE, must approve a mining plan as required by the Mineral Leasing Act. As part of a permit issued by OSMRE or the state RA, the permittee is required to post a reclamation bond to cover the costs of returning the land to the pre-mining state.

A Federal coal lease has an initial term of 20 years, but it may be terminated within 10 years if the coal resources are not diligently developed. A lease is readjusted at the end of the 20-year primary term and every 10 years thereafter for the life of the lease. Diligent development occurs when the lessee mines one percent of the established recoverable reserves. Once that threshold is met, the lessee is required to continue to produce one percent of their original recoverable reserves on an annual basis, or pay an advance royalty.[179] Lessees who fail to comply with continued operation provisions subject their leases to cancellation. Because mines may be located in areas with various coal owners and mining occurs in a logical sequence, establishing a logical mining unit[180] allows lessees to consolidate the diligent development and continuous operations requirements for Federal leases within the boundary of the mine.

[179] Upon request by the lessee, the BLM may accept, for a total of not more than 20 years, the payment of advance royalties in lieu of continued operation, consistent with the regulations. The advance royalty will be based on a percentage of the value of a minimum number of tons determined in the manner established by the advance royalty regulations in effect at the time the lessee requests approval to pay advance royalties in lieu of continued operation (30 USC, Sections 181-287; 20 USC, Sections 351-359 (acquired lands); 43 CFR, Part 3483; BLM Coal Lease Form 3400-12).

[180] A logical mining unit is an administrative construction that allows the lessee or operator to consolidate the diligent development and continued operations requirements for all the Federal leases and other coal tracts within the boundaries of the mine. A logical mining unit provides for continuity in management of the coal resource whenever the geologic characteristics of a coal seam cross property boundaries. A logical mining unit has been defined as an area of land in which the coal can be developed in an efficient, economical, and orderly manner as a unit with due regard for conservation of the coal and other resources. An application is required to be filed with the BLM for approval to form a logical mining unit.

At any time, a lessee may surrender, in whole or in part, its Federal coal lease by filing a written request for relinquishment. Before a lease can be relinquished, the lessee must be in compliance with all lease terms and conditions, and have paid all payments and fees.

CHAPTER 6
PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

The BLM has received a large amount of substantive input from a diverse array of stakeholders through both the internal and external scoping process. **Chapter 5** includes a summary of the comments raised through the scoping process, and **Appendix D** includes a full record of all comments received. The BLM has undertaken a thorough review of the scoping record and developed a preliminary framework for the PEIS based on this input. This chapter presents a purpose and need statement, reform options that meet identified policy objectives to be carried forward for further consideration by the BLM, a rationale for dismissing some options from further consideration, a framework for developing program reform alternatives, issues for analysis, an analytical approach, analytical considerations, and a schedule for completion of the PEIS.

6.1 PURPOSE AND NEED STATEMENT

An EIS "shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR, Subpart 1502.13). For many types of actions, the "need" for the action can be described as the underlying problem or opportunity to which the BLM is responding with the action. The "purpose" can be described as a goal or objective that the BLM is trying to reach (BLM NEPA Handbook Section 6.2).

6.1.1 Need for the Federal Action

The need for this action is to undertake a comprehensive review of the Federal coal program and to consider how the program can be improved and modernized in the areas of fair return, climate change, resource management and protection, and program administration. The last time the Federal coal program received a comprehensive review was in the mid-1980's, and most of the existing regulations which were promulgated in the late 1970's, have been only slightly modified since that time. Further, the direct, indirect, and

cumulative impacts of the Federal coal program have not been fully analyzed under NEPA in over 30 years. As described in Secretarial Order 3338, this has led to calls from a variety of stakeholders, including the GAO, OIG, members of Congress, interested stakeholders, and the public for review of many facets of the Federal coal program.

This need is a part of the BLM's stewardship role as a proprietor and sovereign regulator, which is charged by Congress with managing and overseeing mineral development on the public lands, not only for the purpose of ensuring safe and responsible development of mineral resources, but also to ensure conservation of the public lands; the protection of their scientific, historic, and environmental values; and compliance with applicable environmental laws. In addition, the BLM has a statutory duty to ensure a fair return to the taxpayer and broad discretion to decide where, when, and under what terms and conditions mineral development should occur.

Based primarily on the input received through the listening sessions and scoping process, it appears that modernization of the Federal coal program is warranted. While energy markets, communities, environmental conditions, and national priorities have changed dramatically, the program has remained fairly static in its administration over the last thirty years.

There are three general areas in particular that should be modernized to ensure that the program continues to accomplish its responsibilities to the American public. In each of these areas additional analysis is necessary prior to the recommendation of specific policy choices, in order to provide a complete understanding of the likely impacts of various policies on energy markets, electricity prices, employment, and other critically important issues. These issues will be the focus areas of analysis for the PEIS going forward. However, it is possible at this stage in the process to identify the most promising policies for consideration, and those are also set out below. In addition, there are some simpler good government improvements that can be made without significant additional analysis. These may be undertaken in parallel with the PEIS process and they are set out below as well.

The three general areas requiring modernization are: fair return to Americans for the sale of their public coal resources; impact of the program on the challenge of climate change and on other environmental issues; and efficient administration of the program in light of current market conditions including impacts on communities.

First, the program must ensure that the public owners of this coal receive a full and fair return for this resource. Addressing this issue will benefit not only the general public but the states and communities in which Federal coal is located, since 50 percent of most revenue generated by the program goes to those states.

In 2013, both GAO and OIG issued reports making specific recommendations regarding the Federal coal program, particularly with respect to the leasing process and fair market value. The BLM addressed these recommendations through the development of new protocols and issuance of policy guidance, a manual, and a handbook. In the broader context of these reports, stakeholders have expressed additional concerns with what they believe are fundamental weaknesses in the program with respect to fair return.

These concerns arise, at least in part, because there is currently very little competition for Federal coal leases. About 90 percent of lease sales receive bids from only one bidder, typically the operator of a mine adjacent to the new lease, given the investment required to open a new mine. While the BLM conducts a peer-reviewed analysis to estimate a pre-sale fair market value of the coal and will not sell a lease unless the bid meets or exceeds that value, commenters have questioned whether an accurate fair market value can be identified in the absence of a truly competitive marketplace. As OIG pointed out, "since even a 1-cent-per-ton undervaluation in the fair market value calculation for a sale can result in millions of dollars in lost revenues, correcting the identified weaknesses could produce significant returns to the Government."[181]

Commenters have also raised concerns about the royalty rates in Federal leases, which are set by regulation at a fixed 8 percent for underground mines and not less than 12.5 percent for surface mines. Some stakeholders have suggested that the large volumes and relatively low costs of Federal coal, which currently represents approximately 42 percent of total domestic production, have the effect of artificially lowering market prices for coal, further reducing the amount of royalties received. There are also concerns that the Federal coal program obtains even lower returns through certain types of leasing actions, such as lease modifications, and through royalty rate reductions, which may result in royalty rates as low as 2 percent. In addition, stakeholders have noted that the $100/acre minimum bid requirement has not been updated since it was established in the regulations in 1982. Some stakeholders further suggest that a fair return to the taxpayer should also include compensation for externalities such as the environmental damage (or lost environmental benefits) from the removal and combustion of the coal. Through the PEIS, the BLM will consider reform options to address these and other aspects of fair return.

Second, the program must ensure appropriate alignment with US climate goals and adequately reflect the impact of the program on climate change. Virtually every community in the US is being impacted by climate change, and Federal programs have an obligation to be administered in a way that will not worsen and help address these impacts. The United States has pledged under the United

[181] OIG. 2013. Coal Management Program, US Department of the Interior, Report No. CR-EV-BLM-0001-2012. June 2013. Available at https://www.doioig.gov/sites/doioig.gov/files/CR-EV-BLM-0001-2012Public.pdf

Nations Convention of Climate Change to reduce its greenhouse gas emissions by 26-28 percent below 2005 levels by 2025. Efforts are already being made to reduce US greenhouse gas emissions in line with this target through measures such as vehicle efficiency standards, the CPP, energy efficiency standards, requirements to reduce methane reductions from oil and gas production, and many other measures.

However, numerous scientific studies indicate that reducing greenhouse gas emissions from coal use worldwide is critical to addressing climate change. As noted above, the Federal coal program is a significant component of overall US coal production. In 2015, 42 percent of total US coal production occurred on Federal lands.[182] When combusted, this Federal coal contributes roughly 10 percent of total US greenhouse gas emissions. Many stakeholders highlighted the tension between producing very large quantities of Federal coal while pursuing policies to reduce US greenhouse gas emissions substantially, including from coal combustion. Furthermore they stated that the current leasing system does not provide a way to systematically consider the climate impacts and costs to the public of Federal coal development, either as a whole or in the context of particular projects, and suggested tools such as royalty adders and compensatory mitigation.

Several of the most promising reforms in this area also are linked to fair return in that they would require an increase in the cost of this coal through price or royalty increases or compensatory mitigation to reflect and help to address its climate change impact. Like other fair return approaches, these reforms would benefit not just the public generally, but more specifically the states in which the Federal coal is located and their communities. Through the PEIS, the BLM will consider reform options to better align the Federal coal program with the challenges presented by climate change.

In addition, there is a need for program reform to better protect the nation's other natural resources (e.g., air, water, and wildlife). Commenters suggested a variety of options for improving protection and management of resources as part of the Federal coal program in accordance with the "multiple use" and "sustained yield" principals of FLPMA. Commenters expressed concern that the unsuitability criteria are not consistently applied at the land use plan level, which they believe disregards important landscape-scale land use allocation considerations. Commenters also suggested that the current unsuitability criteria should be revised and expanded to provide greater protection to important resources such as bats and Greater sage-grouse. Commenters requested that the BLM develop strategic leasing plans that would address resource issues at an appropriate scale and with consideration of the need for mitigation. Options were suggested for strengthening lease applicant

[182] US Extractive Industries Transparency Initiative. Full dataset. Table 1. Available at https://useiti.doi.gov/downloads/Federal-production/. See also EIA. Annual Coal Report. Available at http://www.eia.gov/coal/annual/

qualifications to ensure that future leases are only offered to companies that have a proven track record with successful environmental performance, including reclamation. Still other commenters suggested using a pricing mechanism (adder associated with royalties) to account for the environmental externalities associated with coal production and use such as air quality impacts. Through the PEIS, the BLM will consider reform options to improve the protection of natural resources.

Finally, there is a need for common-sense reforms to the Federal coal program that provide for the efficient and orderly administration of coal on Federal lands in light of current market conditions. A number of commenters expressed concern over the length of time it takes to obtain a Federal coal lease (in some cases 10+ years) and what they perceive as redundancies in the process between the other agencies involved. They urged the BLM to consider as part of the PEIS ways to improve the administration of the lease process itself. Others offered information to suggest that current leasing processes do not fully promote competition in the current marketplace. And many, particularly in coal states and communities, made a powerful case that the program administration does not appropriately consider or address the impact on communities from changes in the market. The BLM will consider reform options aimed at improving the administration of the Federal coal leasing process in all of these areas.

6.1.2 Purpose of the Federal Action

The purpose of this action is to identify, evaluate, and recommend comprehensive reforms to the Federal coal program. Through the PEIS, the BLM will consider how the program can be improved and modernized to foster the orderly development of BLM-administered coal on Federal lands in a manner that gives proper consideration to the impact of that development on important stewardship values while also ensuring a fair return to the American public.

Programmatic NEPA reviews address the general environmental issues relating to broad decisions, such as those establishing policies, plans, or programs, and can effectively frame the scope of subsequent site- and project-specific Federal actions.[183] The PEIS provides the BLM with an efficient and effective tool to consider a wide range of reasonable reform alternatives for the Federal coal program and adequately assess the cumulative effects of those alternatives across many factors such as market and climate effects. The analysis in the PEIS will inform, and possibly streamline, future decisions for individual actions under the Federal coal program through the ability to tier. Importantly, the PEIS provides an excellent venue for meaningful public involvement, collaboration

[183] Executive Office of the President, Council on Environmental Quality "Effective Use of Programmatic NEPA Reviews." December 2014. Available at https://ceq.doe.gov/current_developments/docs/Effective_Use_of_Programmatic_NEPA_Reviews_Final_Dec2014_searchable.pdf

with interested parties, and ultimately transparent, accountable, and informed government decision-making.

6.2 OPTIONS AND ALTERNATIVES

6.2.1 Options to Be Evaluated

Table 6-1 outlines the reform options that the BLM is proposing to carry forward for further consideration that may be analyzed in the PEIS and used as the basis for alternatives development. The options are organized by the policy objectives described in the Need for Federal Action in **Section 6.1.1**.

Table 6-1
Options Proposed for Analysis by Policy Objective

Fair Return	Reduce/Account for Greenhouse Gas Emissions	Improve Resource Protection and Management	Increase Lease Process Efficiency
1. Increase royalty rate 2. Implement FMV process changes (i.e., transparency and consistency) 3. Limit the use and improve the transparency of royalty rate reductions 4. Increase rental rate 5. Raise minimum bonus bid 6. Implement inter-tract or modified inter-tract bidding processes to increase competition 7. Evaluate current performance bonding amounts; increase bonding levels as necessary 8. Convene a royalty policy commission	1.Account for carbon-based externalities through royalty rate increase or royalty adder 2. Require compensatory mitigation for greenhouse gas emissions 3. Lease based on a carbon budget 4. Create incentives for methane capture 5. No new leasing, with limited modifications	1. Improve application of unsuitability criteria; modify criteria 2. Develop strategic leasing plans that address landscape scale issues, multiple use, and mitigation planning 3. Account for additional coal-related externalities 4. Strengthen lease applicant qualification requirements 5. Apply environmental protections to existing leases 6. Develop regional mitigation strategies for existing and new coal development (to address public health and environmental impacts) 7. Develop best management practices	1. Develop strategic leasing plans that allow for tiering of future lease decisions 2. Create pre-application process 3. Create a standardized lease application form and develop an electronic application platform 4. Establish a single team to develop FMV 5. Work with other agencies to evaluate means for eliminating overlapping requirements and redundant processes 6. Improve transparency in the leasing process

The reform options presented were raised through the scoping process or developed through internal scoping conducted by the BLM's Interdisciplinary Team. These options are described in greater detail in the text that follows based on best available information. The options presented will be evaluated in terms of benefits, impacts, and overall feasibility, including the BLM's legal and statutory authority for implementation. The BLM may use the options in combination to develop alternatives to be considered in the PEIS, as described in more detail below. Options raised through the scoping process that the BLM proposes not to carry forward for further consideration are discussed in **Section 6.2.3**. Based on further analysis, some of the options identified in **Table 6-1** may also be eliminated from further consideration.

Fair Return

A central objective of the BLM's reform effort for the Federal coal program is the level of return that it provides to the American public. The BLM received a number of comments suggesting reform options that would help better reflect FMV and consequently improve return to the taxpayer. The Federal Government receives revenues generated through the mining of Federal coal in three ways: production royalties, bonus bids, and rental fees (see **Section 5.7.3** for more information). The BLM will assess the following options in terms of the degree to which they would improve fair return to the taxpayer as well as their overall feasibility and practicality.

1. **Royalty Rate Increase:** The BLM will evaluate the ability of using the royalty rate to better reflect FMV and assess the impacts of increasing the royalty rate on Federal coal. Royalty rates are currently set by statute at a minimum of 12.5 percent of the gross value of the coal produced for surface mines and 8 percent for underground mines (43 CFR, Subparts 3473.3-2). The rate for surface mines may be increased on a lease-by-lease basis but may not be set below 12.5 percent. Currently, most leases contain a royalty rate of 12.5 percent. The BLM will analyze a range of royalty rate increases as part of the PEIS effort to secure fair return. The BLM will consider the effective royalty rate (royalty rate when accounting for deductions and royalty relief) for other federally leased commodities, considering royalties, bonus bids, and rental rates. This may include, but is not limited to basing the royalty rate on the market price for nearby regional coal, basing the royalty rate on the market price for non-Federal coal nationwide, or making the royalty rate commensurate with the rate used on other resources such as offshore oil and gas (18.75 percent). The BLM may also consider adjusting existing royalty rates upward until they are commensurate (on an energy content basis) with royalties that would be collected on substitute fuels, such as natural gas, or possibly consider a royalty rate aimed at maximizing revenues.

   For context, the Council of Economic Advisers (CEA) in their study entitled, "The Economics of Coal Leasing on Federal Lands: Ensuring a

Fair Return to Taxpayers,"[184] estimated the necessary royalty rate in the year 2025 based on mine mouth prices to ensure a fair return as follows: 17 percent based on regional coal prices, 29 percent based on non-Federal nationwide coal, and 29 percent based on natural gas prices.[185] The CEA concluded that a policy goal of maximizing return to the taxpayer would require royalty rates of 304 percent[186] (equal to approximately a $30/ton royalty charge on Powder River Basin coal), which would curtail future Federal coal production by more than half from projected levels (partially offset by increased production from other regions) while increasing revenue by $2.7-$3.1 billion. No other studies submitted during the scoping process went into this level of detail on royalty rate increases for the purposes of fair return.

Because royalty charges are related to production levels and gross revenues, the BLM will model the impact various royalty rates have on total Federal coal production and corresponding revenues. For example, the CEA study estimated that Federal coal production based on the royalty rate increases described above would decrease between 3 and 53 percent, respectively, and revenue would increase between $0-290 million to $2.7-3.1 billion annually.

The BLM will also evaluate in more detail than the CEA study how raising the royalty rate may depress bonus bids. As previously discussed, total returns are composed of revenues from royalty rates, bonus bids, and rental fees, less administrative costs. Increasing any single component may reduce one of the other components or vice versa. Revenue collection is split among these components as a risk-sharing mechanism between lessors and lessees.

Implementation of this option could be accomplished through policy under the Secretary's discretion under the Mineral Leasing Act for surface mines; however, rulemaking would be required to increase royalty rates for underground mines. Additionally, rulemaking would be required if the regulatory minimum royalty rate is to be increased.

2. **Fair Market Value Transparency:** The BLM will consider various ways to build on processes that improve consistency and transparency in the FMV calculation process without jeopardizing the competitive process. These include the new oversight process in which the

[184] Council of Economic Advisers, Executive Office of the President. 2016. The Economics of Coal Leasing on Federal Lands: Ensuring a Fair Return to Taxpayers. June 2016. Available at https://www.whitehouse.gov/sites/default/files/page/files/20160622_cea_coal_leasing.pdf

[185] These percent values are relative to an estimated 9.3 percent weighted average royalty rate based on production in 2025 and accounting for waivers, suspensions, and reductions.

[186] The royalty rates increases pertain to mine mouth, initial point of sale, cost of coal. For most Federal coals, this is only a small portion of the totaled delivered cost of coal to a power plant. Therefore, the actual percent increase in price observed by the end user will be significantly lower than the values reflected here.

OVS/DME reviews the BLM's FMV calculations (see **Section 5.8.2**, Competitive Leasing Process), or the establishment of a single team to develop FMV. Regarding transparency, the BLM Handbook instructs that:

> "While much of the data and information used to develop a pre-sale estimate of value have proprietary and confidential characteristics, it is the policy of the BLM that the Federal coal leasing processes are as transparent as the law and regulations allow. To this end, consideration must be given while developing reports that support FMV estimates to the ease with which sensitive, confidential, and proprietary data can be redacted to provide publicly available documents. It is not acceptable to redact an entire document. Further, consideration should be given to timely posting public versions of FMV related documents prominently on publicly available web sites after a successful lease sale, consistent with law and regulation."[187]

As part of the PEIS, the BLM will look at ways to improve the amount and timeliness of information available to the public for FMV, as well as improved transparency of the process. FMV process improvements will require, at a minimum, modification or additions to BLM policy and guidance to implement, and they may require rulemaking based on options to be evaluated.[188]

3. **Royalty Rate Reductions:** The BLM will evaluate its current use of royalty rate reductions and consider ways to limit the use of those reductions. Under certain circumstances the BLM can, upon application by the lessee or operator, temporarily reduce the royalty rate for a specific area of coal. Since the passage of FCLAA in 1976, the BLM has frequently granted royalty rate reductions.[189] In their scoping comment letter, Taxpayers For Common Sense noted that the BLM has reduced the royalty rates on 35 of 80 Federal coal leases in 9 states during the last 25 years, more than half of which occurred between 2001 and 2007 based on data they obtained from the ONRR.[190]

   The general consideration for a royalty rate reduction is to encourage the greatest ultimate recovery of the coal resource. Analysis will be

[187] BLM. 2014. BLM H-3073-1, Coal Evaluation Handbook. October 12, 2014. Available at https://www.blm.gov/style/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.58766.File.dat/H-3073-1.pdf
[188] Pursuant to Mineral Leasing Act § 201(a), "[n]o bid shall be accepted which is less than the fair market value[.]" The Mineral Leasing Act does not provide a definition for FMV. Changes to the FMV process may require modifications to 43 CFR, Subpart 3422.1.
[189] ONRR. 2016. Royalty Reporting (except Solid Minerals). Availiable at http://www.onrr.gov/ReportPay/royalty-reporting.htm
[190] Taxpayers For Common Sense. 2016. Scoping comment letter on Coal PEIS. July 28, 2016. See Volume 2 Appendix D.

needed to determine the overall revenue impact of royalty rate reductions and the potential for improved return if reductions were curtailed. Analysis will be needed to determine if limitations on royalty rate reductions could result in reduced revenue to the government, as rate reductions are most applicable to already marginal investments (i.e., without the reduction, the coal would not be recovered and no revenue would be generated).

The BLM will also consider ways to improve the transparency associated with the use of royalty rate reductions. As described in scoping comments from Taxpayers For Common Sense and others, the BLM could improve transparency in royalty rate reductions by providing public updates of the applications received and/or approved. This work has already been initiated through the implementation of BLM Instruction Memorandum No. 2014-156 and the associated justification that State Directors are required to provide to the Washington Office any application to ensure consistency in the BLM's review and decisions related to royalty rate reductions.[191] These policies may be further modified through the PEIS and formalized as part of the proposed program reform alternatives.

4. **Rental Rate:** The BLM will consider increasing the rental rate associated with coal leases, which is currently set at a minimum $3 per acre as established in 1979 (43 CFR, Subparts 3473.3-1). At a minimum, the BLM will consider increasing rental rates to reflect inflation since 1979. Given the small percentage of overall revenues that are generated by rental rates (see **Section 5.7.3**), it is not expected that this option will result in a substantial increase in return. This option may be implemented without rulemaking on an individual lease basis; however, rulemaking would be required to increase the regulatory minimum rate.

5. **Minimum Bonus Bid:** The BLM will consider raising the minimum bonus bid for coal leases that is currently set at $100 per acre and was established in 1982. The minimum bonus bid represents the minimum value that can be received by the Treasury for a coal lease (43 CFR, Subpart 3422.1[c][2]). The minimum regulatory value is used only when other methods of estimating value (i.e., FMV) yield results that are less than the equivalent of $100 per acre. At a minimum, the BLM will consider increasing the minimum bonus bid to reflect inflation since 1982. Accounting for inflation alone would increase the minimum bid to approximately $250 per acre as pointed out by the Institute for Policy

[191] BLM. 2014. BLM Instructional Memorandum 2014-156. Supplemental Guidance on Processing Royalty Rate Reduction Applications. September 26, 2014. Available at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2014/IM_2014-156.html

Integrity in their paper entitled, "Illuminating the Hidden Costs of Coal."[192]

Raising the minimum bid is not likely to result in a substantial improvement in return since the minimum bonus bid has historically only been employed for leasing in North Dakota and Oklahoma. Minimum bids can vary regionally, and the BLM may also consider establishing minimum bonus bids by coal region taking into account regional economic, geologic, and engineering variables. An additional consideration may be to remove the $100 bid floor and use the FMV process for setting the statutory minimum bid. The BLM will also consider the feasibility of and need for considering the option value associated with future information and/or changed conditions when establishing the minimum bonus bid.

6. **Alternative Leasing Mechanism:** The BLM will consider the use of alternative leasing mechanisms as a potential means to increase competition among bidders with the goal of improving return. Consideration will be given to inter-tract bidding and modified inter-tract bidding processes.

   An inter-tract bidding requires mining companies that are interested in different tracts to compete among themselves for the right to produce on those tracts. As a general overview, the BLM would determine a leasing level for the region being covered before the lease sale. The BLM would then offer tracts for sale, or accept industry requests, in excess of the determined leasing level. The companies would all bid at once on the tracts they most prefer, and their bids would be ranked (e.g., based on $/ton or $/Btu). Tracts would then be subtracted from the leasing level in order until the leasing level is met. At this point, the remaining tracts would be rejected. The accepted tracts would be subjected to standard post-sale review to ensure that they achieved FMV.

   Under a modified inter-tract bidding process, the BLM would determine a maximum tonnage or maximum number of Btus (or possibly carbon credits that would give the right to mine a volume of coal) to be leased for a region. All interested companies would bid among themselves for the right to produce coal. It could be conducted such that each bidder bids for a specified quantity of coal, and the highest bidders' quantities are subtracted in order from the level. Alternately, bids could be accepted on a proportional basis, where each bidder bids in a price per ton or per Btu and wins a proportion of the total leasing level equivalent to the value of their bid. The former option consolidates production among the highest bidders, while the latter ensures that

[192] Bureau of Labor Statistics. 2016. Consumer Price Index Inflation Calculator. Available at http://data.bls.gov/cgi-bin/cpicalc.pl?cost1=100.00&year1=1982&year2=2016

every reasonable bidder receives some production. Once the lessees have received their production quantities, they would be free to allocate the increase on Federal lands of their choice subject to suitability review and NEPA analysis.

Both of these alternative bidding processes imply the need for a strategic plan that sets leasing level for a given region or nationally. Analysis will be needed to determine the potential for increased return associated with modified bidding systems in comparison to the administrative costs. If adopted, the design of this option would be critical. Any procedure to establish leasing levels is subject to uncertainty about future supply and demand conditions in energy markets. For example, the government should have the flexibility to adjust leasing levels to changing market conditions. The methods for how to determine a leasing cap will have to be established (see for example Reduce/Account for Greenhouse Gas Emissions #3). This option may also be considered in connection with the greenhouse gas issues to be discussed below.

It should be noted that the BLM leased coal based on regional plans that included the amount of coal to be leased starting in the late 1970s. This system was suspended due in part to low bidding activity. However, this system did not include the aforementioned alternative leasing mechanisms, and consideration of these options would not be limited to the specific processes and requirements previously used for regional leasing.

7. **Lease Bonding:** The BLM will assess whether current performance lease bonding procedures are sufficient to provide assurance of payment of obligations required under a lease. The BLM is not responsible for establishing bonds to cover environmental protection and reclamation requirements within a SMCRA permit, but rather is responsible for establishing bonds to protect the Federal government from losses in rentals and royalties (and in certain cases unpaid deferred bonus). The bonds are calculated using guidance established in BLM Manual Section 3474 and WO IM 86-145. At minimum, a bond must cover one-fifth of the bonus bid if there is any unpaid balance, as well as one year of advance rental and one-quarter year of royalties if the lease is in production. Bond reviews are currently conducted at least annually but may be increased based on circumstances, such as an anticipated increase/decrease in lease production. The BLM will accept a number of different types of lease bonds but does not accept self-bonds (43 CFR, Subpart 3471.1). This option may be implemented without rulemaking. However, rulemaking would be necessary to make the BLM regulations consistent with section 436 of the Energy Policy Act of 2005, 42 USC, Sections 15801 *et seq*, amending the Mineral Leasing Act at section 201(a)(4)(A).

8. **Royalty Policy Commission:** A number of commenters suggested that the BLM should immediately reconvene the Royalty Policy Committee, which was established by charter in 1995 under the authority of the Federal Advisory Committee Act. The Committee advised the Secretary on royalty management issues and other mineral-related policies, and also provided a forum for mineral lessees, operators, revenue payers, royalty recipients, government agencies, and interested public to express their views on those issues. The Committee charter required biennial review and could be renewed in 2-year increments by the Secretary as long as the Minerals Management Service required the expertise and advice of the Committee.

   The Royalty Policy Committee was terminated on April 2, 2014, due to lack of participation. While the BLM does not believe there is a need to reconvene the Royalty Policy Committee in its previous form, as the Department of the Interior has in place various advisory bodies to address key minerals issues, it will consider the potential value in a policy commission that could assist with rate setting for the Federal coal program and will give that further consideration in the PEIS. Implementation of this option may require development of a charter pursuant to the Federal Advisory Committee Act and Secretarial action to convene a committee.

Reduce/Account for Greenhouse Gas Emissions

A related central objective to the BLM's reform effort for the Federal coal program is consideration of the effect of the program on, and alternatives for alignment with, US climate goals. Many stakeholders highlighted the tension between producing large quantities of Federal coal while pursuing policies to restrict global warming to a 2 degrees Celsius outcome, in line with the Paris Agreement (see **Section 5.4.6** for more information). The BLM received a number of suggestions for reform options that would help limit greenhouse gas emissions associated with Federal coal production. Future BLM analysis will evaluate the comparative effectiveness of these options at mitigating greenhouse gas emissions while still respecting the BLM's multiple use and fair return statutory mandates.

1. **Accounting for Carbon-Based Externalities Through a Royalty Rate Increase or Royalty Adder:** The BLM will consider options to account for the carbon-based environmental and social costs of coal production and use (e.g., climate change damages such as net agricultural productivity, human health, and property damages from increased flood risk). Two possible methods of adjusting the royalty to account for carbon-based externalities will be considered: an increase in the royalty rate (i.e., a percent increase) to account for carbon-based externalities and a carbon adder (or carbon fee) generally expressed as a $/ton fee that would be in addition to the royalty rate. The advantages and drawbacks of a royalty rate increase versus an adder will be

explored in the PEIS. As has been suggested by commenters, the BLM could also theoretically account for carbon-based externalities through changes to rental rates or bonus bids. The BLM has determined that using royalty-based changes would directly connect impacts to the coal production and consumption—the activities that generate externalities—whereas rental rates are denominated in acres, and bonus bids are dependent on upfront estimates of total coal production.

Consideration will be given to the appropriateness of accounting for individual segments of, or the full lifecycle emissions of, CO_2 from coal. This includes the upstream carbon-related impacts associated with coal production, such as methane released during mining, and the midstream and downstream carbon-related impacts associated with transportation and combustion. For context, in their assessment of royalty rate adjustments to account for upstream externalities in coal production, the Institute for Policy Integrity estimated surface mine royalties would increase from 12.5 percent to 18.7 percent, and underground mine royalties would increase from 8 percent to 28.7 percent when accounting for the social cost of methane emissions from coal production.[193] Their analysis suggested a surface mine royalty of 82.6 percent when incorporating environmental and social externalities from coal transportation.[194] Royalty charge estimates increased higher still when the social cost of carbon related to coal combustion was internalized in other studies.

The BLM's consideration of the external costs associated with coal may, among others, rely on estimates for CO_2 and methane from the Federal Interagency Working Group on the Social Cost of Carbon.[195] The estimates of the social cost of carbon vary over time. Thus, in order to apply the social cost of carbon to Federal coal, analysis will be needed to link coal production and/or combustion to the social cost of carbon or social cost of methane specific to that year.

As this option results in higher prices for coal, it is likely to result in decreased Federal coal production and, therefore, greenhouse gas

[193] Foley, J. H. and P. Howard. 2016. Illuminating the Hidden Cost of Coal. New York University School of Law Institute of Policy Integrity. p. A-13. Available at http://policyintegrity.org/files/publications/Hidden_Costs_of_Coal.pdf

[194] These royalty percentages pertain to mine mouth prices, but constitute a much smaller percentage of the delivered price of coal that informs power plant's fuel purchase decisions.

[195] Interagency Working Group on Social Cost of Greenhouse Gases. 2016. Addendum to the Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide. Participation by the Council of Economic Advisers, Council on Environmental Quality, Department of Agriculture, Department of Commerce, Department of Energy, Department of the Interior, Department of Transportation, Department of the Treasury, Environmental Protection Agency, National Economic Council, Office of Management and Budget, Office of Science and Technology Policy. August 2016. Available at https://www.whitehouse.gov/sites/default/files/omb/inforeg/august_2016_sc_ch4_sc_n2o_addendum_final_8_26_16.pdf

emissions, but as a price mechanism it has no pre-determined CO_2 emissions or coal production outcomes, and levels can be expected to vary based on future market conditions and the availability of substitutes. Higher Federal coal prices may lead to increased non-Federal coal consumption that has similar lifecycle CO_2 emissions, which could partially offset some of the climate-related benefits to reduced Federal coal consumption. The environmental effectiveness of a royalty rate increase or adder would be largely contingent on the degree to which the substitute fuel sources are less carbon intensive (e.g., natural gas-fired generation or renewable generation) as opposed to similarly carbon intensive (e.g., non-Federal coal). The BLM will develop and use economic models to assess these substitution dynamics and the impact they have on the costs and benefits of any changes. Although there is less certainty around CO_2 emission under this option, in comparison to a carbon budget or other quantity-based option, a price-based mechanism would provide greater cost certainty to the coal industry.

Initial analysis conducted by Vulcan Philanthropy using the IPM model suggested a wide range of substitution rates of non-Federal coal for Federal coal, largely in the 0.2 to 0.7 range, depending on base case assumptions regarding the CPP and the percentage of the social cost of carbon incorporated into the royalty rate.[196] Two additional studies (one using the IPM model) project a small amount of substitution, while another study has posited that it may be more significant.[197,198,199] The BLM will be conducting independent analysis similar to these as part of the PEIS. The BLM could also use modeling to test for economic efficiency by identifying at what level of royalty rate increase or adder the marginal benefit from avoided climate damages is greater than or equal to the marginal cost of that royalty adder.

Another consideration in the design of this option will be downstream emissions regulations. For instance, if existing downstream regulation at the point of combustion of coal is already addressing carbon

[196] A value of 0.2 would suggest that each decrease in a ton of Federal coal production would result in an increase of 0.2 tons of non-Federal coals. (Note: on average, non-Federal coals have higher Btu and CO_2 content per ton). See:
Vulcan Philanthropy. 2016. Federal Coal Leasing Reform Options: Effects on CO2 Emissions and Energy Markets. Fairfax, Virginia: Vulcan Philanthropy/ICF International. January 2016. Available at http://www.vulcan.com/MediaLibraries/Vulcan/Documents/Federal-Coal-Lease-Model-report-Jan2016.pdf
[197] Gillingham, K, J. Bushnell, M. Fowlie, M. Greenstone, A. Krupnick, C. Kolstad, A. Morris, R. Schmalensee, and J. Stock. 2016. "Reforming the US Coal Leasing Program". *Science* 354(6316):1096-1098. Available at http://science.sciencemag.org/content/354/6316/1096
[198] Gerarden, T., W. S. Reeder, and J. Stock. 2016. Federal coal program reform, the Clean Power Plan, and the interaction of upstream and downstream climate policies. National Bureau of Economic Research Working Paper 22214. Cambridge, Massachusetts. Available at http://scholar.harvard.edu/files/stock/files/fedcoal_cpp_v9.pdf
[199] Krupnick, A., J. Darmstadter, N. Richardson, and K. McLaughlin. 2015. Putting a carbon charge on federal coal: legal and economic issues. Resources for the Future Discussion Paper 15-13. Washington, DC. Available at http://www.rff.org/research/publications/putting-carbon-charge-federal-coal-legal-and-economic-issues

externalities (partially or fully) through Federal or State regulatory initiatives, or if there is carbon capture and sequestration at the point of combustion, then those impacts could be netted out against any assumed social cost of carbon before converting into an adder as suggested by commenters. One such final downstream regulation is the CPP, which regulates CO_2 from existing power plants and, in effect, causes the internalization of a portion of the social cost of carbon. Because this downstream regulation partially captures the social cost of carbon, optimal upstream policies reflecting the social cost of carbon could be less than 100 percent of the full social cost of carbon to account for the CPP's effects.

With these substitution effects and downstream regulations in mind, some commenters have suggested only incorporating a percentage of the social cost of carbon into any royalty adjustments.[200,201] However, the percentages used in these studies was illustrative and would require further refinement by the BLM. For example, research by Kenneth Gillingham and James Stock found that a carbon adder accounting for 20 percent of the social cost of carbon would amount to between $15 and $20 per ton for Powder River Basin coal.[202] Relative to current coal prices and the current surface mining royalty of 12.5 percent, this would equate to a royalty rate of roughly 160 percent to 210 percent.

The BLM may also consider as part of the PEIS opportunities for directing increased revenue streams to address climate adaptation and preparedness practices (e.g., develop and implement comprehensive climate adaptation plans, update stormwater infrastructure, and wildfire programs). Opportunities to direct revenue streams may require recommendations to Congress for statutory amendments.

2. **Compensatory Mitigation:** The BLM will consider adopting requirements for the use of compensatory mitigation to offset the greenhouse gas emissions and climate change impacts associated Federal coal production and use. According to the Department of the Interior's Departmental Manual chapter on implementing mitigation, compensatory mitigation is defined as means to compensate for remaining unavoidable impacts after all appropriate and practicable avoidance and minimization measures have been applied, by replacing or

[200] Vulcan Philanthropy. 2016. Federal Coal Leasing Reform Options: Effects on CO2 Emissions and Energy Markets. Fairfax, Virginia: Vulcan Philanthropy/ICF International. January 2016. Available at http://www.vulcan.com/MediaLibraries/Vulcan/Documents/Federal-Coal-Lease-Model-report-Jan2016.pdf
[201] Gerarden, T., W. S. Reeder, and J. Stock. 2016. Federal coal program reform, the Clean Power Plan, and the interaction of upstream and downstream climate policies. National Bureau of Economic Research Working Paper 22214. Cambridge, Massachusetts. Available at http://scholar.harvard.edu/files/stock/files/fedcoal_cpp_v9.pd
[202] Gillingham, K. and J.Stock. 2016. Federal Minerals Leasing Reform and Climate Policy. Hamilton Project Policy Proposal 2016-07. December 8, 2016. Available at https://www.brookings.edu/wp-content/uploads/2016/12/es_20161208_federal_minerals_leasing_reform_and_climate_policy_pp.pdf

providing substitute resources or environments through the restoration, establishment, enhancement, or preservation of resources and their values, services, and functions. Impacts are authorized pursuant to a regulatory or resource management program that issues permits and licenses, or otherwise approves activities.[203]

Under this option, the BLM could receive compensation for unavoidable impacts associated with carbon-based externalities from lessees in the form of a fee paid at lease issuance based on the units of coal produced. Once the fee is paid, the BLM could assume responsibility for ensuring that the desired outcomes of compensatory mitigation are achieved. This approach has been used by the BLM in solar development and is proposed to be used in oil and gas development in the Northeastern National Petroleum Reserve in Alaska. Through the PEIS, the BLM will look at ways to calculate mitigation fees for unavoidable carbon-related impacts and ways to invest the fees collected. Alternately, under this option, the BLM could approve transactions proposed by lessees that would achieve the desired outcome of compensatory mitigation, but for which projects were carried out by private businesses, non-profits, or state or local agencies. This approach has been used under the Endangered Species Act and Clean Water Act as an efficient way to provide appropriate and measurable benefits to a resource that has been negatively affected through a proposed action.

Suggestions made through scoping comments on ways to spend compensatory mitigation funds include carbon offsets, carbon sequestration, climate adaption, and community resilience. As with option #1, Royalty Rate Accounting for Externalities, a compensatory mitigation fee would generate revenue. Careful consideration will be given to which carbon-related externalities should be mitigated for: upstream, or upstream and downstream. Another consideration in the design of this option will be existing regulations for downstream emissions. Like a royalty rate increase or royalty adder, compensatory mitigation may result in substitution from Federal to non-Federal coal and/or other energy sources. This substitution effect would need to be incorporated into BLM's analysis. In comparison to a royalty rate increase or carbon adder, this approach may offer the BLM the ability to direct how mitigation dollars are spent.

3. **Carbon Budget:** The BLM will consider establishing a carbon budget to guide Federal coal leasing in an effort to limit the amount of greenhouse gas emissions associated with Federal coal production. Under this quantity based option, the BLM would offer leases in

[203] Department of the Interior. 2015. Departmental Manual Part 600 Public Land Policy, Chapter 6 Implementing Mitigation at the Landscape-scale, Section 6.4.C. October 2015. Available at https://www.doi.gov/sites/doi.gov/files/uploads/TRS%20and%20Chapter%20FINAL.pdf

accordance with an established carbon budget. A carbon budget would reflect the estimated annual volumes of CO_2 from Federal coal that align with US climate goals (see **Section 5.4.6**) and give consideration to the role of Federal coal in the emissions profile. Under this option, the BLM would identify the amount of Federal coal production and desired additional leasing over a specified time period that would be consistent with current national greenhouse gas emission reduction goals. Like a royalty rate increase or royalty adder, the carbon budget approach may result in substitution from Federal to non-Federal coal and/or other energy sources, so reducing federal leasing by a given amount may not lead to a commensurate reduction in greenhouse gas emissions. This substitution effect would need to be incorporated into BLM's analysis. In comparison to a royalty rate increase or royalty adder approach to addressing carbon-based externalities, a carbon budget approach would not link the climate cost of coal to consumption or provide cost certainty to industry.

In November 2016, the White House released its Mid-Century Strategy for Deep Decarbonization, which lays out the long-term pathways to achieve reductions in net economy-wide emissions of 80 percent below 2005 levels by 2050.[204] This is consistent with the global ambition necessary to avoid most costly climate impacts and risks by meeting the long-term Paris Agreement aim of limiting the increase in the global average temperature to well below 2 degrees Celsius. Other studies have estimated that the US will have to reduce emissions an average of 83 percent below 2005 levels by 2050 (to do its part in limiting the concentration of greenhouse gases in the atmosphere to around 450 parts per million of CO_2).[205]

Studies acknowledge there are multiple potential pathways to a 2 degree compliance scenario, and there is not a single coal production level specific to these broader climate goals at a given point in time. The BLM may consider a carbon budget that is commensurate with Federal coal's appropriate contribution to meeting economy-wide greenhouse gas emission reduction targets. The BLM may also consider phasing in a budget over time to reduce the economic impact to coal producing regions. Furthermore, the BLM could analyze alternative carbon budgets that strive to align with other metrics such as EIA's projected demand for coal in its reference case scenario, or the anticipated amount of coal demand when social cost of methane and/or social cost of carbon dioxide are internalized into its price. Establishment of any carbon budget would have to consider the amount

[204] The White House. 2016. US Mid-Century Strategy for Deep Decarbonization. November 2016. p.26. Available at https://www.whitehouse.gov/sites/default/files/docs/mid_century_strategy_report-final.pdf

[205] See International Energy Agency. 2015. Energy and Climate Change. p.151. Available at publication/WEO2015SpecialReportonEnergyandClimateChange.pdf

of coal already available under lease, production capacity, demand, and substitution effects.

Leasing per a carbon budget implies the need for a strategic leasing plan that guides how coal resources will be allocated overtime in a given region or nationally (see Improve Resource Protection & Management #2). It also would likely have to be coupled with a modified bidding system in order to allocate the coal per the budget as discussed under Improve Return #6.

4. **Methane Emissions:** The BLM will consider opportunities to address methane emissions associated with coal mining operations through the PEIS. This includes creating incentives for operators to capture waste mine methane (e.g., for free on-lease use, or capture, storage and sale to the market). The BLM initiated rulemaking through an Advanced Notice of Proposed Rulemaking for waste mine methane use or capture in April 2014 that considers the capture of waste mine methane, for use or sale, that would otherwise be vented.[206] This proposed rulemaking asked for comments and suggestions that might assist the agency in the establishment of a program to capture, use, or destroy waste mine methane that is released into the mine environment and the atmosphere as a direct result of underground coal mining operations. As suggested in scoping comments, the BLM will consider incorporating some of these concepts into the PEIS.

5. **No New Leasing:** The BLM will fully analyze a no new leasing alternative as part of the PEIS as a means to reduce greenhouse gas emissions. Under this alternative, the BLM would issue no future leases for Federal coal with the exception of lease modifications within the defined acreage limitations; existing coal already under lease would not be impacted. Commenters have raised differing opinions on the BLM's legal authority with respect to ceasing all leasing of Federal coal. As part of the PEIS, the BLM will examine its statutory authority regarding implementing a no new leasing alternative and will consider alternative ways this option may be accomplished.

   This alternative will require modeling and analysis of substitution, or "leakage," effects to determine net impacts on greenhouse gas emissions and climate change. For example, in the study entitled "How Would Phasing Out US Federal Leases for Fossil Fuel Extraction Affect CO_2 Emission and 2 Degree Celsius Goals?" the authors concluded that if the Federal government stopped all new leasing and did not renew non-producing leases, 3.1 QBtu of Federal coal would not be extracted that

[206] BLM. 2014. Waste Mine Methane Capture, Use, Sale, or Destruction. Proposed Rule. *Federal Register* 79 (82): 23923. April 29, 2014. Available at https://www.gpo.gov/fdsys/pkg/FR-2014-04-29/pdf/2014-09688.pdf

otherwise would be between now and 2030.[207] In terms of greenhouse gas emission reductions, assuming CPP implementation, the authors found that leasing restrictions would reduce CO_2 emissions in 2030 from coal by about 107 million metric tons of CO_2, but increased use of gas would increase emissions by about 36 million metric tons of CO_2, resulting in a net reduction of 71 million metric tons of CO_2. Supporting modeling showed that approximately 60 percent of the decreased Federal coal production would be made up by increased production in the Illinois Basin and (to a lesser extent) Appalachia. The resulting increased coal prices also led to some substitution by gas in domestic power systems, which also reduced emissions.

The BLM could consider including a conditional no new leasing option in which the BLM would issue new and renewed leases conditioned only upon a demonstration that the United States is on track to meet its economy-wide carbon reduction goals. If current emissions and projected emission levels did not suggest that the United States was on track to meet its emissions reduction goals, such as, for example, an 80 percent reduction from 2005 levels by 2050, then the BLM could withhold all new and renewed Federal leases on coal. If the United States were meeting or exceeding the economy-wide percent reduction goals for 2050, then new and renewed coal leasing could continue with no need for any climate-based royalties or budgets discussed in other options.

Improve Resource Protection and Management

The BLM will consider options aimed at improving resource protection and management, beyond the climate considerations described previously. These options will be analyzed to determine effectiveness at avoiding, minimizing, and/or mitigating impacts on resources of concern. This includes impacts on natural resources and communities as well as impacts related to public health.

1. **Unsuitability Criteria:** In accordance with the BLM's coal leasing regulations (43 CFR, Subparts 3420.1-4[a]), coal cannot be leased until it has been evaluated in a comprehensive land use plan or land use analysis. As part of the planning process for coal resources, the BLM must identify areas acceptable for further consideration for leasing using four screening procedures (see **Section 5.8.1** for more information). Commenters expressed concern that the BLM does not consistently apply these screens at the land use plan level however. As part of the PEIS, the BLM will identify mechanisms to improve the application of these screens, which include the 20 defined unsuitability criteria, in

[207] Erickson, P. and M. Lazarus. 2016. How would phasing out US federal leases for fossil fuel extraction affect CO2 emissions and 2°C goals? The Stockholm Environmental Institute. 2016 Working Paper. Available at https://www.sei-international.org/mediamanager/documents/Publications/Climate/SEI-WP-2016-02-US-fossilfuel-leases.pdf

Resource Management Plans (43 CFR, Part 3461), such as requiring documentation and updating plans where this analysis is lacking.

As part of the PEIS, the BLM will also evaluate and modify as necessary the existing 20 criteria listed in the regulations that define areas as unsuitable for surface mining (43 CFR, Subpart 3461.5). For example, The Wilderness Society in their scoping comment letter suggested that the current unsuitability criteria be revised or expanded to include bat roosts and colonies, and important greater sage-grouse habitats, including priority habitat management areas (PHMA) and sagebrush focal areas (SFA).[208] In their scoping comment letter, the Center for Biological Diversity provided specific suggested modification to individual criteria, such as increasing the buffer distance for public building or homes to 500 feet in Criterion 3 and including inventoried roadless areas in Criterion 4.[209] The BLM will consider these suggestions as well as others as part of this option. Each of the unsuitability criteria contains specific information about exceptions or exemptions. As part of the PEIS, the BLM will also evaluate and modify as necessary the application of exceptions and exemptions to ensure adequate resource protection and consistency in application (43 CFR, Part 3461).

2. **Strategic Coal Leasing Plans:** The BLM will consider the development of strategic coal leasing plans as a means to guide Federal coal leasing for a given region or nationally. These plans would likely be step-downs to (or tiered to) an existing Resource Management Plan. However, the opportunity exists to include many of the same decisions and considerations in a Resource Management Plan. These strategic plans would be developed by the BLM on a reoccurring time frame. Many commenters have suggested a 5-year planning horizon for such plans, consistent with the Secretary's leasing program for offshore oil and gas. Commenters have also advocated for a regional approach to strategic planning in order to recognize the significant differences in geology, coal rank and quality, mining conditions, and socioeconomic conditions across various coal regions (see **Sections 5.4.2** and **5.7.1** for more information). As envisioned, these strategic plans could serve a variety of purposes that meet a number of policy objectives. Specific to the policy objective of improving resource protection and management, these plans could address resource management concerns at a landscape scale and potentially incorporate mitigation planning. These plans could recommend how much coal should be leased, in what

[208] The Wilderness Society. 2016. Scoping comment letter on the Coal PEIS. July 28, 2016. See Volume 2, Appendix D.
[209] Center for Biological Diversity. 2016. Scoping comment letter on the Coal PEIS. July 28, 2016. See Volume 2, Appendix D.

locations, and on what timeline to facilitate management of the Federal coal program under a carbon budget (Reduce/Account for Greenhouse Gas Emissions #3) and accommodate modified bidding procedures (Fair Return #6). These plans could also help streamline future leasing actions and provide a mechanism for future decisions to "tier" to or incorporate by reference (see Increase Lease Process Efficiency #1).

3. **Accounting for Additional Externalities:** The BLM will evaluate the impacts of increasing the royalty rate or including an adder for Federal coal to account for the environmental and social costs of coal production and use beyond carbon-based externalities. These externalities may include, but are not limited to, public health, safety, air quality, water quality, and wildlife impacts. Similar to Option #1, Royalty Rate Accounting for Externalities, an important consideration in the design of this option is what externalities at what point in the coal lifecycle to account for (i.e., upstream, or upstream and downstream). Coordination will be needed with many other agencies to avoid duplicate accounting for these externalities and to establish dollar values for impacts that are not easily quantified.

   Inclusion of all of these values is likely to increase the cost of Federal coal substantially. For example, the study entitled "Full Accounting of the Life Cycle of Coal," published by the New York Academy of Sciences, provided an estimate for all lifecycle externalities (upstream and downstream) related to Federal and non-Federal coal, including carbon-related externalities that ranged from $175 to $523 billion in 2008 dollars.[210] The authors point out that their review was limited by the omission of many environmental, community, mental health, and economic impacts that are not easily quantifiable or monetized. The BLM will develop a similar calculation for both upstream and downstream externalities specific to Federal coal production and use.

   As with other options, the BLM will use modeling and analysis to determine the impact of coal price increases on Federal coal production. With increased costs, there is also the potential for switching to non-Federal coal or other energy sources, which could have a net effect on impacts and externalities associated with energy generation. Modeling and analysis will be needed to determine the projected level of substitution associated with various price increases on Federal coal. With these factors in mind, the BLM may consider applying only a percentage of the externality costs as a component of this option.

4. **Applicant Qualifications:** The BLM will consider strengthening the self-certification requirements for companies bidding on leases (43 CFR,

[210] Epstein, P. R. et al. 2011. "Full cost accounting for the life cycle of coal". *Ann. N.Y. Acad. Sci.* 1219(2011):73-98. Available at http://www.chgeharvard.org/sites/default/files/epstein_full%20cost%20of%20coal.pdf

Subparts 3472.1-2[e][2]). As suggested in comments, requirements to be evaluated should include prohibiting leasing to self-bonded companies, ensuring sufficient financial resources, ensuring companies have not been cited for major violations of environmental regulations in connection with other operations, and verifying companies have been fulfilling reclamation obligations in connection with other operations. This option would require substantial coordination between the BLM, OSMRE, and the states to obtain this information on companies before they bid on leases.

5. **Environmental Protections:** The BLM will consider improving mechanisms that apply environmental protections in the form of stipulations (e.g., to reduce groundwater depletions, conduct breeding bird surveys, establish a monitoring program to assess mining impacts, and address any adverse impacts on surface resources from subsidence as a result of underground mining) to existing leases. The BLM currently has the authority to modify the terms and conditions of a lease at lease readjustment. This occurs upon the expiration of the initial 20-year lease period and any 10-year period thereafter (30 USC, Subsection 207[a]; 43 CFR, Subpart 3451.1[a][1]). The BLM also has the authority to apply additional stipulations to existing leases if the leases are modified and additional acreage is added (43 CFR, Subpart 3432.3).

6. **Regional Mitigation Strategies:** Commenters suggested that the BLM develop regional mitigation strategies for existing and new coal development to address environmental and public health impacts. Regional mitigation strategies identify and facilitate mitigation opportunities at the regional scale, allowing for pre-planning for mitigation opportunities. Guidance on preparing regional mitigation strategies is included in BLM Manual Section 1794.[211] Where the BLM anticipates large-scale development, regional mitigation strategies can be an effective tool to increase permitting efficiency and financial predictability for applicants by studying potential mitigation needs and opportunities on both BLM and non-BLM-administered lands, which can help to inform subsequent permits and authorizations. Regional mitigation strategies can also enhance the ability of Federal and state governments, tribes, nongovernmental organizations, and resource users to invest in larger-scale mitigation efforts through prioritization of investments and pooling of financial resources. The BLM will consider its existing authority with respect to environmental and public health impacts and determine if the concept of regional mitigation strategies could be applied to the Federal coal program to further the goal of improving resource protection and management. This option will

[211] BLM 2013. BLM Manual Section 1794. Available at https://www.blm.gov/sites/blm.gov/files/uploads/BLM_MS-1794%20Mitigation%20FINAL.docx

require close coordination with the OSMRE to identify appropriate mitigation actions.

7. **Best Management Practices:** The BLM will consider the use of best management practices to meet resource protection goals for the Federal coal program. Best management practices are state-of-the-art mitigation measures to be applied on a site-specific basis to reduce, prevent, or avoid adverse environmental or social impacts. The BLM often applies best management practices in the context of oil and gas development and will evaluate the use of best management practices to meet resource protection goals in the coal leasing and management context. These best management practices may be incorporated as stipulations in individual new leases as appropriate. Best management practices would serve a similar purpose as design features, which were suggested by some commenters as an option to protect resources.

Increase Lease Process Efficiency

The BLM will consider options that are intended to improve the lease process itself. A number of commenters expressed concern over the time it takes to obtain a Federal coal lease and what they perceive as redundancies in the process. These options will be analyzed to determine the degree to which the BLM can increase the efficiency of the lease process while maintaining the integrity and intent.

1. **Strategic Coal Leasing Plans:** As discussed under the policy objective Improve Resource Protection and Management, the BLM will consider the development of strategic coal leasing plans as a means to guide Federal coal leasing for a given region or nationally. These plans would likely be step-downs to (or tiered to) an existing Resource Management Plan. However, the opportunity exists to include many of the same decisions and considerations in a Resource Management Plan. These strategic plans would be developed by the BLM on a reoccurring time frame. Many commenters have suggested a 5-year planning horizon for such plans, consistent with the Secretary's leasing program for offshore oil and gas. Commenters have also advocated for a regional approach to strategic planning in order to recognize the significant differences in geology, coal rank and quality, mining conditions, and socioeconomic conditions across various coal regions (see **Sections 5.4.2** and **5.7.1** for more information). As envisioned, these strategic plans could serve a variety of purposes that meet a number of policy objectives. Specific to the policy objective of increasing lease process efficiency, these plans could be designed to help streamline future leasing actions, providing a mechanism for future decisions to "tier" to or incorporate by reference addressing regional issues that tend to be cumulative in nature, such as air quality and climate change. In addition, these plans could address resource management concerns at a

landscape scale and potentially incorporate mitigation planning (see Improve Resource Protection and Management #2). These plans could recommend how much coal should be leased, in what locations, and on what timeline to facilitate management of the Federal coal program under a carbon budget (Reduce/Account for Greenhouse Gas Emissions #3) and accommodate modified bidding procedures (Fair Return #6).

2. **Pre-Application Process:** The BLM will consider creating a pre-application process in which lease applicants would be required to complete some work prior to the BLM accepting an application (e.g., Qualified Surface Owner consent/identification). This would be intended to help reduce time delays that take place after an application is received.

3. **Standardized Lease Application Form:** The BLM will consider establishing a standardized lease application form to include minimum requirements found in 43 CFR, Subparts 3425.1-7 and other requirements, as determined appropriate. The BLM will also consider developing an electronic platform for the submission of applications. This could improve the consistency and efficiency of the application process.

4. **Single Fair Market Value Team:** The BLM will consider establishing a single team nationwide that conducts the FMV calculations for all offices. This is expected to bring a higher level of consistency and efficiency to the process. This work is currently carried out by a mix of field and state office personnel. This team would prepare the geologic, engineering, economic, and valuation reports to support the estimate of FMV associated with a coal tract proposed for leasing.

   Chapter 2 of the BLM's Coal Evaluation Handbook, H-3073-1 describes evaluation team members and their roles in the estimate of FMV. Secretarial Order 3300 established that the Department of the Interior, OVS has the sole responsibility for all real estate valuation functions of the BLM. Based on recent GAO/OIG recommendations, the BLM and OVS revised the Coal Evaluation Handbook (H-3073-1) to establish the procedures under which OVS reviews the BLM's FMV estimates to assure compliance with all applicable guidance and professional standards.

5. **Eliminating Redundant Processes:** The BLM will work with other agencies to evaluate means for eliminating identified overlapping requirements and redundant processes associated with the Federal coal leasing and permitting process. There are existing interagency memorandums of understanding that outline the roles and responsibilities of the various agencies involved in Federal coal activities. The OSMRE is the Federal agency with the primary responsibility to

administer programs that regulate surface coal mining and reclamation operations in accordance with SMCRA and with oversight over state RAs. The state RAs in primacy states have primary responsibility to administer and regulate surface coal mining operations within their jurisdiction subject to the OSMRE's oversight. The OSMRE also is responsible for providing the Mineral Leasing Act mining plan recommendations to the Assistant Secretary of the Interior, Land and Minerals Management. The Forest Service also has jurisdictional responsibilities (i.e., they must provide consent or concurrence to the BLM) when coal is proposed for leasing or exploration on National Forest System lands. Both Federal agencies, as well as state and tribal RAs, may participate as cooperating agencies on the BLM's NEPA analysis for a given coal lease and use that analysis (e.g., through tiering or incorporation by reference) to prepare a decision for actions under their jurisdiction.

6. **Improve Transparency:** The BLM will continue to seek opportunities to improve transparency associated with the Federal coal leasing process. This work has already been initiated through the development of an Instruction Memorandum expected to be finalized in early calendar year 2017. In accordance with that Instruction Memorandum, state offices are directed to maintain on their publicly accessible websites information regarding:

    a. Lease and lease modification applications covered by one of the exceptions to the Pause

    b. Coal leasing information including the number of coal leases that are currently in effect; the total acreage under lease; the number of sales held in each fiscal year, including both successful and unsuccessful lease sales; and noncompetitive lease modifications

    c. Exploration licenses and licensing applications

    d. Previously granted and pending royalty rate reduction applications.

These policies may be further modified through the PEIS and formalized as part of the proposed program reform. These options may be implemented without rulemaking.

6.2.2 Development of Alternatives

The BLM will conduct an evaluation of the options in **Table 6-1**. Once the benefits, impacts, and overall feasibility of the various options are understood, the BLM will be better equipped to blend the options into reform alternatives for the Federal coal program and consider their combined impacts. Program alternatives will be analyzed in a comparative way in the Draft PEIS to determine

their overall impact on the energy markets, energy prices, socioeconomics, and the environment as described in more detail in **Section 6.4**.

The BLM believes that there are a number of the options that represent more modest reforms that could be combined with almost any combined option package or future alternative, or implemented as standalone actions. These options represent beneficial program modernization activities and good government practices.

For fair return, these include FMV determination process changes aimed at transparency and consistency, limiting the use of royalty rate reductions and improving the transparency associated with the use of royalty rate reductions, rental rate adjustments to reflect inflation, minimum bonus bid adjustments to reflect inflation, and evaluation of current performance bonding amounts. For greenhouse gas emissions, this includes creating incentives for methane capture.

For resource protection and management, this includes strengthening requirements for companies bidding on leases, all of which would require coordination with the OSMRE. The requirements include prohibiting leasing to self-bonded companies, ensuring sufficient financial resources, ensuring companies have not been cited for major violations of environmental regulations in connection with other operations, and verifying companies have been fulfilling reclamation obligations in connection with other operations. It also includes developing best management practices for resource protection and improving planning to avoid land use conflicts, such as through the modification and improved application of unsuitability criteria or through the development of strategic coal leasing plans. For lease process efficiency, these include standardizing lease application forms, developing an electronic platform for the submission of applications, working with other agencies to evaluate means for eliminating redundant processes, and improving transparency.

At the Secretary's direction in connection with Order 3338, the BLM is in the process of developing guidance to implement several of these improvements. Additional reforms may be implemented prior to completion of the Final PEIS if further analysis supports taking action on a more expedited timeframe.

To demonstrate how the various options could be combined to develop alternatives in the PEIS, the BLM sets out three possible option combination packages. Because each option presents its own range of analytic issues and because that complexity may be compounded by interactions among the reform options if they are implemented in combination, additional analysis is needed before these or other combinations of options can be included as alternatives for consideration in the PEIS. The Draft PEIS also will analyze a "no action" and a "no leasing" alternative.

Possible Option Combination Package #1

1. Fair Return

   Increase the royalty rate to reflect the fair return for coal produced on Federal land. The BLM would identify the most appropriate metric and corresponding royalty rate for Federal coal, reflecting on analysis already conducted by other groups such as the CEA. The BLM would also assess the net impact on revenues from such changes, including any potential reduction in bonus bids and production.

2. Climate Change/Resource Protection

   Require compensatory mitigation for Federal coal leases. The BLM would require lessees to carry out or fund activities that proportionally offset climate-related impacts, including through investment in a fund managed by an entity that takes on the liability to proportionally offset those greenhouse gas emissions and climate-related impacts. Contribution to the fund would be tied to the unit of coal produced. Funds could be used for activities including, but not limited to, carbon offsets, carbon sequestration, climate adaptation, and community resilience.

3. Leasing Process

   a. *Develop strategic leasing plans and utilize modified inter-tract bidding on a $/ton or $/Btu basis*. Strategic leasing plans would be developed based on regular reviews of projected domestic coal demand (e.g., over a 5-year window) and the role of Federal coal resources in meeting domestic energy needs. These plans would set lease sales on a regular schedule to accommodate a modified inter-tract bidding system. The BLM would determine a maximum tonnage of coal or maximum number of Btus to be leased consistent with projected demands. Under a modified inter-tract leasing process, all interested companies would bid among themselves for the right to produce a specified quantity of coal in the location of their choice, assuming it is suitable for mining and consistent with the approved land use plan and strategic leasing plan. To the extent that auctions become more competitive through the use of modified inter-tract bidding, resulting in increased bonus bids, the need for a higher royalty rate could be revisited on a periodic basis.

   b. *Develop regional mitigation strategies.* Regional mitigation strategies would be developed by the BLM to identify and facilitate compensatory mitigation opportunities at the regional scale, allowing for pre-planning for, and advanced investment in, mitigation opportunities.

4. Community Assistance

a. *Explore use of compensatory mitigation funds to invest in affected communities experiencing reduced coal production.* The BLM would seek to use compensatory mitigation funds to invest in economic diversification and workforce development efforts.

b. *Direct a portion of Federal coal revenues to community assistance.* The BLM would seek to secure Congressional authorization to direct a portion of increased Federal coal revenues toward investments in impacted communities that support economic diversification, job training, mine reclamation, and other community priorities.

Possible Option Combination Package #2

1. Fair Return

   Increase the royalty rate to reflect the fair return for coal produced on Federal land. The BLM would identify the most appropriate metric and corresponding royalty rate for Federal coal reflecting on analysis already conducted by other groups. Because a carbon-based royalty adder, as described under 2, could be instituted in combination with or independent of a potential royalty rate increase based on fair return principles, the BLM will analyze the effects of such changes both individually and cumulatively.

2. Climate Change/Resource Protection

   Apply a royalty adder to royalty rates to account for carbon-based environmental and societal costs of coal production and use ($/ton of coal). A royalty adder would tie climate costs directly to production/consumption. As a price mechanism, a royalty adder would provide price certainty to mining operators and downstream purchasers. A royalty adder would apply only to new and renewed leases and, therefore, would be necessarily phased in over time. The BLM would conduct analysis to identify the most appropriate royalty adder taking into account downstream regulations and substitution effects, and reflecting on analysis already completed by other groups. The BLM would also assess the net impact on revenues from such changes, including any potential reduction in bonus bids and production.

3. Leasing Process

   Develop strategic leasing plans and utilize modified inter-tract bidding on a $/ton or $/Btu basis. Strategic leasing plans would be developed based on regular reviews of projected Federal coal demand (e.g., over a 5-year window) and could serve a variety of purposes that meet a number of policy objectives, including addressing resource management concerns at a landscape level and helping to streamline future leasing actions. These plans would set lease sales on a regular

schedule to accommodate a modified inter-tract bidding system. The BLM would determine a maximum tonnage of coal or maximum number of Btus to be leased consistent with projected demands. Under a modified inter-tract leasing process, all interested companies would bid among themselves for the right to produce a specified quantity of coal in the location of their choice, assuming it is suitable for mining and consistent with the approved land use plan and strategic leasing plan. To the extent that auctions become more competitive through the use of modified inter-tract bidding, resulting in increased bonus bids, the need for a higher royalty rate could be revisited on a periodic basis.

4. Community Assistance

   a. *Direct a portion of Federal coal revenues to community assistance.* The BLM would seek to secure Congressional authorization to direct a portion of increased Federal coal revenues toward investments in impacted communities that support economic diversification, job training, mine reclamation, and other community priorities.

   b. *The states' portion of increased revenues would be available to invest in impacted communities experiencing reduced coal production.* The additional revenues generated by a royalty rate adder would be split with states consistent with current law and could be used by states to support economic diversification efforts in communities and related activities.

Possible Option Combination Package #3

1. Fair Return

   Increase the royalty rate to reflect the fair return for coal produced on Federal land. The BLM would identify the most appropriate metric and corresponding royalty rate for Federal coal, reflecting on analysis already conducted by other groups. The BLM would also assess the net impact on revenues from such changes, including any potential reduction in bonus bids and production.

2. Climate Change/Resource Protection

   a. *Periodically evaluate and ensure that coal production and associated life-cycle emissions are consistent with the need to reduce net domestic greenhouse gas emissions 80 percent below 2005 levels by 2050.* This tracks to a straight-line reduction from the US 2025 Intended Nationally Determined Contribution (INDC),[212] and it is also consistent with the long-term pathway set forth in the US Mid-

[212] Actions described by the UNFCCC in December 2015 to achieve the long-term goals of the Paris Agreement: to hold the increase in global average temperature to well below 2°C, to pursue efforts to limit the increase to 1.5°C, and to achieve net zero emissions in the second half of this century.

Century Strategy for Deep Decarbonization.[213] *The BLM would limit the amount of Federal coal leased at a given time based on a carbon budget.* The Federal coal leasing levels would be premised on a carbon budget that is commensurate with Federal coal's appropriate contribution to meeting economy-wide greenhouse gas emission reduction targets. In other words, the total amount of coal offered and made accessible under Federal leases would contain lifecycle CO_2 emission levels that are less than or equal to the anticipated emissions from Federal coal under an INDC strategy.[214] The BLM would also need to evaluate the effectiveness of applying INDC-based limits to Federal coal leasing if and when no similar limitations are applied to substitute non-Federal energy sources to address concerns over emissions shifting to non-Federal coal sources. This potential shifting to non-Federal coal sources could reduce the environmental benefit of such limits (i.e., due to emissions leakage).

b. *Develop strategic leasing plans.* Strategic leasing plans would incorporate the carbon budget and set lease sales on a regular schedule to accommodate a modified bidding system (see 3a below). These strategic plans could help meet a variety of policy objectives, including addressing resource management concerns at a landscape level and helping to streamline future leasing actions.

3. Leasing Process

Use modified inter-tract bidding on a $/ton or $/Btu basis. The BLM would determine a maximum tonnage of coal or carbon or maximum number of Btus to be leased consistent with the defined carbon budget. Under a modified inter-tract leasing process, all interested companies would bid among themselves for the right to produce a specified quantity of coal in the location of their choice, assuming it is suitable for mining and consistent with the approved land use plan and strategic leasing plan. To the extent that auctions become more competitive through the use of modified inter-tract bidding, resulting in increased bonus bids, the need for a higher royalty rate could be revisited on a periodic basis.

4. Community Assistance

Direct a portion of Federal coal revenues to investments in communities experiencing economic impacts from reduced coal production. The BLM would seek to secure Congressional authorization to direct a

[213] The White House. 2016. US Mid-Century Strategy for Deep Decarbonization. November 2016. Available at https://www.whitehouse.gov/sites/default/files/docs/mid_century_strategy_report-final.pdf

[214] One way to implement this approach would be for the BLM to use an economy-wide model to estimate least cost compliance strategies for meeting INDCs. The BLM could use the model output to derive anticipated Federal coal consumption levels over a 20-year period, and then use that level, in conjunction with reserves already under lease, as a limit on the amount of reserves that are leased.

portion of increased Federal coal revenues toward investments in communities that support economic diversification, job training, mine reclamation, and other community priorities.

No Action Alternative

Under the no action alternative, the Federal coal program would continue to be administered in the manner in which it is administered currently. Leasing would be conducted through LBA. The current means of determining FMV, royalty rate reductions, minimum bonus bids, and rental rates would remain unchanged. The no action alternative would not address concerns raised by numerous parties about the Federal coal program, including concerns raised by the GAO, the OIG, members of Congress, interested stakeholders, and the public.

No Leasing Alternative

Under a no leasing alternative, the BLM would issue no new leases for Federal coal except for lease modifications within the defined acreage limitations (960 acres or less[215]). Existing coal already under lease would not be impacted. Administration of existing leases would remain unchanged, including existing royalty rates and rental rates. The BLM may also consider combining the no new leasing alternative with other reform options aimed at modernizing the administration of existing leases as part of separate reform packages or alternatives.

6.2.3 Options Not Carried Forward for Further Analysis

The following section includes a summary of additional reform options suggested through the scoping process that the BLM is proposing not to carry forward for analysis in the PEIS. A rationale has been provided as appropriate. Many of these options are already undertaken by the BLM, are under the authority of another agency, or would not meet the policy objectives outlined in BLM's Need for Federal Action in **Section 6.1.1**.

Fair Return

Comments were submitted suggesting that the FMV calculation for Federal coal should be redefined to account for environmental and social costs of coal production and use. While the BLM agrees that consideration should be given to such costs, the agency does not believe the FMV is the appropriate place for this to be applied. FMV is defined at 43 CFR, Subparts 3400.0-5(n) as the "amount in cash, or on terms reasonably equivalent to cash, for which in all probability the coal deposit would be sold or leased by a knowledgeable owner willing but not obligated to sell or lease to a knowledgeable purchaser who desires but is not obligated to buy or lease." The Coal Evaluation Handbook (H-3073-1) describes FMV as a determination made by reference to a competitive market rather than to personal or inherent value of the property. Therefore, the BLM believes accounting for the social and environmental costs of coal to be

[215]As defined in the Energy Policy Act of 2005 Section 432

produced in the future would be too remote or speculative to include in the FMV calculation. Alternatively, the BLM is proposing to consider the environmental and social costs of coal production and use as part of an increased royalty rate or adder (see Reduce/Account for Greenhouse Gas Emissions #1 and Improve Resource Protection and Management #3).

Other comments made with respect to the FMV calculation asked the BLM to consider non-Federal coal, exports, and extraction costs in their calculation methods. The BLM's calculation of FMV already takes these factors into consideration. Chapter 3 of H-3073-1 discusses both export coal market data and lease-specific comparable sales data requirements, including information about private coal property market transactions.

A number of commenters suggested that the BLM should subject the FMV calculation to public hearing(s) ahead of the competitive leasing process. The BLM's FMV process currently includes the opportunity for public input as part of the information gathering process that goes into the FMV calculation (see **Section 5.8.2**). Because the Mineral Leasing Act requires competitive leasing, the BLM believes that opening up the FMV estimate to the public would undermine the bidding process, especially on those tracts where only one bid is received.

Some commenters requested that the BLM maintain the existing royalty rates and consider reducing the existing royalty rates as a means to increase production and, therefore, improve return. The BLM will consider no change in the existing royalty rates as part of the no action alternative. An option to reduce the royalty rate is not proposed to be carried forward for further analysis in the PEIS, however, as royalty rates are already at their statutory defined floor (43 CFR, Subparts 3473.3-2). The BLM has determined that this option would not meet the object of improving fair return to the American taxpayer.

As described in **Section 5.4.6**, Main Drivers, the demand for coal is driven by a variety of complex market and regulatory factors. A simple reduction in the current royalty rate on coal would not necessarily lead to increased demand levels that offset the revenue loss. Therefore, this may have the impact of decreasing return to the Federal taxpayer. Moreover, while more analysis is needed, most preliminary qualitative and quantitative assessments suggest increasing, not decreasing, royalty rates is the appropriate direction to evaluate to enhance FMV and revenues. This is supported by the market projections for coal (see **Section 5.5**).

A number of commenters suggested alternative ways that the value of coal production, on which royalties are assessed, should be calculated. Options included basing the value of coal production on the final sale price to a power plant or other end user or applicable market price; basing the value of coal production on the average price of nearby regional coal, the price of nationwide

coal, or the price of a substitute in the electricity dispatch order; basing the value of coal production on sales prices of coal with similar characteristics from both Federal and non-Federal lands; and directly valuing coal production using an appraisal approach rather than basing the value on individual sales transactions.

Other comments suggested capping transportation deductions, establishing cost of allowable transportation deductions based on the most efficient means of transport, or establishing the cost of allowable transportation deductions based on observable indices of coal transportation costs per rail mile, rather than self-reported cost numbers. Comments were also raised regarding the elimination of coal washing deductions, the practice of selling to affiliates at artificially low prices, and take or pay contracts. The BLM has no authority over the valuation of coal production for purposes of royalty payments; this is the ONRR's responsibility (see **Section 5.2**). The ONRR has recently completed rulemaking on Consolidated Federal Oil and Gas and Federal and Indian Coal Valuation Reform (30 CFR, Parts 1202 and 1206), which will become effective January 1, 2017.

In terms of bonus bids, commenters suggested that the BLM should base bonus bids on the amount of recoverable coal rather than the amount of coal reserves. This is already the case, as the BLM bases the pre-sale FMV on recoverable coal estimates. This will be considered as part of the no action alternative. In order to provide additional clarity, the BLM will consider revising guidance to ensure consistency among states on how to apply recoverable coal estimates.

Commenters also suggested that the BLM should abandon bonus bids for maintenance tracts, and instead employ an adjusted revenue-neutral royalty schedule for those tracts. The BLM experimented with this approach in the past and found that it did not meet the goals of obtaining fair return for the coal resource. If the coal were never produced, there would be no benefit associated with issuing a maintenance tract, whereas a bonus bid ensures a return to the public. Therefore, this suggestion would be ineffective, as it does not meet the purpose and need of the PEIS.

Commenters suggested that the BLM incorporate into coal leases the authority to adjust rental and royalty fees over time. The BLM currently has the authority to modify the terms and conditions of a lease, including rental fees and royalty rates at lease readjustment (43 CFR, Part 3451). This occurs at the end of the 20-year primary term and then every 10 years for the life of the lease (43 CFR, Part 3451). It should also be noted that royalty rates are assessed on the value of coal production, which is determined by the ONRR at the time of the first arm's-length sale (30 CFR, Part 1206).

Commenters also suggested the BLM should cancel existing leases that are not producing. While the BLM is not authorized to cancel an existing lease specifically for "not producing," it can cancel an existing lease for not meeting

the terms and conditions of the lease, which include diligent development (43 CFR, Subparts 3452.2-1). Therefore enforcing diligent development of existing leases will be considered as part of the no action alternative.

Commenters requested that the BLM modify the time frame over which bonus bid payments are made (i.e., over a longer or shorter period of time). This option would not impact the overall value of the bonus bid. The BLM has decided not to carry this option forward for further analysis, because it does not meet any of the objectives stated as part of the purpose and need of the PEIS.

Commenters also suggested that the BLM consider delaying collection of bonus bids until mining begins on the leases and allow a royalty credit for the capital costs to establish a mining operation to increase competition for bids. The BLM has decided not to carry this option forward for further analysis, because it does not meet any of the policy objectives stated as part of the purpose and need of the PEIS.

Commenters suggested that the BLM should ban companies from selling coal to subsidiaries to depress rates (i.e., captive transactions). This issue is outside of the BLM's authority, but is addressed by the ONRR in the methods by which it values coal production. The ONRR has procedures in place to ensure proper valuation of coal production sold to affiliates or subsidiaries under non-arm's-length transactions. Effective January 1, 2017, the ONRR amended their regulations governing valuation, for royalty purposes, of oil and gas produced from Federal onshore and offshore leases and coal produced from Federal and Indian leases (81 FR 43337).

Commenters asked the BLM to consider how the leasing of smaller tracts might better ensure the maximum economic recovery of coal (e.g., reduce market uncertainties and ensure a higher fair market valuation associated with shortened duration of mining operations). Other commenters suggested that the BLM only lease 10 years or less of coal reserves under a single lease. The BLM already considers the size of the tract and potential amount of reserves as part of the leasing process and has the ability to reconfigure tracts prior to lease sale. Tract reconfiguration is done to increase competition when another existing mine is nearby and to carve out areas not suitable for leasing (e.g., raptor nests and cultural sites). The BLM also may reconfigure a LBA tract to ensure that Federal coal reserves are not bypassed and the amount of reserves is reasonable based on the annual production at that mine. This will be considered as part of the no action alternative.

Commenters suggested two ways to potentially reduce costs with respect to the coal leasing process. These included waiving the BLM cost recovery imposed during the Federal coal leasing process and not charging lease applicants for the third-party NEPA associated with NEPA actions. These suggestions run counter to the objective of orderly administration of coal on Federal lands. Without

cost recovery, the BLM would have to allocate appropriated budget dollars from other priorities for processing coal lease applications. The BLM would also have to identify staff to undertake NEPA analyses for leasing actions or allocate budget dollars to hire third-party NEPA consultants to undertake this work. Given resource limitations, this would have a negative impact on the efficiency of the process, which is already the subject of criticism for the length of time it takes to complete.

Reduce/Account for Greenhouse Gas Emissions

Regarding Social Cost of Carbon, commenters recommend the inclusion of a net "social benefit" standard for coal that includes both the social cost of carbon and the positive economic benefits of coal jobs and revenue, schools, infrastructure, and reliable, low-cost electricity. While the BLM agrees that there are benefits associated with the production and use of Federal coal, many of these "benefits" are captured in the market value of coal. Additional nonmarket benefits can be assessed qualitatively. While not necessarily in the form requested by commenters, the PEIS will include consideration of both the market and nonmarket values associated with coal (see **Section 5.7**).

Some commenters suggested the BLM should not allow leasing of Federal coal if it is intended to be used for export. It should be noted that exports have historically and currently make up a very small part of Federal coal market (see **Section 5.4.6**). Opportunities for exports are limited by the availability of export terminals, transportation costs, and global coal prices. Because the BLM has very limited, if any, control over where Federal coal is ultimately consumed (i.e., coal may change hands multiple times before its final end use), this option will not be carried forward for further analysis. The BLM does however identify coal export market information during the preparation of the economic evaluation report supporting BLM's FMV estimate (Chapter 3 of H-3073-1), and will consider it in the context of evaluating strategic leasing plans that could be developed based on regular reviews of projected domestic coal demand (e.g., over a 5-year window) and the role of Federal coal resources in meeting domestic energy needs.

A number of commenters emphasized the need to require carbon capture and sequestration for coal energy generators, and to invest in carbon capture and storage technologies and clean coal technologies. The BLM does not have the authority to require any action of coal consumers or dollars to invest in new technologies. While not carried forward as an option in the PEIS, it is worth noting there are a number of Federal programs in place that target these topics. For example, the Department of Energy's Office of Fossil Energy manages a Clean Coal Research and Development program that is focused on developing and demonstrating advanced power generation and carbon capture, utilization and storage technologies for existing facilities and new fossil-fueled power plants by increasing overall system efficiencies and reducing capital costs. Their Carbon Capture, Utilization and Storage program advances safe, cost effective, capture

and permanent geologic storage and/or use of CO_2 and their Advanced Energy Systems program focuses on improving the efficiency of coal-based power systems, enabling affordable CO_2 capture, increasing plant availability, and maintaining the highest environmental standards.[216]

Some commenters stated support for investing in renewable energy programs over coal mining operations, due to the decreased environmental impact and efforts to mitigate climate change. The promotion of renewable energy programs over coal leasing is outside of the scope of the PEIS. The BLM will however consider as part of the PEIS analysis the impacts of coal program reform alternatives on the larger power sector including other energy sources such as wind and solar energy generation (see **Section 6.4**).

Improve Resource Protection and Management

Some commenters suggested that the BLM should modify regulations to require the application of unsuitability criteria only at the time an applicant submits an application for leasing (versus at the Resource Management Plan stage). The BLM believes that there are benefits to applying the unsuitability criteria at both stages in the process, and the regulations allow for consideration at both levels (43 CFR 3461.3-1). The application of unsuitability criteria at the Resource Management Plan level allows for landscape-scale land use allocation decisions to be made and areas to be identified as unsuitable for coal leasing. Once an application has been submitted for an area allocated as suitable for coal leasing, the BLM has the obligation to take a second look at the area under consideration to determine if any of the unsuitability criteria are triggered based on site-specific information.

Commenters suggested that the BLM should provide clarification around "contemporaneous" reclamation and develop rules that require diligent reclamation. Commenters also submitted comments suggesting that the BLM evaluate alternatives for funding reclamation and post-closure activities. While the BLM understands the importance of timely, successful reclamation, the BLM does not have authority over the reclamation process associated with Federal coal production. This authority is held by OSMRE (see **Section 5.2**). As appropriate, the BLM will work with OSMRE to improve reclamation planning and implementation opportunities for Federal coal.

A larger number of commenters expressed concern about the practice of self-bonding for reclamation requirements and requested amendment to the regulations at 30 CFR 800.23 and any other regulations, as appropriate, to prohibit self-bonding whenever publicly owned coal is permitted to be mined. This is particularly troublesome with the recent rash of bankruptcies among many large coal companies. While the BLM is aware of the issues associated

[216] Department of Energy, Office of Fossil Energy Clean Coal Research Program. 2016. Clean Coal Research. Available at https://energy.gov/fe/science-innovation/clean-coal-research

with self-bonding for reclamation, the BLM does not have the authority over bonding for reclamation. This authority is held by OSMRE (see **Section 5.2**) and primacy states. OSMRE recently announced its intention to initiate rulemaking on the practice of self-bonding.[217] As appropriate, the BLM will work with OSMRE to improve self-bonding regulations.

Increase Lease Process Efficiency

Commenters suggested consolidating the Federal coal leasing and permitting process into the hands of fewer agencies. SMCRA prohibits this (30 USC 1211). There are inherent differences in the duties of OSMRE and the BLM. To combine the agencies would require amending the SMCRA. Further, Department of the Interior experience has shown that it is best to keep leasing and environmental enforcement separate. For example, the Minerals Management Service, which previously managed the nation's natural gas, oil, and other mineral resources on the outer continental shelf split into the BOEM, the Bureau of Safety and Environmental Enforcement (BSEE), and the Office of Natural Resources Revenue. In lieu of consolidation, the BLM is proposing to consider options to work with other agencies to evaluate means for eliminating the overlapping requirements and redundant processes (see Increase Lease Process Efficiency #5).

Commenters suggested the BLM establish specific timelines and procedures for the various steps in the leasing process. The BLM's existing coal regulations (43 CFR Part 3400) delineate the process for issuing leases (see **Section 5.8** on Leasing Process). While the BLM agrees that improvements in efficiency may be needed (and will be considered as part of the PEIS), past experience with many other programs has proven that mandatory timelines often are not effective in improving efficiency, therefore this option is not considered further.

Other

A large number of commenters discussed the pause on significant new coal leasing decisions instituted through Secretarial Order 3338. Some commenters expressed support for the coal leasing pause, stating that it should be extended or made permanent and reasoned that a sufficient amount of coal has already been leased. Other commenters stated opposition to the coal leasing pause, stating that it should be removed because it negatively impacts the economy and violates laws. The leasing pause does not apply to existing leases and coal production activities and is intended to be in place temporarily while the PEIS is underway.

Some commenters stated concern over both the environmental impacts of leasing and the economic impacts of delays for specific coal lease applications (e.g., Alton Mine, Bull Mountain Mine, and Greens Hollow Coal tract). Consideration of specific leasing actions is outside of the scope of the PEIS. The

[217] OSMRE Decision on Petition to Initiate Rulemaking, 81 Fed. Reg. 61612 (September 7, 2016).

BLM will however consider the full portfolio of existing BLM leasing activities as part of the analysis in the PEIS.

6.3 COMMUNITY TRANSITION CONSIDERATIONS

A central theme in many of the comments raised by stakeholders is concern about the implications of current and future coal market conditions. As discussed in **Section 5.4.5** and reported by the EIA, in 2015, the United States' total coal production was roughly 900 million short tons, 10 percent lower than in 2014. The 2016 production levels are expected to decrease further, reaching levels not seen since the 1970s. Worldwide, demand for coal appears to be softening as well, with EIA projections for coal exports (the majority of which is metallurgical coal) being relatively flat through 2030, accounting for only approximately 8 percent of total US coal production (see **Section 5.5.3**). As a result of the softening of both the domestic and export markets, a number of mines in the United States have idled production, several major coal companies have entered Chapter 11 bankruptcy, many coal miners have been laid off, and coal-dependent communities have suffered. The EIA and other projections of future coal production show anticipated continuing declines.

Commenters have urged the BLM to take these significant market changes into account when considering reform options for the Federal coal program. In order to make fully informed decisions, stakeholders have requested that the BLM determine what the impacts of reform options will be on factors such as coal production, energy supply, energy prices, state revenues, and jobs (direct and indirect). As discussed in more detail in **Section 6.4**, the BLM intends to evaluate all program alternatives against a set of defined issues for analysis that include all of these critical metrics.

Through the scoping process, stakeholders also provided suggestions to help communities currently in transition or communities that may find themselves in need of transitioning in the near future. While many of these suggestions do not fall under the authority of the BLM's coal program, the BLM believes they are an important part of the larger conversation about coal's future in the United States. The BLM is committed to working with the White House, Congress, and other Federal, state, and local agencies throughout the PEIS process to further these ideas and to address Federal coal reform in the most comprehensive manner possible. The stakeholders' suggestions are summarized below, and it is worth noting that the BLM could seek to secure Congressional authorization to direct a portion of increased Federal coal revenues toward such community assistance programs.

- Undertake meaningful collaboration with coal-producing states concerning socioeconomic impacts related to Federal coal mining
- Develop a program to hire mine workers for restoration and rehabilitation associated with mining operations

- Explore changes to revenue-sharing statutes to improve community access to funding for local school and other community priorities
- Provide communities a comprehensive review of tools to help diversify their economies
- Work to secure Congressional authorization to direct increased royalty and rental payments toward worker and community support
- Establish an Economic Transition Fund that would be sustained by an increase in reimbursement fees charged by the Department of the Interior when processing coal-related applications
- Prioritize support and assistance to help communities transition (e.g., Secretarial Order)
- Accelerate the transition to renewable energy production on Federal lands, identify new opportunities to use abandoned or reclaimed mine lands as renewable energy production sites, and work with partner agencies to assist in retraining coal workers for the renewable energy industry
- Provide assistance to help coal miners transition to other jobs
- Undertake severance tax reform and ensure that taxes that are intended to provide funds to invest in economic diversification in the coalfields are actually being invested back into coal producing counties at a higher rate and in a timely manner
- Look for ways to ensure coal revenue is reinvested in communities to help them break from the boom and bust cycles of fossil fuel extraction

The Power Plus (POWER+) Plan,[218] proposed in President Obama's FY2016 and FY2017 budgets, and the Obama Administration's corollary POWER Initiative provide an example of recent efforts by the Federal government to help coal communities in transition.

The POWER+ Plan proposed a range of investments in economic diversification, employment and training services, and abandoned mine reclamation targeted to coal communities and workers. It also included Federal transfers to rescue the solvency of the largest multi-employer pension plan serving retired coal miners and their families, and to extend health care coverage to beneficiaries who were going to lose their coverage at the end of 2016.[219] In addition, it included two

[218]The White House. 2016. Investing in Coal Communities, Workers, and Technology: The POWER+ Plan. Available at https://www.whitehouse.gov/sites/default/files/omb/budget/fy2016/assets/fact_sheets/investing-in-coal-communities-workers-and-technology-the-power-plan.pdf

[219] The Further Continuing and Security Assistance Appropriations Act of 2017 provided funds to ensure that the health care coverage to these beneficiaries was extended until April 30, 2017. Pub. L. No. 114-254 (Dec. 12, 2016).

new proposed tax credits to catalyze the deployment of carbon capture, utilization, and sequestration (CCUS) technologies in the power sector.

Starting in 2015, the Administration began in parallel—because the economic need was so urgent—the POWER (Partnerships for Opportunity and Workforce and Economic Revitalization) Initiative, which is effectively the economic and workforce development component of the POWER+ Plan. It was a coordinated effort involving ten Federal agencies—including the DOE—with the goal of effectively aligning, leveraging, and delivering a range of Federal economic and workforce development resources to assist communities negatively impacted by changes in the coal industry and coal-fired segment of the power sector.

Since October 2015, as part of the POWER Initiative, Federal agencies have awarded to date roughly $80 million to support economic and workforce development projects in coal- impacted communities in 15 states. These projects will catalyze economic diversification in industry clusters ranging from advanced manufacturing and agriculture to information technology and tourism and recreation.[220,221] In addition, in the Consolidated Appropriations Act of 2016, Congress appropriated OSMRE $90 million for a pilot program in three Appalachian states, inspired by a proposal in the POWER+ Plan, to use General Treasury funds for the reclamation of abandoned mine land sites in conjunction with economic and community development and reuse goals.[222]

6.4 ISSUES FOR ANALYSIS

According to the BLM NEPA Handbook (Section 6.4), an "issue" is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. Analysis of an issue is necessary to make a reasoned choice between alternatives. Based on the input received through the scoping process, the BLM has identified the following issues for analysis in the PEIS. Each program reform alternative will be evaluated against these issues, and a comparative analysis will be presented in the Draft PEIS. Consistent with guidance in the BLM's NEPA Handbook (Section 9.2.9), the BLM will attempt to quantify the effects analysis in the PEIS as much as possible.

[220] The White House. 2016. Fact Sheet: Administration Announces Additional Economic and Workforce Development Resources for Coal Communities through POWER Initiative. October 26, 2016. Available at https://www.whitehouse.gov/the-press-office/2016/10/26/fact-sheet-administration-announces-additional-economic-and-workforce

[221] The White House. 2015. FACT SHEET: Administration Announces New Workforce and Economic Revitalization Resources for Communities through POWER Initiative. October 15, 2015.Available at https://www.whitehouse.gov/the-press-office/2015/10/15/fact-sheet-administration-announces-new-workforce-and-economic

[222] OSMRE. 2016. Guidance for Eligible Projects To Be Funded Under The Abandoned Mine Land Reclamation Economic Development Pilot Program For Fiscal Year 2016. Available at https://www.osmre.gov/programs/aml/pilotProgramGuidance.pdf

- What would be the effect of the alternatives on Federal coal production?
- What would be the effect of the alternatives on other energy sources?
- What effect would the alternatives have on substitution between energy sources and between Federal and non-Federal coal?
- What would be the effect of the alternatives on energy prices (wholesale and retail)?
- What would be the effect of the alternatives on net coal exports?
- What would be the change in effect of the alternatives considering sensitivity analysis (e.g., natural gas prices)?
- What would be the effects of the alternatives on socioeconomic factors, including but not limited to, national revenues, state revenues, and employment (direct and indirect)?
- What would be the effect of the alternatives on fair return to the American taxpayer?
- What would be the effect of the alternatives on greenhouse gas emissions (separated by streams: production, transportation, and combustion)?
- What would be the effect of the alternatives in terms of achieving US climate goals?
- What would be the effect of the alternatives on the environment?
- What would be the effect of the alternatives on public health?

6.5 ANALYTICAL APPROACH

Consistent with the requirements of NEPA, the BLM will prepare the PEIS using an interdisciplinary approach, and the disciplines of the preparers will be appropriate to the scope of the analysis and to the issues identified in the scoping process (40 CFR, Subpart1502.6). As can be seen in the issues identified for analysis (see **Section 6.4**), the PEIS will require economic and national and global energy market expertise among the more traditional disciplines. Further, many of the issues identified for analysis will require the use of sophisticated power sector modeling. The BLM is in the process of assessing the various models that are available and will determine which model or models best meet the analytical needs of the PEIS.

The BLM will prepare a reasonably foreseeable development scenario to support the analysis in the PEIS. The reasonably foreseeable development scenario will forecast coal exploration, development, and production for the planning area for a defined time horizon. This baseline scenario will inform the analysis of the no action alternative and other program reform alternatives.

In accordance with the requirements of NEPA, the PEIS will analyze the direct, indirect, and cumulative impacts of the proposed coal reform alternatives (40 CFR, Subpart 1508.25[c]). As determined appropriate, this will include considerations such as transportation related impacts, health impacts, socioeconomic impacts, and ecological impacts. As discussed in CEQ's guidance "Effective Use of Programmatic NEPA Reviews," a broad (e.g., regional or landscape) description may suffice for characterizing the affected environment in programmatic NEPA reviews, so long as potentially impacted resources are meaningfully identified and evaluated. Further impacts in programmatic reviews are typically discussed in a broad geographic and temporal context with particular emphasis placed on cumulative effects.[223]

In developing the PEIS, the BLM will adhere to CEQ's Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews (August 1, 2016). This includes an assessment of greenhouse gas emissions and the effects of climate change on a proposed action and its environmental impacts. The BLM will quantify the projected direct and indirect greenhouse gas emissions associated with the proposed coal reform alternatives to the extent practicable. The BLM will also evaluate the appropriate application of the social cost of carbon and the social cost of methane in the PEIS.

The BLM will use the best available science to support its NEPA analyses in the PEIS (BLM NEPA Handbook Section 6.8.1.2) and will adhere to the five Principles and Practices of Science-Management Integration identified in the March 2015 publication *Advancing Science in the BLM: An Implementation Strategy*[224]:

1. Use the best available scientific knowledge relevant to the problem or decision being addressed, relying on peer-reviewed literature when it exists.
2. Recognize the dynamic and interrelated nature of socioecological systems within which the BLM operates.
3. Acknowledge, describe, and document assumptions and uncertainties.
4. Use quantitative data when it exists, in combination with internal and external professional scientific expertise.
5. Use transparent and collaborative methods that consider diverse perspectives.

[223] Executive Office of the President, Council on Environmental Quality. 2014. Effective Use of Programmatic NEPA Reviews. December 2014. Available at https://ceq.doe.gov/current_developments/docs/Effective_Use_of_Programmatic_NEPA_Reviews_Final_Dec2014_searchable.pdf

[224] BLM. 2015. Advancing Science in the BLM, an Implementatoin Strategy. Avaialbe at http://www.blm.gov/style/medialib/blm/wo/blm_library/BLM_pubs.Par.38337.File.dat/BLMAdvSciImpStratFINAL0 32515.pdf

The BLM will conduct a thorough review of all data, reports, and studies submitted to the BLM over the course of the NEPA process and incorporate them as appropriate into the NEPA analysis. A list of the data and reports submitted through the scoping process can be found in the annotated bibliography in **Appendix E** (see **Section 4.6.1** for more information). The BLM will work with Cooperating Agencies and other industry experts as necessary in conducting this work.

Consistent with NEPA, the PEIS will concentrate on the issues that are truly significant to the action in question rather than amassing needless detail (40 CFR, Subpart 1500.1). While the reform options under consideration are fairly expansive, the BLM will work to keep the PEIS as focused as possible with a goal of developing a document that is understandable to the larger public and completed in a timely manner.

6.6 ENERGY AND ECONOMIC ANALYTICAL CONSIDERATIONS

The development of the PEIS will involve detailed analysis of options, option combination packages, and alternatives with a goal of addressing the issues for analysis described in **Section 6.4**.

Of particular relevance will be analyzing effects on energy markets and the energy economy as well as fiscal effects. Most obviously, adjustments to the Federal coal program have the potential to impact Federal coal production as well as employment and the state and Federal revenues associated with production. Moreover, policy options also have the potential to impact greenhouse gas emissions directly through limitations on production or indirectly through mechanisms that factor in the environmental externalities of coal production. However, as illustrated by comments and accompanying studies and reports, there are a wide array of variables and constraints to consider when examining how coal reform would interact with other components of the national energy and economic systems. Some of these considerations are highlighted below. These considerations present key next steps for the BLM, Cooperating Agencies, and other interested stakeholders in examining reform opportunities for the Federal coal program.

Modeling choice for energy sectors: The impacts from reforms to the PEIS would be absorbed over an extended period of time as it is adopted through new or renewed coal leases as current lease contract periods expire.[225] As noted above, reform options would have the potential to affect not just Federal coal production, but national energy and economic systems as a whole. Estimating these potential system wide effects requires modeling the complex interactions of the power sector and various fuel sources. There are a number of power

[225] Existing leases are generally structured as 20-year contracts and would not be directly impacted by the reform until up for renewal.

sector models available to assist the BLM in this task.[226] The power sector represents the chief source of demand for Federal coal; its detailed representation and ability to respond to changes in fuel cost through dispatch and capacity changes are critical to accurately modeling any leasing reform.

Capacity expansion models that optimize electricity dispatch and generation subject to fuel costs and regulatory constraints are ideal for analyzing these types of long-run power generation scenarios and the policies that drive them.[227] Production cost models and network reliability models have higher temporal resolutions focused on near-term electricity production and dispatch decisions and generally apply to more narrow geographies. Given the nationwide power market implications of Federal coal leasing reform and the extended time horizon for which its impact would be assessed, capacity expansion models would offer an advantage over other power-sector models. These types of models can provide the temporal and spatial dimensions necessary to best capture the full impacts of leasing decisions. The discussion below highlights important considerations regarding modeling assumptions and inputs and outputs.

Model Inputs

1. *Coal Supply Representation:* With slightly over 40 percent of coal produced in the United States coming from Federal lands, a key data element for analysis and modeling will be distinguishing between coal supplied from Federal coal leases and other non-Federal mineral ownership. This distinction would allow the BLM, when specifying modeling inputs, to most accurately link any coal reform changes to the mines on the supply-side that will absorb those changes. Furthermore, being able to distinguish between the types of mine—surface or underground—will also be a relevant distinction for analytic efforts. Federal coal leasing currently involves different royalty rates for surface and underground mines, and it is likely that any alterations that address fair return or environmental impacts would likely impact these mine types differently. Finally, a data field that distinguishes whether a particular mine is an existing lease, a renewed mine lease, or a new lease would be central to appropriately reflecting Federal coal leasing changes when designing modeling parameters. Any Federal coal leasing changes would likely only apply to renewed and new leases and, therefore, having a detailed mine-by-mine coal supply representation that made this distinction would allow the BLM to best reflect the policy parameters in its analysis. In summary, having detailed mine-by-mine

[226] Howard, P. 2016. The Bureau of Land Management's Modeling Choice for the Federal Coal Programmatic Review. New York University Institute for Policy Integrity. June 10, 2016. Available at http://policyintegrity.org/publications/detail/BLM-model-choice
[227] Ibid.

supply assumptions that include data on each mine's Federal/non-Federal, surface/underground, and existing/new status will equip the BLM with the appropriate data necessary to best analyze any coal reform changes.

2. *Coal Transportation Representation:* The primary consumer of Federal coal is the power sector. Many of these buyers are located far away from the western coal lands where the majority of coal from Federal leases is produced. Consequently, compared with other domestic coal sources, the cost of transportation is typically a more significant factor into the delivered price of western coal. Therefore, having an accurate representation of the linkages from coal supply regions to the power plant is critical to assessing the delivered price of coal to power markets and the corresponding dispatch decisions to meet electricity demand. Data regarding the mode of transportation (e.g., rail, barge, and truck) from mine to power plant and the cost per ton-mile transported will likely be an important model input. Any capacity limitations would also be critical to understand—and to capture as a constraint—in analysis to ensure that significant changes in coal supply origins are compatible with current and future infrastructure. Finally, coal transportation cost and supply linkages between plant and supply region may be informed by historical data (such as fuel receipts provided in EIA Form 923). However, the BLM would likely need to identify possible rail linkages, not just historical ones, between supply regions and plants to ensure that new transportation options to competing basins are an option, where appropriate, for power plants in optimization models to prevent any bias against substitution in its analysis.

3. *Coal Demand Representation:* Demand for Federal coals is almost entirely from US power plants. Power plants base their purchase decisions on a variety of factors, including the delivered price per mmBtu of a particular coal, compatibility with boiler design, and the environmental properties of the coal, the compatibility with current pollution control equipment (e.g., flue gas desulfurization or dry sorbent injection), and emission requirements. Moreover, coal plants may have captive competition where they only access coal markets through a single rail carrier, or they may have a more competitive position where they can access coal supply through a variety of the primary rail carriers. While a mine-by-mine representation of coal supply will allow the BLM to most accurately estimate the effect of coal reform adjustments on availability of different types of coal, a detailed plant-by-plant representation of the power sector will help best capture how any changes affect the demand for coal as well as other fuel sources. A bottom-up model that starts with a database of the power plant fleet and contains capacity, historical fuel consumption, boiler design, plant-specific pollution controls, and emissions constraints for each power plant will be a central data element to future PEIS analysis.

Model Outputs/Impacts Dependent on Model Outputs

1. *Substitution:* With appropriate model structure and supply and demand representation, the impact of any Federal coal program reforms will ultimately pivot on substitution. Specifically, this includes estimated shifts to/away from Federal coal and estimated shifts to/away from competing electricity generation (e.g., non-Federal coal, natural gas, renewable, etc.). To inform substitution effects, the BLM may use power-sector models that accurately reflect electricity generation capacity and capacity expansion, as well as cost and performance metrics of each form of electricity generation.

   In regard to coal switching between Federal and non-Federal it is important to fully capture the cost of such switching to ensure there is no bias for or against substitution. For instance, the majority of Federally produced coal is subbituminous, and the majority of non-Federal coal is bituminous. When a coal boiler built for subbituminous substitutes to bituminous, it may require soot blowing or heat transfer surface modifications to handle the low ash fusion temperatures and/or corrosive nature of its higher chlorine content. These costs, in addition to the fuel costs, are critical data elements to capture when assessing substitution. Likewise, when a boiler built for consuming bituminous coals substitutes to subbituminous, it may experience additional capital cost in the form of increased material handling, milling capacity, and dust control. Finally, a plant may have an investment in certain control technologies, such as dry sorbent injection, that only function with certain coal ranks and, thus, this data needs to be considered when assessing substitution costs.

   When switching to/from natural-gas fired generation, it is important to have production and pipeline data to ensure that the levels of substitution are not inconsistent with infrastructure capabilities. Likewise, it is important to appropriately reflect the cost and performance of renewable technologies to identify the degree to which this technology serves as a substitute. Due to the long time horizon under consideration when evaluating PEIS reform and the rapidly evolving changes regarding renewable energy costs, it is a data component that may benefit from sensitivity analysis. For example, its viability as a substitute may be informed by current cost and performance metrics in one sensitivity, but a different set of technology cost and performance assumptions reflecting recent trends and growth may be used for sensitivity.

   Some commenters have conducted initial analysis that informs the likely substitution effects from different policy scenarios and may help inform further exploration of substitution effects. For example, Vulcan Philanthropy looked at varying scenarios where different royalty rates were applied. With CPP, the royalty change resulted in a substitution as high as 0.75 tons of non-Federal coal for every ton of Federal coal decline

in 2030. At higher royalty rates, these substitution rates reached levels where only 0.5 tons of additional non-Federal coal were produced for every ton of Federal coal reduced in 2030 as the power sector increasingly looks for non-coal energy (e.g., natural gas) sources to replace larger decreases in Federal coal production.[228] As the substitution rate to non-Federal coal became smaller, the substitution to natural gas became larger, reflecting the competitive reality of these two fuels as marginal dispatch sources.

The environmental (including climate change) and economic impacts of reform alternatives depend, in large part, on the estimated substitution effects. For a variety of reform options, identifying substitution will be a critical early data element to enable the BLM to subsequently determine the power system impacts, corresponding cost and benefits, changes to state/Federal revenues, employment, and greenhouse gas emissions impacts. Some of those impacts are explored further below.

2. *Employment Impacts:* The BLM will analyze employment impacts (as well as impacts on other economic metrics such as output, gross domestic product, and labor income) to sectors potentially affected by reform alternatives. The prior discussion highlights that these impacts extend beyond the coal sector to the energy industry as a whole, as well as other industries affected by the multiplier impacts of coal production, transportation, and generation. The estimated substitution results of alternative reforms will serve as primary input for such an analysis on employment impacts to various sectors.

   One key consideration for analyzing coal employment impacts relates to differences in labor intensity of Federal and non-Federal coal. The majority of Federal coal is surface mined and has the lowest labor intensity in the nation, whereas the non-Federal coals generally require much more labor per ton of coal removed. For instance, in Wyoming, where the majority of Federal coal is located, the aggregate coal mine productivity is 29 tons per labor hour. Illinois, Pennsylvania, and West Virginia, where many of the competing non-Federal coals are mined, have productivity rates in the range of 2 to 6 tons per labor hour due to the thinner and more difficult-to-reach seams (see **Table 6-2**, which shows coal labor employment and productivity for the seven largest states by employment).[229] This means that for each ton of Federal coal

[228] Vulcan Philanthropy. 2016. Federal Coal Leasing Reform Options: Effects on CO2 Emissions and Energy Markets. Fairfax, Virginia: Vulcan Philanthropy/ICF International. January 2016. Available at http://www.vulcan.com/MediaLibraries/Vulcan/Documents/Federal-Coal-Lease-Model-report-Jan2016.pdf

[229] US EIA. 2016. Data from Annual Energy Outlook Coal Data Browser. Available at http://www.eia.gov/beta/coal/data/browser/#/topic/37?agg=0,2,1&geo=vvvvvvvvvvvo&mntp=g&freq=A&start=2001&end=2014&ctype=map&ltype=pin&rtype=s&maptype=0&rse=0&pin=

Table 6-2
Labor Requirements to Mine Coal

	Employment	Productivity (tons per labor hour)
West Virginia	18,330	2.69
Kentucky	11,834	2.8
Pennsylvania	7,938	3.52
Wyoming	6,624	28.62
Illinois	4,218	5.99
Indiana	3,810	4.21
Alabama	3,694	1.88

Source: US EIA 2016[230]

replaced by a ton of non-Federal coal, the amount of coal labor may increase by a factor of 10. The BLM will examine the substitution impacts from any coal reform to assess the impact on employment markets in non-Federal coal mining markets and in natural gas markets. The EIA data on productivity and employment will be one critical element to understanding coal mining job impacts from any reform efforts and subsequent substitution.

Initial analysis provided by commenters examining the impact of various coal reform options, such as royalty rate adders, highlighted that nationwide coal mining employment increased (by more than 5 percent) as a result of Federal royalty rate adders that made non-Federal coals more competitive.[231] With appropriate data on substitution and employment, the BLM can further explore the potential to simultaneously increase coal revenues and employment. **Figure 6-1** highlights the negative correlation historically observed between Powder River Basin production and coal mining jobs. The BLM analytical efforts could help ensure that the price for which Federal coals are leased reflects FMV in order to prevent any effective subsidization of western coal mining jobs at the expense of eastern coal mining jobs.

3. *Electricity Prices* - Any changes that make fuel more expensive will likely be carried through to the end user of the fuel–the electric ratepayer. The BLM will assess how these changes to Federal coal leasing impact fuel cost and related capital cost, and how those costs are passed through to ratepayers.

[230] US EIA. 2016. Coal data browser. Available at www.eia.gov/beta/coal/data/browser
[231] Gillingham, K. and J. Stock. 2016. Federal Minerals Leasing Reform and Climate Policy. Hamilton Project Policy Proposal 2016-07. December 8, 2016. Available at https://www.brookings.edu/wp-content/uploads/2016/12/es_20161208_federal_minerals_leasing_reform_and_climate_policy_pp.pdf

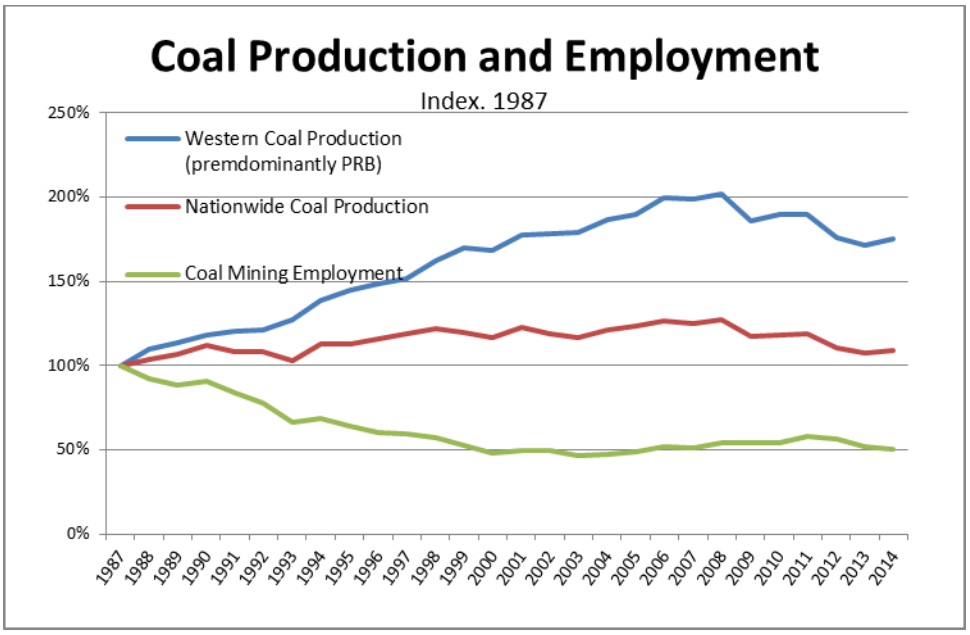

Figure 6-1. Powder River Basin Production and Nationwide Coal Employment

Source: Employment: MSHA 2016[232]
Production (1987-2011): US EIA. 2012[233]
Production (2012-2015): US EIA 2016[234]

4. *Revenue Impacts:* The BLM will analyze data on government revenues as a result of any coal leasing changes. This includes assessing effects on the Federal revenue sources, particularly revenues associated with bonus bids, rental rents, and royalties. To the extent feasible, the BLM will assess effects on other Federal taxes (e.g., Reclamation Fee and Black Lung Excise Tax) and effects on relevant state and local revenues. The analysis released by the Council of Economic Advisors suggests that as coal royalties increase up to a certain point so too do government revenues.[235] That is, the increase in revenue from higher royalties more than offsets any decline in production and bonus bids. For example, their analysis suggested that a royalty charge of $30/ton would result in an additional 2.7 to 3.1 billion dollars in government revenues each year after 2025 when the changes are fully phased in even though total annual production would decrease by 53 percent. Regional coal

[232] MSHA (United States Department of Labor Mine Safety Health Administration). 2016. Coal Mine and Employment Data. Accessed September 2016. Available at http://arlweb.msha.gov/OpenGovernmentData/OGIMSHA.asp
[233] US EIA. 2012. Annual Energy Review. Table 7.2: Coal Production, 1949-2011. Available at: https://www.eia.gov/totalenergy/data/annual/showtext.php?t=ptb0702.
[234] US EIA. 2016. 2016 Annual Coal Report. Table 1. Coal Production and Number of Mines by State and Mine Type. November 3, 2016. Available at: http://www.eia.gov/coal/annual/.
[235] Council of Economic Advisers, Executive Office of the President. 2016. The Economics of Coal Leasing on Federal Lands: Ensuring a Fair Return to Taxpayers. June 2016. Available at https://www.whitehouse.gov/sites/default/files/page/files/20160622_cea_coal_leasing.pdf

production forecasts, including forecasts specific to Federal leases, are the key input for analyzing revenues. Therefore, outputs that detail production levels from different coal supply regions and Federal mines will be critical results from the energy sector model.

5. *Externalities:* Economic theory indicates that markets are optimized when the full marginal cost of production (including externalities) is equal to the marginal benefits. In order to reflect this optimal level, fuels such as coal would have a cost that reflects not only the extractive component but also any environmental or social damages associated with them. When examining externalities, the BLM would need data and analysis regarding the social cost of methane and the social cost of carbon per ton of coal produced. These values, and instructions on how to incorporate them, are available from the Interagency Working Group on the Social Cost of Carbon. The BLM would also need to project the incremental changes in methane and CO_2 emissions from upstream, midstream, and downstream portions of coal's lifecycle. These estimates are needed for all coal not just coal from Federal leases, as well as from competing fossil fuel substitutes such as natural gas. Having this price and volume data would allow the BLM to assess the total impact of any coal reform changes.

   Commenters also pointed out other, non-climate-based externalities on which the BLM would need better data quantification. These include the ecosystem impacts from coal mining, lifecycle criteria pollutant impacts, rail transportation fatalities, etc. Emission estimates for SO_2, NOx, and mercury will be useful data points for informing the benefits of any coal reform changes. These changes will largely manifest themselves in the power sector, so using a model that included outputs for these variables will be an important consideration in the BLM's analytic endeavors. Finally, being able to understand the locational impact of these changes will empower the BLM and the public to best understand the distributional aspects of the cost and benefits to coal reform. Having this data will help the BLM consider environmental justice impacts as required under NEPA and to consider how best to address adverse community impacts from any coal job loss as well as other labor impacts.

6. *Sensitivity:* Sensitivity analysis will be central to any assessment of Federal coal leasing reform due to the uncertainty of energy markets over the extended time horizon affected by any leasing changes. Therefore, specifying modeling runs that test the same policy scenario under different market and regulatory assumptions (i.e., sensitivity analysis) will be useful to determine a range of possible results that capture the uncertainty of policy impacts. These sensitivities may include, but are not limited to, testing policy changes:

a) With reference case natural gas prices, as well as high and low natural gas prices scenarios

b) With high and low renewable technology cost and performance assumptions

c) With and without additional coal export terminal capacity on the West Coast

d) With and without improved cost performance of carbon capture and sequestration

6.7 SCHEDULE

As discussed previously, on January 15, 2016, Secretary Jewell issued Secretarial Order 3338 directing "the BLM to prepare a discretionary PEIS that analyzes the potential leasing and management reforms to the current Federal coal program." In the press release and other materials released with the Secretarial Order and Notice of Intent, the Secretary indicated that the PEIS would take approximately 3 years to complete.

Following the CEQ regulations at 40 CFR, Subpart 1508.22, a Notice of Intent to prepare a PEIS was issued on March 30, 2016, which initiated the scoping process. The proposed schedule for the PEIS can be found in **Table 6-3**. The BLM will prepare a Draft PEIS using the information received during the scoping process and will provide, at minimum, a 45-day public comment period on the Draft PEIS (43 CFR, Subpart 1506.10). The BLM plans to release the Draft PEIS in January 2018. The BLM will incorporate public comments received on the Draft PEIS and prepare a Final EIS (40 CFR, Subpart 1502.9) by January 2019, with a Record of Decision to follow by March 2019 (40 CFR, Subpart 1506.10).

Table 6-3
Proposed Schedule for the PEIS

Milestone	Proposed Date
Scoping Report	January 2017
Draft PEIS	January 2018
Public Comment Period	January – March 2018
Final PEIS	January 2019
Record of Decision	March 2019

Exhibit 2

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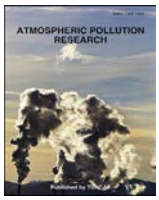

Original article

Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA

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ABSTRACT

We examined the emissions of diesel particulate matter (DPM) and coal dust from trains in the Columbia River Gorge (CRG) in Washington State by measuring PM_1, $PM_{2.5}$, CO_2, and black carbon (BC) during the summer of 2014. We also used video cameras to identify the train type and speed.

During the two-month period, we identified 293 freight trains and 74 coal trains that gave a $PM_{2.5}$ enhancement of more than 3.0 μg/m^3. We found an average $PM_{2.5}$ enhancements of 8.8 and 16.7 μg/m^3, respectively, for freight and coal trains. For most freight trains (52%), and a smaller fraction of coal trains (11%), we found a good correlation between $PM_{2.5}$ and CO_2. Using this correlation, we calculated a mean DPM emission factor (EF) of 1.2 gm/kg fuel consumed, with an uncertainty of 20%.

For four coal trains, the videos revealed large plumes of coal dust emanating from the uncovered coal cars. These trains also had the highest peak $PM_{2.5}$ concentrations recorded during our study (53–232 μg/m^3). Trains with visible coal dust were observed for 5.4% of all coal trains, but 10.3% when the effective wind speed was greater than 90 km/h. We also found that nearly all coal trains emit coal dust based on (1) statistically higher $PM_{2.5}$ enhancements from coal trains compared to freight trains; (2) the fact that most coal trains showed a weak correlation between $PM_{2.5}$ and CO_2, whereas most freight trains showed a strong relationship; (3) a statistically lower BC/$PM_{2.5}$ enhancement ratio for coal trains compared to freight trains; and (4) a statistically lower PM_1/$PM_{2.5}$ enhancement ratio for coal trains compared to freight trains. Our results demonstrate that, on average, passage of a diesel powered open-top coal train result in nearly twice as much respirable $PM_{2.5}$ compared to passage of a diesel-powered freight train.

1. Introduction

Rail locomotives powered by diesel fuel travel through the Columbia River Gorge National Scenic Area as well as many urban areas in Washington State. Evaluating the air quality impacts from rail traffic for people living near rail lines is hampered by a lack of data. Several plans that would expand coal shipments by rail through Washington and Oregon to coastal ports for export to Asia have been proposed. New export facilities have been proposed for Longview and Bellingham, Washington. One proposed port near Bellingham would have the capacity to ship up to 54 million metric tons of coal annually (WA DOE, 2013).

The U.S. Department of Health and Human Services states that diesel particulate matter (DPM) is “reasonably anticipated to be a human carcinogen” (U.S. DHHS, 2014). The World Health Organization also categorizes DPM as “carcinogenic to humans” (WHO, 2012). In urban areas, including Seattle, the most significant “air toxic” is DPM, contributing over 80% of the cancer risk for air toxics

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(Keill and Maykut, 2003; PSCAA, 2005). DPM sources consist of rail locomotives, ships and diesel trucks, both on road and off road. Average DPM concentrations for the Seattle area are 1.4–1.9 μg/m^3, based on monitoring and a chemical mass balance model (Keill and Maykut, 2003; Maykut et al., 2003). These DPM concentrations make up 15–20% of the mass of total particulate matter with diameters less than 2.5 μm ($PM_{2.5}$).

Emission standards for new and remanufactured locomotives, developed by the U.S. Environmental Protection Agency (EPA) (40 CFR part 1033) have decreased steadily over the past several decades. For diesel locomotives various standards apply based on the date of manufacture: Tier 0, 1973–2001; Tier 1, 2002–2004; Tier 2, 2005–2010; Tier 3, 2011–2014; and Tier 4, after 2015 (U.S. EPA, 2013). Tier 4 locomotives must comply with a PM_{10} standard of 0.03 g/bhp-h, which is about 0.19 g of PM_{10} per kg of fuel consumed (U.S. EPA, 2009).

Previous studies looked at rail yards as air pollutant sources. They determined that the primary source of $PM_{2.5}$ at these sites was diesel fuel combustion. One study investigated the impact of DPM emissions on $PM_{2.5}$ concentrations at an Atlanta area rail yard (Galvis et al., 2013). Using measurements collected upwind and downwind of the rail yard, they found the average "neighborhood" contribution to $PM_{2.5}$ was 1.7 μg/m^3. The emission factors (EFs) per kg of diesel fuel burned were calculated to be 0.4–2.3 g DPM. The EFs were not determined from individual train measurements but were calculated using three different methods, each based on differing assumptions. Two studies of a Roseville, California, rail yard also found significant enhancements in $PM_{2.5}$ from the yard. Using measurements from upwind and downwind, Cahill et al. (2011) found an average $PM_{2.5}$ enhancement of 4.6 μg/m^3, and Campbell and Fujita (2006) found even larger contributions (7.2–12.2 μg/m^3). Cahill et al. (2011) also demonstrated that particles with diameters below 1 μm are the major contributor to $PM_{2.5}$ aerosol mass from diesel exhaust. Abbasi et al. (2013) studied concentrations in the interior of trains and close to rail lines and found significantly elevated $PM_{2.5}$ and PM_{10} concentrations, particularly in stations that were underground. Gehrig et al. (2007) looked at electric trains in Switzerland and examined the influence of dust from these trains on PM_{10} concentrations. Several studies investigated the EFs of on-road diesel trucks and buses (Jamriska et al., 2004; Zhu et al., 2005; Cheng et al., 2006; Park et al., 2011; Dallmann et al., 2012), but we have found no similar studies on diesel rail.

Trains that carry coal in uncovered rail cars may also release coal dust, in addition to DPM, into the atmosphere. The BNSF railway requires that a surfactant be applied over the top of coal being transported by rail (see BNSF Railway, 2013). However, we are unaware of any studies reported in the scientific literature that evaluate the efficacy of this or the impact of coal dust on air quality. By examining the PM by train type, we can examine whether there is respirable coal dust ($PM_{2.5}$) as part of the emissions from coal trains. We will also examine the particle size distribution because combustion-related particles and coal dust, which is mechanically generated, are associated with particles of different sizes (Seinfeld, 1986).

A substantial amount (44–60%) of the diesel engine $PM_{2.5}$ mass is black carbon (BC) (Bond et al., 2004; Kirchstetter and Novakov, 2007; Ramanathan and Carmichael, 2008). Because radiative forcing due to BC is the major light-absorbing species in atmospheric aerosol, it is significant both globally and regionally (Jacobson, 2001; Ramanathan and Carmichael, 2008). In addition, because of BC's surface properties, it is possible for polyaromatic hydrocarbons (PAHs) and other semi-volatile compounds to be adsorbed and transported by BC (Dachs and Eisenreich, 2000). Health organizations are also taking a hard look at BC because of its contribution to the harmful effects caused by $PM_{2.5}$, including cardiopulmonary and respiratory disease (Jansen et al., 2005; Janssen et al., 2011; U.S. EPA, 2012).

Because of the lack of information on $PM_{2.5}$ concentrations and the exposure to humans from diesel trains, the debate over coal dust and the scarcity of information on diesel train EFs, we sought to measure these air quality effects by answering the following questions:

1. What are the DPM emission factors for locomotives in Washington State and how do these compare with published values?
2. Do open-top coal-carrying trains emit respirable coal dust ($PM_{2.5}$) into the air? If so, can we quantify the emissions?

To address these questions we measured PM_1, $PM_{2.5}$, CO_2, black carbon and meteorology at a location in the Columbia River Gorge next to the rail line. Because we wanted to quantify DPM and coal dust exposure and quantify the EFs from each train, we collected measurements every 10 s in order to identify the air quality impacts of individual trains. In a previous study, we measured a similar suite of parameters in 2013 at a site in Seattle, Washington, and (very briefly) at a site in the Columbia River Gorge (Jaffe et al., 2014). In the previous study, we quantified DPM emission factors from diesel trains, evaluated the neighborhood scale exposure to $PM_{2.5}$ from trains and found evidence that suggested emissions of coal dust, based on particle size. In the present analysis, we report new data taken in 2014 that more clearly identifies and quantifies the emissions of DPM and coal dust from coal-carrying trains.

2. Experimental

Measurements were made at a site between the towns of Lyle and Dallesport, Washington, in the Columbia River Gorge (approximately 45.7°N, 121.2°W) between June 7–August 10, 2014. The instruments were housed in a weather-proof enclosure, located about 10 m above and 20 m northeast of the rail line. Two video cameras were used; one took video of the trains at a 90 angle to the rail line, and one viewed the trains arriving/departing to the northwest. The rail line travels along the north side of the Columbia River. There were no roads between our site and the river. Our measurement site was approximately 200 m southwest of Washington Route 14, a state highway with light traffic. The measurement location used in 2014 was in the same general location, but about 300 m away, from the site we used for our 2013 measurements (Jaffe et al., 2014). At this site the rail line is almost completely flat; there is a maximum grade of 1 m per km in the next few km in either direction.

We used a DustTrak DRX Aerosol Monitor (Model #8533, TSI, Inc., Shoreview, MN) to measure size-segregated PM. The DustTrak reports 4 size fractions of PM mass concentrations: PM_1, $PM_{2.5}$, PM_{10} and TSP. The instrument uses aerosol scattering to calculate its measurements. Therefore, its measurements are not the same as mass-based measurements (Wang et al., 2009). The DustTrak is calibrated against Arizona road dust (ISO 12103-1) by the manufacturer and so will not correctly reflect the mass concentration for other types of aerosol. This is specifically the case for diesel PM because of the particle size (Park et al., 2011). Obtaining accurate measurements with the DustTrak requires comparing its measurements with a mass-based measurement (Moosmuller et al., 2001). The DustTrak has been used to quickly measure several PM size fractions and determine EFs of individual vehicles in several previous studies (e.g., Park et al., 2011; Dallmann et al., 2012), but usually after using a mass-based method to calibrate the response factor (Jamriska et al., 2004; Zhu et al., 2005; Cheng et al., 2006; Jaffe et al 2014). In our study, the DustTrak was

calibrated against two mass-based measurements—a Tapered Element Oscillating Microbalance (TEOM) and the EPA Federal Reference Method at a routine air quality monitoring station in Seattle, Washington (details below).

The DustTrak inlet was stainless steel tubing (4.8 mm i.d.) facing downward from a height of approximately 2 m above ground level. The flow rate through the inlet was 3.0 L per minute. With these conditions, the flow was laminar. To estimate the particle sampling efficiency, we used the methodology and program provided by von der Weiden et al. (2009). The wind speeds during train sampling in the CRG varied between 1 and 11 m per second (mps), with an average of 4.5 mps during the sampling period. For particles less than 2.5 μm aerodynamic diameter, we calculated greater than 90% particle transmissions at all wind speeds up to 15 mps. For particles between 3 and 10 μm aerodynamic diameter, the inlet sampling efficiency would be much less than 1.0 and vary with wind speed (von der Weiden et al., 2009). For this reason, we used only the $PM_{2.5}$ and PM_1 data in this analysis.

We measured CO_2 using a Licor-820 (Licor, Inc., Lincoln, NE) with a small vacuum pump for sampling. The inlet was a 4.8 mm i.d. stainless steel tube (38 mm long) connected to PFA tubing. We zeroed the instrument using CO_2-free air and calibrated it with a 395 ppmv standard from Airgas, Inc. We calibrated the instrument both before and after the deployment; the instrument response varied by less than 1 ppmv between these calibrations. We used DAQFactory on a PC to record data from the DustTrak, the Licor-820 (CO_2, cell temperature and pressure) and the meteorological station. We recorded 10-s averages for PM and CO_2 data.

To identify trains and quantify their speeds, we used two Night Owl cameras (Model CAM-MZ420-425M) that were equipped with infrared (IR) night vision. The cameras were motion activated and operated with iSpy open source camera security software. However, even with the IR capability of the cameras, we were unable to identify the type of trains at night. We considered using an auxiliary light to view the trains at night; however, this was rejected as the Columbia River Gorge is classified as a National Scenic Area, which limits lighting options. Only trains that could positively be identified as freight or coal were used in this analysis, so this excluded all trains passing our site in full darkness.

BC was measured using an aethalometer (Magee Scientific model AE22). BC data were collected at one-minute time resolution at 370 nm and 880 nm. BC loading was determined using infrared attenuation data at 880 nm alone, because at 370 nm, other organic compounds may contribute interference (Wang et al., 2011). The aethalometer determines raw BC concentration (BC_0, ng/m^3) from measured attenuation values (ATN, m ^{1}) via

$$BC_0 = 10^9 \quad ATN/\sigma \tag{1}$$

where σ is the calibrated cross-section (16.6 m^2/g at 880 nm). As in our previous study (Jaffe et al., 2014), we applied a correction to the BC_0 concentrations to account for diminishing transmission as a function of BC loading. Transmission (Tr) is calculated from each attenuation value:

$$Tr = e^{\ ATN/100} \tag{2}$$

Following Kirchstetter and Novakov (2007), we calculated the corrected BC mass loading (BC_{corr}, ng/m^3) as:

$$BC_{corr} = BC_0/(0.88 \quad Tr + 0.12) \tag{3}$$

The DPM EFs are calculated for each passing train in units of DPM emitted per kg of diesel fuel burned using:

$$EF\ (PM_{2.5}) = \frac{\Delta PM_{2.5}}{\Delta CO_2} \quad CF \quad W_c \tag{4}$$

where the $\Delta PM_{2.5}/\Delta CO_2$ or "enhancement ratio" is calculated from the Reduced Major Axis (RMA) regression slopes of the 10-s CO_2 and $PM_{2.5}$ data for each passing train, in units of μg/m^3 per ppmv. CF is a conversion factor to convert CO_2 concentrations in ppm to μg C/m^3 units using the ideal gas law at 1 atm and 25 C (1 ppmv CO_2 = 490.7 ugC/m^3). W_C is the mass fraction of carbon in diesel fuel (870 g C/kg fuel) (Lloyd's Register, 1995; Cooper, 2003), which yields overall units on the EF of g $PM_{2.5}$/kg fuel consumed. Yanowitz et al. (2000) showed that over 95% of diesel fuel carbon is released as CO_2.

Enhancement ratios ($\Delta PM_{2.5}/\Delta CO_2$ and $\Delta PM_1/\Delta PM_{2.5}$) were calculated from the 10-s data using the RMA regression method, which considers errors in both the x and y variables (Ayers, 2001; Cantrell, 2008). Absolute enhancements were calculated by subtracting out the PM, BC and CO_2 maximums during train passage from the background concentration measured prior to each trains passage. The RMA regression parameters were calculated for each train passage using a program written in Java utilizing Apache Commons Mathematics Library 3.3. The program first looked for a $PM_{2.5}$ enhancement of at least 3 μg/m^3 over the median value from the past 17 min (100, 10-s data points). The accuracy of the Java program to calculate PM and CO_2 enhancements and the RMA regression parameters were manually verified for approximately 20% of the peaks. All times in this manuscript are given in Pacific Daylight Time (PDT).

3. Results

3.1. Calibration of the DustTrak

We compared the DustTrak $PM_{2.5}$ concentrations with a TEOM and the filter-based Federal Reference Method (FRM) at a routine air quality monitoring site in Seattle, Washington (Beacon Hill), operated by the Puget Sound Clean Air Agency (PSCAA). Comparison data were obtained between April 30–May 20, 2014. TEOM data were continuous and reported on an hourly basis, the filter-based FRM measurements were for 24 h and conducted every third day only. At this site, the TEOM is a Thermo Fisher Scientific Model 1400AB with 8500C Filter Dynamic Measurement System (FDMS) with the Very Sharp Cut Cyclone (VSCC™) modification (U.S. EPA, 2014). This configuration is designated by the EPA as a Federally Equivalent Method (FEM) for $PM_{2.5}$. The inlet and flow configuration used for the DustTrak at the Beacon Hill site were identical to the configuration used in the Columbia River Gorge.

We found a very good correlations between the TEOM $PM_{2.5}$, the FRM and the DustTrak's reported $PM_{2.5}$. Table 1 shows the regression parameters.

The 95% confidence interval in the slope for the DustTrak-TEOM comparison is ±4.5%, whereas it is ±32% for the DustTrak-FRM comparison due to the very small sample size. In both cases, the intercepts are insignificantly different from zero (95% confidence interval overlaps zero). Because of this, we corrected all of the DustTrak PM data using the TEOM slope of 0.5577. This slope is 22% greater than the one reported by Jamriska et al. (2004), who reported a slope of 0.458. It also is approximately 14% greater than our earlier DustTrak comparison at a different site, where we reported a slope of 0.491 (Jaffe et al., 2014). These differences may be attributable to different aerosol types at these sites. Given these differences, we estimated the uncertainty in the corrected DustTrak PM_1 and $PM_{2.5}$ values to be ±20%.

Table 1
Regression parameters for the comparisons between the DustTrak data, the TEOM data and the FRM method at the PSCAA site at Beacon Hill, Seattle, Washington.

Comparison equation (using reduced major axis regression)	R^2	N
TEOM $PM_{2.5}$ ($\mu g/m^3$) = DustTrak 0.5577 − 0.6977	0.74	485 (h averages)
FRM $PM_{2.5}$ = DustTrak 0.5524 − 0.8433	0.92	7 (24-h samples)
FRM $PM_{2.5}$ = TEOM 1.05 − 0.4326	0.96	7 (24-h samples)

3.2. Overview of observations on train emissions in the Columbia River Gorge

As each train passed our observation site, we may detect a peak in PM and CO_2, but this depended on the wind direction and wind speed. If the winds were from the north to northeast directions, our sensors recorded minor peaks only, or no peaks at all, in PM and CO_2. We found that small PM events had a lower correlation between the various parameters. For this reason, we screened out small peaks where the maximum $\Delta PM_{2.5}$ (enhancement above background) was <3 $\mu g/m^3$. If a peak larger than this value was detected and the video confirmed a simultaneous train passage, then we included this peak in our analysis. We included only freight and coal-carrying trains, since these were the dominant types that we observed in the Columbia River Gorge. Trains that carried mixed loads (e.g., freight plus coal), sand or other unidentifiable or uncovered cargo were not included in this analysis. We also observed very few passenger trains during the daytime hours, in contrast to our previous study in Seattle (Jaffe et al., 2014).

During this study, we observed 367 events with $\Delta PM_{2.5}$ >3 $\mu g/m^3$ that were identified by the video cameras as either freight or coal. We refer to each train passage with a detectable PM peak and verified by the video as a "train event." Table 2 shows a summary of the 367 train events, including number and average peak PM_1 and $PM_{2.5}$ enhancement values (over background). The peak PM_1 and $PM_{2.5}$ enhancements (10-s) from coal trains are about double the enhancements seen from freight trains. In addition, there are three extreme events with $PM_{2.5}$ enhancements greater than 75 $\mu g/m^3$ that were seen only for the coal trains. The differences between the peak PM enhancements for coal and freight trains are statistically significant ($P < .001$). The statistically significant difference remains even if these extreme events are excluded from the analysis. For all train events, there is an excellent relationship between the PM_1 and $PM_{2.5}$ data, although the fraction of $PM_1/PM_{2.5}$ varies by train type. This is discussed in Section 3.5 below.

However, only some train events showed a good correlation between $PM_{2.5}$ and CO_2. Fig. 1 shows an example of a freight train that passed our site on July 10, 2014. In this case, the $PM_{2.5}$ enhancement is 24 $\mu g/m^3$, the CO_2 enhancement is 39 ppmv and the two are very well correlated, indicating that the dominant source of PM is diesel exhaust. Fig. 2 shows an example of a coal-carrying train that passed by on July 18, 2014. For this example, the peak $PM_{2.5}$ concentration is more than 6 times the peak shown

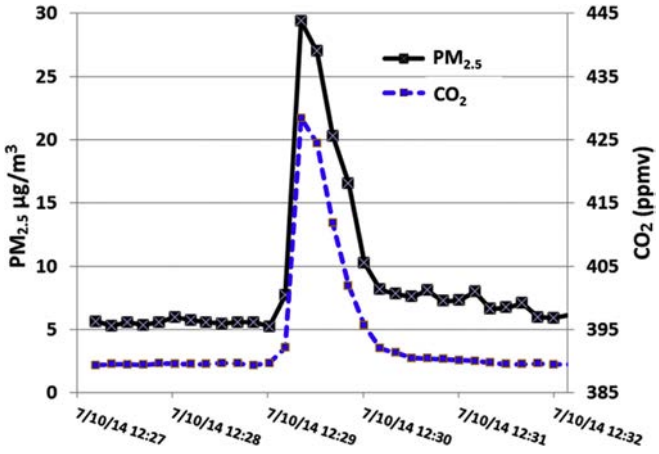

Fig. 1. $PM_{2.5}$ and CO_2 during passage of a freight train on 7/10/2014 at 12:29 PDT. The two values show a good correlation with an R^2 of 0.98 and a slope of 0.61 $\mu g/m^3$ per ppmv.

previously for the freight train, while the CO_2 enhancement is much smaller. In addition, the CO_2 peaks occurred at the start and end of the train passage due to locomotives at the beginning and end of this train, which is typical of the very long coal trains. The height of the CO_2 peak shows no obvious relationship with train type and likely varies mainly with meteorology, which influences the degree to which the combustion exhaust gases reach the measurement site. For the coal train (Fig. 2), the dominant source of PM is not diesel exhaust but coal dust. This was confirmed by the video (discussed below). It should be noted that DPM was probably present but is not apparent in the data due to the much larger coal dust peak. In this case, because the PM concentrations were not correlated to CO_2, we were not able to calculate a DPM emission factor. For this reason, we did not include train events in the DPM EF calculation if the $PM_{2.5}$–CO_2 R^2 is less than 0.5. We also excluded train events that had very small CO_2 enhancements (ΔCO_2 <2 ppmv), as these had erratic behavior.

Supplementary data related to this article can be found online at http://dx.doi.org/10.1016/j.apr.2015.04.004

3.3. DPM emission factors

The $\Delta PM_{2.5}/\Delta CO_2$ was used to derive the DPM emission factors. The average $\Delta PM_{2.5}/\Delta CO_2$ slope for all train events was found to be 6.56 $\mu g/m^3$ per ppmv, but this included many trains with a very poor correlation between $PM_{2.5}$ and CO_2. For the DPM emission factor calculation, we restricted our analysis to only those cases with an R^2 for the $PM_{2.5} - CO_2$ relationship of 0.5 or greater and a CO_2 enhancement of at least 2 ppmv. Table 2 shows the number of each train type that was used for the DPM analysis and statistics on the $PM_{2.5} - CO_2$ slope.

Table 2
PM and CO_2 data for freight and coal trains. Slopes for $\Delta PM_{2.5}/\Delta CO_2$ relationship is reported only for those train events with R^2 >0.5 and ΔCO_2 >2 ppmv.[a]

	Freight	Coal	All trains
Number	293	74	367
Average peak ΔPM_1 ($\mu g/m^3$)	11.0	19.7	12.5
Average peak $\Delta PM_{2.5}$ ($\mu g/m^3$)	10.7	20.9	13.0
Maximum $\Delta PM_{2.5}$ ($\mu g/m^3$)	57.2	232.3	232.3
Number with $PM_{2.5} - CO_2$ R^2 > 0.5 and ΔCO_2 > 2 ppm	152 (52%)	11 (15%)	163 (44%)
Mean/median $\Delta PM_{2.5}/\Delta CO_2$ slope ($\mu g/m^3$/ppmv)	0.70/0.56	0.71/0.56	0.70/.56
Max/Min slope	3.88/0.10	1.64/0.20	3.88/0.10

[a] In addition to the criteria given in the text above, we excluded one additional case with visible coal dust and an extremely high $PM_{2.5}$–CO_2 slope (12.0).

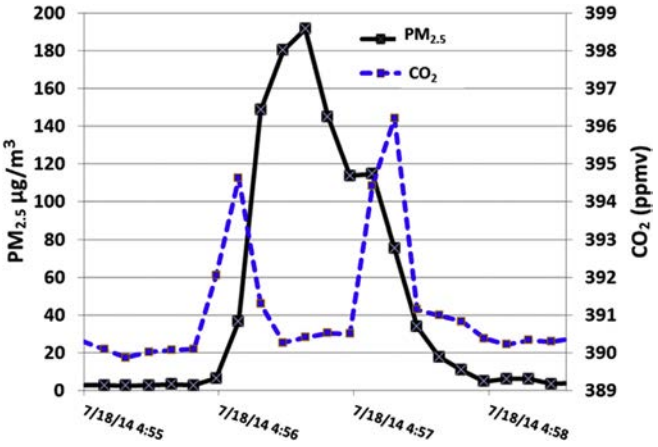

Fig. 2. $PM_{2.5}$ and CO_2 during passage of a coal train on 7/18/2014 at 4:56 PDT. The two parameters show no correlation during this time period. The train was observed to have locomotives in the front and rear, giving rise to the CO_2 peaks at the beginning and end of this time period.

The data in Table 2 show that while most freight trains were included in this analysis, the majority of coal trains were not included. This is due to the fact that most of the coal train events show a poor correlation between $PM_{2.5}$ and CO_2 (see Fig. 2). One coal train that would otherwise have been included in the DPM calculation had a $PM_{2.5} - CO_2$ slope of 12.0, more than 10 the mean value, and had visible coal dust in the video. Thus the large amount of $PM_{2.5}$ in this case cannot be attributed solely to DPM. This train event was not included in the DPM analysis. With this exclusion, the mean and median slopes for freight and coal trains are rather similar. Using equation (4), we find that the mean and median DPM EFs from our study are 1.2 and 0.99 g/kg fuel consumed, with an overall uncertainty of 20%. Our previous observations in the Pacific Northwest (Jaffe et al., 2014) found an average EF for diesel locomotives of 0.94 g/kg.

Diesel EFs for locomotives have been previously reported from several measurement campaigns. Kean et al. (2000) reported locomotive emission factors of between 1.8 and 2.1 g/kg using the EPA "NONROAD" model. A 2009 report (U.S. EPA, 2009) estimated that average locomotives EFs are declining about 5% per year, with a 2014 value of 0.98 g/kg. A study by Sierra Research in 2004 (Sierra Research, 2004) forecast a much slower decrease in the EFs of diesel locomotives, compared to U.S. EPA (2009), and for 2014 projected 1.4 g/kg. Our average measured EF is consistent with those cited in the above literature for the 2014 time frame, within the respective uncertainties.

3.4. Black carbon

We obtained simultaneous BC and $PM_{2.5}$ data on 294 of the trains. Table 3 reports the observed $BC/PM_{2.5}$ and $PM_1/PM_{2.5}$ enhancement ratios (discussed in Section 3.5).

These data show that, on average, 43% of the $PM_{2.5}$ was BC for all trains. In our previous study using similar data from 2013 (Jaffe et al., 2014), we found that the BC/PM_1 fraction was 52%, with most of those observations on freight trains. Our new data in 2014 indicates a significant difference ($P < .001$) in the average $BC/PM_{2.5}$ fraction for freight (0.47) and coal trains (0.29). Previous studies have found values that are similar to our freight train values for the BC/PM fraction. A study by Hildemann et al. (1991) found that 55% of diesel emissions were BC, and Watson et al. (1994) reported 45%. An Atlanta study (Galvis et al., 2013) found that diesel trains had BC to $PM_{2.5}$ ratios of 47–52%. The significant difference in the $BC/PM_{2.5}$ between coal and freight trains, shown in Table 3, indicates a significant coal dust component in the PM from the coal trains.

Table 3
$BC/PM_{2.5}$ and $PM_1/PM_{2.5}$ enhancement ratios for freight and coal trains.

	Freight	Coal	All trains
N (for $BC/PM_{2.5}$ analysis)	233	61	294
Mean/median $BC/PM_{2.5}$ (unitless)	0.47/0.40	0.29/0.20	0.43/0.35/0.27
Standard deviation on $BC/PM_{2.5}$	0.27	0.23	0.27
N (for $PM_1/PM_{2.5}$ analysis)	293	74	367
Mean/median $PM_1/PM_{2.5}$ (unitless)	0.93/0.93	0.96/0.96	0.96/0.96
Standard deviation on $PM_1/PM_{2.5}$	0.03	0.03	0.03

We assume that the coal dust has the same composition as the coal being shipped. This coal, from the Powder River Basin of Wyoming and Montana, has a relatively low carbon content compared to other coal types (ca 50% C), with the remainder of the mass made up of moisture and minerals, such as silicates, iron oxides and calcium oxide (NETL, 2012). While the low carbon content is partly responsible for the low $BC/PM_{2.5}$ fraction, shown in Table 3, our data suggest that other factors may also be involved. This could include a change in the mass absorption cross section for coal dust, as compared to diesel exhaust, which might reflect the impact of the coal mineral content, the organic matter composition or the size distribution of the particles.

3.5. $PM_1/PM_{2.5}$ fraction

The DustTrak calculates concentrations of PM in four size ranges, but due to the inlet sampling efficiency (discussed in Section 2) we considered only data for PM_1 and $PM_{2.5}$. Table 3 gives the statistical parameters on the $PM_1/PM_{2.5}$ enhancement ratio. Coal trains showed a larger mass fraction of particles above 1 µm aerodynamic diameter, and this difference is statistically significant. This reflects the significant contribution of coal dust to the $PM_{2.5}$ concentrations during the passage of the coal trains.

3.6. Influence of coal dust on $PM_{2.5}$ concentrations

In four cases, the videos revealed visible coal dust from the open-top coal trains. These visible coal dust plumes were seen in the four train events with the highest peak $PM_{2.5}$ concentrations (Table 4). We call these four train events with the highest $PM_{2.5}$ and visible coal dust "super-dusters." Two of the "super-duster" videos have been archived as part of the supplemental materials for this paper (8/7/2014 and 7/27/2014). Fig. 3 shows still images obtained from the video before and after train passage for the "super duster" on 8/7/2014, along with the measured $PM_{2.5}$ concentrations. We found that 4 out of 74 coal trains, or 5.4%, were classified as "super dusters" during our study.

A number of factors could be important in explaining the coal dust emissions of $PM_{2.5}$ from coal trains. These include quality of the surfactant application or factors that may disturb the coal/surfactant surface, such as high train speeds, exposure to high winds or rough handling during transport. While we have no information on

Table 4
The four train events with the highest peak $PM_{2.5}$ concentrations. In each case, a coal train with a visible coal dust plume was confirmed in the video recording.

Date/time (PDT)	Peak $PM_{2.5}$ conc. µg/m^3	Peak BC µg/m^3	$BC/PM_{2.5}$ ratio
8/7/14 17:28	232.3	53.5	0.23
7/18/14 4:57	188.8	88.9	0.47
7/20/14 14:07	77.6	8.86	0.11
7/27/14 21:16	53.1	9.13	0.17

Fig. 3. Images captured from the video camera before and after coal train passage on 8/7/2014 at 17:28 PDT. The full video of this train passage is archived as part of the supplemental materials for this paper. The camera looks to the west, downriver in the Columbia River Gorge. The coal train is visible in the right image and was moving from left to right.

upstream conditions, our data do allow us to examine the influence that train and local wind speed may have played on dust emissions. To do this, we calculated train speeds for each coal train from the videos. We also calculated the vector component of the winds in the direction opposite to the trains' travel. The sum of train speed plus vector wind speed represents the true wind speed across the open-top coal trains. We refer to this as the effective wind speed. During our study, the average train speed was 71.3 km/h and the average vector wind speed was 14.9 km/h.

Fig. 4 shows the effective wind speed versus peak $PM_{2.5}$ for each coal train event. The four "super dusters" are shown as large red squares. While no simple relationship emerges from this analysis, the data do suggest that "super dusters" are more likely to occur when the effective wind speed is greater than 80–90 km/h. Above 90 km/h, the fraction of "super dusters" is 10.3% (3 out of 29 trains), compared to 5.4% at all wind speeds. Thus we can view wind speed as one factor that increases the risk of high-level coal dust exposure. However, the fact that many coal trains with effective wind speeds greater than 90 km/h are not "super dusters" indicates that other factors, such as quality of the surfactant applied to the coal surface, must also be important.

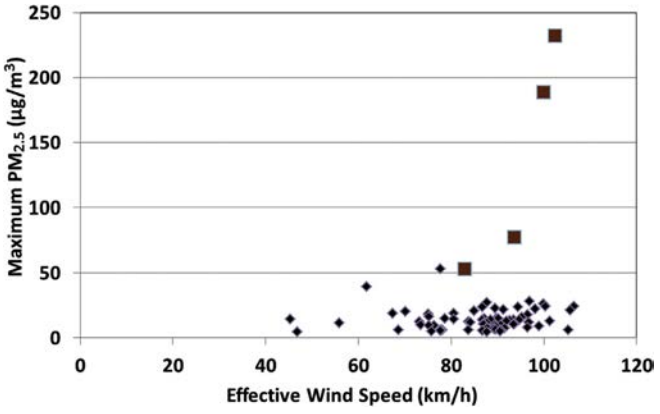

Fig. 4. Peak $PM_{2.5}$ enhancement for each coal train passage versus effective wind speed over the top of the train. The effective wind speed is calculated as the train speed plus the vector component of the wind at 180° to the train's movement. The four "super dusters" are shown as large red squares.

4. Conclusions

We measured PM_1, $PM_{2.5}$, BC and CO_2 during 367 train passages (train events) in the Columbia River Gorge. From the data, we calculated a DPM EF average of 1.2 g/kg fuel consumed (±20%) on 163 of those train events that show a good correlation between $PM_{2.5}$ and CO_2 (mostly freight trains). Our data indicate that nearly all open-top coal trains release coal dust, which contributes to enhanced $PM_{2.5}$ in the Columbia River Gorge. In four train events, that we call "super-dusters," the coal dust emissions led to visible dust plumes and the highest $PM_{2.5}$ concentrations observed in our study. But nearly all coal trains generate some degree of coal dust ($PM_{2.5}$) based on the following evidence:

1. Statistically higher peak $PM_{2.5}$ concentrations during passage of coal trains compared to freight trains. The peak $PM_{2.5}$ enhancements during a coal train passage are nearly double, on average, compared to the value during a freight train passage (Table 2);
2. The fact that most freight trains (52%) show a good correlation between $PM_{2.5}$ and CO_2, whereas very few coal trains (15%) show this relationship (Table 2);
3. The BC/$PM_{2.5}$ enhancement ratio is statistically higher for freight trains compared to coal trains (Table 3);
4. The PM_1/$PM_{2.5}$ enhancement ratio is statistically higher during passage of freight trains compared to coal trains (Table 3).

These four results demonstrate statistically significant differences between freight and coal trains, even if the four super-dusters are excluded from the statistical analysis.

Because our focus was on air quality, we measured the respirable size fractions of PM. Thus it is not possible to relate our observations to any data on bulk loss of coal during transport, since most of this loss will occur as much larger size particles. Because most coal train events show a poor correlation between $PM_{2.5}$ and CO_2, it is not possible to rigorously derive a fuel-based emission factor for the coal dust. Nonetheless, our data provide some guidance to anyone wishing to calculate total $PM_{2.5}$ emissions from the railway sector. Since the peak $PM_{2.5}$ values for coal trains are nearly double those for freight trains, it is reasonable to conclude that the total $PM_{2.5}$ emissions from coal trains are approximately double

those of freight trains. This would imply that the coal train $PM_{2.5}$ emissions consist of approximately half DPM and half coal dust.

Though all coal trains appear to generate some degree of dust, the "super-dusters" generate visible plumes and the highest concentrations of $PM_{2.5}$. "Super-dusters" represent 5.4% of all coal trains but 10.3% when the effective wind speed is greater than 90 km/h. This indicates that wind is one factor contributing to the coal dust emissions, but it is not the only explanatory factor.

Conflict of interest

The authors have no conflicts of interest to report.

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