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APPENDIX D

July 22, 2023

ATTN: **Docket ID No. EPA-HQ-OAR-2018-0794**

Administrator Michael Regan
C/O EPA Docket Center (EPA/DC)
Docket ID No. EPA-HQ-OAR-2018-0794
U.S. Environmental Protection Agency

Submitted via Federal eRulemaking Portal (Regulations.gov)

RE: **Comments of Westmoreland Mining Holdings LLC ("Westmoreland") on the "National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units Review of the Residual Risk and Technology Review" 88 Fed. Reg. 24854 (April 24, 2023) ("Proposed Rule").**

Dear Administrator Regan:

Westmoreland Mining Holdings LLC ("Westmoreland") presents the following comments regarding EPA's proposed rulemaking titled "National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units Review of the Residual Risk and Technology Review," published in the Federal Register at 88 Fed. Reg. 24854, on April 24, 2023 (hereafter, the "Proposed Rule"). Westmoreland supplies all coal required by the mine-mouth powerplant in Colstrip Montana.

This proposed rulemaking has significant implications for coal fired power plants in general and disproportionately impacts one facility in particular, the Colstrip Power Plant in Colstrip, Montana. Under EPA's proposal, the rule at issue would impose tens of millions of dollars on Colstrip per year and require temporary shutdown to design and retrofit additional emission controls, despite the fact that EPA has now determined multiple times that the existing standards provide an ample margin of safety to protect public health and that more stringent standards are not necessary to prevent an adverse environmental effect.

For these reasons and those discussed below, the Proposed Rule does not demonstrate that its proposed technology-review-based emission standards are in fact "necessary" in terms of cost, feasibility, utility, cost-effectiveness, and adverse collateral environmental impacts. Accordingly, Westmoreland offers the following comments herein regarding specific issues with the Proposed Rule and its supporting analysis.

In the event that EPA instead finalizes different limits than those in the Proposed Rule, EPA must at that time provide a rationale for such inclusion and provide opportunity for public comment on any such newly proposed limits.

Any Limits Proposed by EPA Must Appropriately Account for Cost, Feasibility, Utility, Cost Effectiveness, and Adverse Environmental Impacts Associated With Proposed Technology

Major source emission standards under section 112 of the CAA are initially be based on "the maximum degree of reduction in emissions of the hazardous air pollutants . . . that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources." *See* 42 U.S. Code § 7412(d)(2)(a). EPA then must conduct a "technology review" of these established limits every 8 years, in which EPA "shall review, and revise as necessary (taking into account developments in practices, processes, and control technologies), emission standards promulgated under this section." *See* 42 U.S. Code § 7412(d)(6).

Importantly, during a technology review, EPA is not required to recalculate the maximum achievable control technology floor. *Ass'n of Battery Recyclers, Inc. v. E.P.A.*, 716 F.3d 667, 673 (D.C. Cir. 2013). Nor does EPA claim to do so in the Proposed Rule. When determining whether changes are "necessary" as part of a technology review EPA is statutorily required to account for the cost of any proposed changes. *Id.* And courts have upheld EPA's past practice of further taking into account "feasibility, utility, cost-effectiveness, and adverse collateral environmental impacts associated with this technology" when assessing whether to require additional limits as part of a technology review. *Id.* at 674. And because EPA has relied on such factors in the past, it would be unlawfully arbitrary for EPA to fail to consider such factors in this or other technology reviews without providing a rationale for the reversal in policy. *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502 (2009) ("An agency may not . . . depart from a prior policy sub silentio"). The Proposed Rule purports to be solely based on EPA's technology review authority, and thus must account for these factors including cost, feasibility, utility, cost-effectiveness, and adverse collateral environmental impacts.[1]

The Proposed Rule is Not Cost Effective, and EPA's Determination to the Contrary is Arbitrary and Unreasonable

The proposed rule seeks to impose an eight-figure cost-per-ton of emission reduction. Not only is there no reasonable basis to find cost effectiveness of this magnitude to be cost effective, but it is also so far afield from prior EPA cost effectiveness determinations as to be arbitrary and is in direct conflict with prior EPA determinations that such costs are in fact not cost effective.

The Proposed Rule itself estimates that lowering the fPM standard to 0.010 lb/MMBtu would only reduce industrywide metal HAP by about 6 tons per year but would cost $77.3 million

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[1] Although EPA also has authority to make changes to an existing emission standard under Section 112 based on a "residual risk" analysis of whether an emission standard provides an "ample margin of safety to protect public health." *See* 42 U.S. Code § 7412(f), the Proposed Rule expressly reaffirms EPA's 2020 determination that the current MATS requirements already provided an ample margin of safety to protect public health and that more stringent standards were not necessary to prevent an adverse environmental effect, and thus does not rely on that basis for any of the proposed additional emission limits. *See* Proposed Rule at 24865-66.

to $93.2 million per year. See Proposed Rule at 24870, Table 3. Thus, the total cost effectiveness of the proposed reduction is 12.2 million to 14.7 million dollars per ton of non-hg metal HAP controlled. EPA has never endorsed such extraordinary costs for such meager rewards and doing so here would be arbitrary and capricious.

Indeed, even the low end of EPA's estimate—$12.2 million per ton of emission reduction – dwarfs other cost-per-ton calculations previously rejected by EPA as not cost effective. *See, e.g.,* 85 Fed. Reg. 42074, 42090 (July 13, 2020) (rejecting an "estimated cost effectiveness ... [of] approximately $14,000/ton," because it "is above the range that the EPA has typically considered cost effective for volatile HAP"); *see also* 78 Fed. Reg. 10006, 10020-21 (Feb. 12, 2013) (rejecting more stringent limit of 0.04 lb/ton, versus the then-current limit of 0.07 lb/ton, reasoning that achieving that additional increment of particulate reduction would not be cost effective on a cost-per-ton basis because "$268,000 per ton of PM removed ... is [a] significantly higher cost effectiveness for PM than the EPA has accepted in other NESHAP standards") (citing 76 Fed. Reg. 15704 (March 21, 2011) (rejecting $48,501 per ton of PM as not cost effective for PM emitted by solid waste energy recovery units)). Likewise, in a report titled *The Benefits and Costs of the Clean Air Act from 1990 to 2020* (released in April 2011), EPA noted in the specific context of PM, that "controls more costly than $15,000 per ton may not be cost-effective," and acknowledged that "[c]ontinued effort is needed to ensure that air pollution policies are pursued in the most cost-effective manner possible."[23] And just earlier this year, EPA rejected, on cost-effectiveness grounds, imposition of lead controls that would, for at least one facility, result in "a cost effectiveness of $4.7M/ton," which EPA acknowledged "is considerably higher than cost effectiveness values we have historically accepted for lead." *See, e.g.,* 88 Fed. Reg. 11556, 11565 (February 23, 2023). The proposed rule's cost effectiveness of $12-14 million per ton of regulated pollutant emissions is not aligned with EPA's policy, precedent, or obligation to pursue air pollution policies "in the most cost-effective manner possible," and would arbitrarily conflict with every single prior cost-effectiveness determination EPA has made in analogous contexts.

The few instances in which EPA has found imposition costs per ton in the same order of magnitude as the Proposed Rule to be cost effective is exclusively in the context of highly toxic chemicals e.g. hexavalent chromium, or ethylene oxide. And even then, EPA only proposed such high cost-per-ton of emissions reduced to be cost effective when such reductions were necessary to provide an ample margin of safety under residual risk reviews. Those examples thus could not be used to justify the Proposed Rule (and notably, EPA properly does not do so). In fact, EPA expressly determined in 2020 that the current NESHAP limit for coal fired power plants was sufficiently protective of human health and the environment, and that no further reductions were required. The Proposed Rule expressly agrees with its 2020 finding and makes clear that EPA is "not proposing any revisions to the 2020 determination" "that the current MATS requirements

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[2] Report is available at https://www.epa.gov/sites/default/files/2015-07/documents/fullreport_rev_a.pdf

[3] EPA assumes total fPM reductions of 2,074 tons/year (Proposed Rule at 24870, Table 3), which would equate to a cost effectiveness of $37,270 to $44,937 per ton of fPM, well over the costs that EPA has specifically found not cost effective for fPM as well. But regardless, because an RtR review under Section 112 is focused on whether additional control of *regulated HAP* is "necessary" the cost effectiveness analysis should focus on the regulated HAP rather than justification in terms of non-HAP reductions.

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provided an ample margin of safety to protect public health in accordance with CAA section 112 ... [and] that more stringent standards were not necessary to prevent an adverse environmental effect." (Proposed Rule at 24865-66.) It is therefore arbitrary and capricious for EPA to impose such unprecedented costs on facilities, particularly when the reduction will only result in a marginal reduction of emissions that even EPA agrees are not posing unreasonable risk to the environment or public health.

Furthermore, EPA's rationale for imposing such exorbitant compliance costs is a non-sequitur. EPA justifies the costs "[b]ecause much of the fleet is already" in compliance with the proposed limit, and therefore the costs "are modest in the context of total control costs and emissions of the coal fleet." But the control costs of the coal fleet at large is not the relevant metric because, as EPA points out, much of the fleet will not incur such high substantial additional costs. Instead, the tens of millions of dollars of annual compliance costs will fall disproportionately on a few facilities. For Colstrip in particular, EPA estimates an annualized cost of $38,051,172.[4] EPA does not adequately justify its proposal of forcing a few facilities to incur massive compliance costs, only to incrementally reduce emissions that have already been reduced to a level which EPA agrees poses no danger to the environment or public health. The fact that the cost will be disproportionately allocated to a few facilities, and most facilities will not incur any additional costs, serves only to highlight the arbitrary and capricious nature of the Proposed Rule. After all, it is arbitrary to justify imposition of cost-ineffective proposals by averaging the cost across all power plants not in fact impacted by the massive costs, just as it would be arbitrary to conclude that imposing cost-ineffective controls was cost justified in comparison to profits across all other sectors of the US economy not impacted by the Proposed Rule.

Not only is EPA's rationale arbitrary on its face, but it is also arbitrary because it reverses, without explanation, EPA's prior acknowledgements that cost-effectiveness should account for the cost effectiveness of imposing controls at each affected facility, and not simply on an aggregate nationwide basis. *See, e.g.,* 88 Fed. Reg. 11556, 11565 (February 23, 2023) (rejecting on cost effectiveness grounds a lead emission requirement because it would have imposed costs on a single facility "a cost effectiveness of $4.7M/ton," which EPA acknowledged "is considerably higher than cost effectiveness values we have historically accepted for lead.").

EPA's Cost Analysis is Unreasonable and Arbitrary

The other elements of EPA's cost analysis underlying the Proposed Rule are likewise arbitrary or otherwise unsupported in several key respects:

First, the monetized benefits that EPA weighs against the above discussed costs are based *entirely* on non-HAP (i.e., PM$_{2.5}$, Ozone, and CO$_2$).[5] This is not reasonable or appropriate, because the statutory requirement that revised technology standards under section 112(d)(6) be "necessary"

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[4] $18,992,866 for one unit, and $19,058,306 for the other. *See* 2023 Technology Review for the Coal- and Oil-Fired EGU Source Category, at 80, Appendix D, Docket ID. EPA-HQ-OAR-2018-0794-5789 ("Technology Review TSD")

[5] *See* Proposed Rule at 24891 (projecting monetized benefits of $3.3 billion in present value, or expected annual value of $390 million, based solely on anticipated reductions of PM$_{2.5}$, Ozone, and CO$_2$ that are expected to occur as an indirect effect of this Proposed Rule).

must be understood in the context of section 112, which applies *solely* to HAPs (and in fact bars the regulation of criteria pollutants as HAPs), and thus a finding that a specific control on a specific regulated HAP is "necessary" must be justified by the benefits derived from additional regulation of that specific HAP, and not based on benefits that might be associated with non-HAP. Furthermore, EPA's reliance on non-HAP reduction benefits to justify the cost of proposed controls is arbitrary because it departs from EPA's prior related rulemakings without adequate explanation. Specifically, when assessing the appropriateness of taking into account benefits of non-HAP reductions in the context of the Clean Air Act's HAP regulations of fossil fuel fired power plants under section 112 of the Clean Air Act, EPA found in 2020 that "equal reliance on the particulate matter (PM) air quality co-benefits projected to occur as a result of the reductions in HAP was flawed as the focus of CAA section 112(n)(1)(A) is HAP emissions reductions."[6] More specifically, "it would be highly illogical for the Agency to make a determination that regulation under CAA section 112, which is expressly designed to deal with HAP, is justified principally on the basis of the criteria pollutant impacts of these regulations. That is, if the HAP related benefits are not at least moderately commensurate with the cost of HAP controls, then no amount of co-benefits can offset this imbalance for purposes of a determination that it is appropriate to regulate under CAA section 112(n)(1)(A)." Although EPA later rescinded the particular rulemaking containing this analysis, EPA did not abandon this specific determination regarding the appropriateness of using non-HAP co-benefits to justify section 112 HAP regulations, instead making a specific finding that "under its preferred approach, the EPA finds regulating EGU HAP emissions is appropriate without consideration of non-HAP emissions reductions".[7] Although CAA Sections 112(n)(1)(A) and 112(d)(6) are separate statutory provisions, both turn on whether regulation is "necessary" in the specific context of section 112, and thus the cost/benefit analysis must be treated consistently. Accordingly, it is unlawful and arbitrarily inconsistent with prior EPA actions to justify the costs and burdens of the Proposed Rule by resort to non-HAP co-reductions.

Second, the Proposed Rule states that its calculation of estimated benefits related to decreased CO_2 emissions are based on an interim Social Cost of Carbon estimate developed by an Interagency Working Group in February 2021 [8] Those estimates, relied on in the Proposed Rule, are in turn "identical to those reported in the 2016 SC-GHG TSD (IWG 2016a) adjusted for inflation to 2019 dollars."[9] It is not reasonable for EPA to rely on these social cost of carbon

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[6] *See* "Proposed Rule: National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review," 84 Fed. Reg. 2670, 2676; see also "Final Rule: National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Reconsideration of Supplemental Finding and Residual Risk and Technology Review," 85 Fed. Reg. 31,286, 31,299 (May 22, 2020) ("finalizing the determination outlined in the 2019 Proposal").

[7] *See* "National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Revocation of the 2020 Reconsideration and Affirmation of the Appropriate and Necessary Supplemental Finding," 88 Fed. Reg. 13956, 13967 (March 6, 2023).

[8] Proposed Rule at 24890 (citing "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990," (Feb. 2021), available at https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf).

[9] See "Final version of the RIA for the Proposed EGU MATS RTR," At 4-49, Table 4-11, Docket ID. EPA-HQ-OAR-2018-0794-5837.

estimates, given the many issues identified with the arbitrariness and unlawfulness of these very same social cost of carbon estimates by stakeholders and states in other litigation to which EPA has been a party, without addressing the flaws that have been identified to EPA in such lawsuits.[10] Specifically, it is arbitrary for EPA to fail to address relevant considerations, and these many challenges to the validity and reliability of the 2021 social cost of carbon estimates are relevant considerations which EPA must address before deciding to rely on those estimates.[11] And as further detailed in the complaints and motions for preliminary injunction specifically referenced in footnote 10 above, which are hereby incorporated by reference into these comments, EPA reliance on the IWG2021 cost of carbon estimates is unlawful and arbitrary, because the IWG2021 expressly violates statutory prohibitions, is based on a fundamentally flawed methodology that does not take into account statutory considerations, ignores decades of best regulatory practices, and sub silentio departs from regulatory documents that remain in force. For example:

    a. The underlying 2021 Interim Working Group assessment (IWG 2021) reflects a policy and value judgment to consider the anticipated global effects of greenhouse gases, not just their anticipated effects within the United States. IWG2021 at 14–16. But reliance on global impacts directly conflict with the text and structure of the Clean Air Act, both by considering factors not permitted by Congress (i.e., global impacts) and neglecting to consider relevant statutory factors and their unmistakably domestic focus. In adopting the CAA, Congress made several specific findings, all of which are explicitly domestic. *See* 42 U.S.C. §7401(a)(1)-(4) (referring to "the Nation's population," the "responsibility of States and local governments," and "cooperative Federal, State, regional, and local programs to prevent and control air pollution"). Congress also made clear that CAA programs are designed to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of *its population*." *Id.* §7401(b)(1) (emphasis added). To implement this design, the CAA authorizes the Administrator of EPA to set air pollution standards for new motor vehicles and stationary sources, "which may reasonably be anticipated to endanger public health or welfare." *Id.* §§ 7411(b)(1)(A), 7521(a)(1). Nowhere is the Administrator authorized to consider global effects in setting these vitally important standards. The structure of the CAA likewise confirms that agencies may not consider global effects. When Congress addresses global effects through the CAA, it does so through a specific process in Section 115. There the Administrator is instructed to instate a formal State SIP plan process when he "has reason to believe that any air pollutant or pollutants emitted in the United States cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country." 42 U.S.C. §7415(a). When EPA wishes to consider foreign effects of air pollution, it can only through this specific process—not through the other

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[10] See *Missouri v. Biden*, No. 4:21-cv-00287 (E.D. Mo., complaint filed, and motion for preliminary injunction filed May 3, 2021); *Louisiana v. Biden*, No. 2:21-cv-01074 (W.D. La., complaint filed April 22, 2021, and motion for preliminary injunction filed July 29, 2021).

[11] See *FCC v. Prometheus Radio Project*, 141 S. Ct. 1150, 1158 (2021) (When an agency acts, it must "reasonably consider[] the relevant issues and reasonably explain[]" its actions) (citations omitted); *see also Michigan v. EPA*, 576 U.S. 743, 751–52 (2015) ("[A]gency action is lawful only if it rests on a consideration of the relevant factors" and "important aspect[s] of the problem.") (internal quotations and citations omitted).

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provisions of CAA, which are explicitly focused on domestic effects. This conclusion is further buttressed by the fact that when Congress wishes for agencies to consider international effects, it does so explicitly. For example, in the Energy Independence and Security Act of 2007's amendment to EPCA, Congress created an International Clean Energy Foundation entirely separate from the CAFE and energy efficiency programs to study international implications of greenhouse gases. *See* 42 U.S.C. §17352(a)(3). By creating such a separate authority Congress demonstrates that it knows how to clearly instruct agencies to consider international effects. *Cf. Morrison v. Nat'l Australia Bank Ltd.*, 561 U.S. 247, 255 (2010) ("When a statute gives no clear indication of an extraterritorial application, it has none*."); cf. Corrosion Proof Fittings v. E.P.A.*, 947 F.2d 1201, 1209 (5th Cir. 1991) (international considerations cannot be implied when statue "provides a laundry list of factors to consider when promulgating a rule under section 6, including 'the effect [of the rule] on the national economy'" and "[i]nternational concerns are conspicuously absent from the statute"). Accordingly, reliance on the IWG2021 explicitly and unlawfully conflicts with the text and structure of the Clean Air Act. Agency action is unlawful if it is "not in accordance with law" or "in excess of statutory jurisdiction, authority, or limitations." 5 U.S.C. §706(2)(A) & (C).

b. EPA's reliance on IWG2021 ignores specific factual findings and decisions made by the previous EPA Administration and other federal agencies. In the first place, IWG2021's reliance on global impacts, in addition to being unlawful, as described above, also arbitrarily departs from decades of prior EPA practice and the directives of OMB Circular A-4. *See* Arden Rowell, *Foreign Impacts and Climate Change*, 39 Harv. Envtl. L. Rev. 371, 389 (2015) (observing that "agencies have used [the domestic scope] in their cost-benefit analyses for decades"). Indeed, IWG2021 concedes that "[b]enefit-cost analysis of U.S. Federal regulations have traditionally focused on the benefits and costs that accrue to individuals that reside within the country's national boundaries." IWG2021 at 14. *Cf. California v. Bernhardt*, 472 F. Supp. 3d 573, 600-01 (N.D. Cal. 2020) ("While the Executive branch holds the power to issue executive orders, an agency cannot flip-flop regulations on the whims of each new administration. The APA requires reasoning, deliberation, and process. These requirements exist, in part, because markets and industries rely on stable regulations."). But IWG2021 does not actually acknowledge that it broke with OMB Circular A-4's clear and reasoned directive to "focus on benefits and costs that accrue to citizens and residents of the United States." Circular A-4, at 15. Instead, IWG2021, like its predecessor, attempts to argue that its global focus is somehow consistent with Circular A-4's domestic effects framework. *See Rowell, supra*, at 397 n.138 ("The IWG's choice of a standardized global SCC thus deviates from [Circular A-4's] guidance in two important ways: in focusing on foreign impacts, and in encouraging agencies to value, calculate, and make decisions based upon a global SCC that does not require any separate identification, much less consideration, of domestic impacts."). By misrepresenting Circular A-4's clear guidance, the IWG2021 arbitrarily failed to "display awareness that it is changing position." *See Fox Television Stations*, 556 U.S. at 515 ("An agency may not, for example, depart from a prior policy sub silentio or simply disregard rules that are still on the books."). Moreover, the IWG2021 completely ignores the

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extensive discussion and findings regarding discount rates and uncertainty in Chapter 7 of the EPA's RIA supporting the repeal of the Clean Power Plan. *See* EPA, *Regulatory Impact Analysis for the Review of the Clean Power Plan*, at 7-2 through 7-8 (June 2019), Docket ID EPA-HQ-OAR-2017-0355-26743; EPA, *Regulatory Impact Analysis for the Review of the Clean Power Plan: Proposal*, at 42-46 (Oct. 2017), Docket ID EPA-HQ-OAR-2017-0355-0110. Moreover, IWG2021 arbitrarily departed from decades of prior Executive Branch cost/benefit practice regarding discount rates. As embodied in OMB Circular A-4, Executive Branch agencies have long utilized standard discount rates of 3 percent and 7 percent. *See* Arden Rowell, *Foreign Impacts and Climate Change*, 39 Harv. Envtl. L. Rev. 371, 385 n.88 (2015) ("Agencies typically discount at 3% and 7%, the rates set forth in OMB Circular A-4, which provides well-established executive guidance to agencies performing cost-benefit analysis."). The IWG fundamentally alters this longstanding practice without a reasoned justification. Circular A-4 explains that the 7 percent discount rate is essential to reasoned cost/benefit analysis because "it is a broad measure that reflects the returns to real estate and small business capital as well as corporate capital" and "approximates the opportunity cost of capital." Circular A-4, at 33. Therefore, the 7 percent discount rate "is the appropriate discount rate whenever the main effect of a regulation is to displace or alter the use of capital in the private sector." *Id.* Neither the Proposed Rule nor IWG2021 assert that the fundamentals of economics have changed in a manner justifying abandoning the longstanding 7 percent discount rate. Instead, to reach a higher SC-GHG valuation, the Proposed Rule simply ignores the effects that regulations have on "the use of capital in the private sector" by instead stating that the use of 3% or lower discount rate is appropriate due to "intergenerational impacts" (Proposed Rule at 24894). But this capital measure, as long recognized by Circular A-4, and Executive Branch agencies, is an indispensable variable when calculating regulatory costs. By directing agencies to ignore it, the IWG2021 estimates direct agencies to systematically ignore an important aspect of any regulatory cost/benefit analysis. EPA's failure to address these prior fact findings by itself renders EPA's reliance on IWG 2021 Estimates arbitrary and capricious. *See F.C.C. v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009) (agency required to "provide a more detailed justification than what would suffice for a new policy created on a blank slate" when "its new policy rests upon factual findings that contradict those which underlay its prior policy"); *see also Dep't of Homeland Sec. v. Regents of the Univ. of Cal.*, 140 S. Ct. 1891, 1912 (2020) (agency's "prior judgment" or factual finding cannot be ignored "without any consideration whatsoever" of the prior finding or alternative).

c. Similarly, EPA's reliance on IWG2021 ignores the relevant fact that other agencies have rejected IWG2021 and its approaches. For example, IWG2021 does not even acknowledge the existence of the Council on Environmental Quality's final rule regarding the appropriate calculation of uncertainty under NEPA, which finalized revisions to its binding NEPA regulations to "simplify the definition of effects by striking the specific references to direct, indirect, and cumulative effects and providing clarity on the bounds of effects

consistent with the Supreme Court's holding in *Public Citizen.*"[12] As agencies have observed, CEQ's NEPA regulation "explains that agencies should not consider effects that are 'remote in time, geographically remote, or the result of a lengthy causal chain.'"[13] Instead, "[u]nder this standard, the mere fact that an effect might not occur 'but for' the project is not sufficient to trigger a NEPA analysis; rather, there must be a 'reasonably close causal relationship' between the proposed action and the effect, 'analogous to proximate cause in tort law.'" *Id.* This proximate cause standard is fundamentally at odds with the expansive approach to causation embedded in the IWG2021, which are much closer to the but-for standard that CEQ explicitly considered and rejected. The IWG does not even acknowledge the existence of CEQ's standard—or that it is compelling agencies to use a fundamentally different causation standard when calculating environmental effects for cost/benefit purposes than the standard they must use when calculating the same effects under NEPA. Furthermore the Bureau of Land Management found that the IWG2016 on which the IWG2021 is based "is not appropriate" because "it is intended to model effects on the welfare of future generations on a global scale by additional carbon emissions occurring in the present," "[m]onetizing only certain effects on social welfare can lead to an unbalanced assessment," and "[r]eporting the SCC in isolation would be misleading." BLM, Record of Decision, WY-060-EA13-147 (Nov. 30, 2017) (regarding West Antelope II South Lease Modification WYW-177903; *see also WildEarth Guardians v. Bernhardt,* 2020 WL 6799068, at *11 (D.N.M. Nov. 19, 2020) (affirming BLM's refusal to use SCC).

d. The IWG2021 fails to justify the use of a global rather than domestic scope in calculating costs. Focusing on global effects is particularly unreasoned in the context of greenhouse gas emissions. As one court has noted, "Greenhouse gases, once emitted from a specific source, quickly mix and disperse in the global atmosphere and have a long atmospheric lifetime. Current research on how greenhouse gases influence global climate change has focused on the cumulative environmental effects from aggregate regional or global sources. But there is limited scientific capability in assessing, detecting, or measuring the relationship between a certain GHG emission source and localized climate impacts in a given region." *Washington Env't Council v. Bellon,* 732 F.3d 1131, 1143-44 (9th Cir. 2013). Thus, calculating the global effect of any discrete regulated activity is inherently arbitrary. *Id.* (noting that "the effect of collective emissions from the Oil Refineries on global climate change is 'scientifically indiscernible'").

e. IWG2021 fails to consider all important aspects of the problem by failing to consider the positive externalities of energy production. IWG2021 arbitrarily focused only upon energy production's negative aspects without discounting costs based on the concomitant benefits affordable energy has on economic development, social welfare, economic and energy independence, and international peace. Instead, it continued to rely upon flawed integrated assessment models (IAMs) that arbitrarily refuse to consider potential benefits from a

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[12] CEQ, "Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act," 85 Fed. Reg. 43304, 43375 (July 16, 2020).
[13] *Qualifying Facility Rates & Requirements Implementation Issues Under the Pub. Util. Regul. Pol'y Act of 1978,* 173 FERC ¶ 61158 n.790 (2020) (quoting id.).

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warming climate. The DICE Model, which accounts for 1/3 of the input of IWG2021 (id. at 10), focuses exclusively upon increased mortality from warming-related diseases but ignores decreased mortality from wintertime mortality. *See* Susan E. Dudley et al., *The Office of Management and Budget's Draft 2010 Report to Congress on the Benefits and Costs of Federal Regulations*, at 12, GW Regulatory Studies Center; *see also* Arden Rowell, *Foreign Impacts and Climate Change*, 39 Harv. Envtl. L. Rev. 371, 383 (2015) ("[L]acking any principled mechanism for distinguishing between the models, the IWG decided to simply average them. This had the effect of weighting each model as one third of the SCC."). Both IWG2021 and its underlying models systematically refuse to consider economic and health benefits, indicating a determination to bend science to a particular policy outcome.

f. There is a "significant mismatch" between the conclusions of the IWG2021 and the administrative record. *See Dep't of Commerce v. New York*, 139 S. Ct. 2551, 2575 (2019). IWG2021 itself recognized that its SC-GHG Estimate is based on antiquated models, needs updating to reflect changed circumstance, and based largely on guesswork. But instead of addressing these serious shortcomings, the Working Group rushed out the SC-GHG Estimates in a hurried process with no outside input. The only discernable reason for this rush was to comply with EO 13990's demand that the IWG come up with the most important number in American regulatory policy in a month. *Cf. Texas v. United States*, 2021 WL 723856, at *41 (S.D. Tex. Feb. 23, 2021) (noting that a similar time frame "did not leave much time for reflection and analysis"). Although political reasons can be a legitimate basis for agency action, agencies cannot avoid accountability by refusing to frankly acknowledge the influence of such reasons on their decisionmaking, *Dep't of Commerce*, 139 S. Ct. at 2575 ("[W]e cannot ignore the disconnect between the decision made and the Case explanation given [and] are 'not required to exhibit a naiveté from which ordinary citizens are free.'") (cleaned up). "Altogether, the evidence"—that IWG2016 was at a minimum, insufficient and out of date -- "tells a story that does not match the explanation the [Working Group] gave for [its] decision." *Id*. Because IWG2021 dresses up a political decision in the cloak of science without acknowledging the political drivers of the decision, it is arbitrary and capricious.

g. Both the underlying models themselves and the process IWG2021 uses to produce social cost values from them are inherently unreliable. IWG2021 acknowledged that the task of assigning "social costs" to greenhouse gases involves attempting to predict global "changes in net agricultural productivity, human health effects, property damage from increased flood risk natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services." IWG2021 at 2. This includes "spillover pathways such as economic and political destabilization and global migration." *Id*. at 3. In other words, this task involves attempting to predict such unknowable contingencies as the likelihood, frequency, scope, and severity of future international conflicts and human migrations for *300 years* into the future. *Id*. The Working Group also admitted that its calculations involve attempting to predict future developments in human technology and innovation for centuries to come, future mitigation strategies performed by the world's 195

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nations, and global atmospheric concentrations due to greenhouse gas emissions. *Id.* at 15-16. The underlying models estimates of climate impacts out to the year 2300 represent "a significantly longer time scale than is generally included in such analyses, which do not typically extend further than fifty years." Rowell, *supra* at 386. This time horizon is inherently arbitrary and cannot serve as a reasoned basis for regulatory prediction given the impossibility of forecasting that far into the future. For example, estimating costs incurred almost 300 years in the future would require considering how well someone living in 1720 could have projected the societal values and vulnerabilities of 2020, including markets, levels of economic output, technologies, and lifestyle preferences. Market seers of 1720 would have overemphasized the importance of protecting against a future threat to the supply of horses, given that horses and other animals provided the sole source of locomotion on land other than walking. As noted above, the models are also flawed because they systematically undervalue or entirely ignore positive externalities from energy production. And the IWG added another layer of arbitrariness in its method of using these arbitrary models to come to the SC-GHG Estimates. Each model produces different SC-GHG values. Instead of accounting for the relative flaws and strengths of each model, the IWG 2021 simply averages the SC-GHG values produced by these models to reach the definitive SC-GHG Estimates that agencies must follow. *See* Rowell, *supra* at 383 ("[G]iven that the different IAMs predicted different monetized impacts, how should the IWG calculate a single, standardized SCC? One option, of course, would have been to create multiple SCCs representing the predicted outcomes of each model. ... Instead, lacking any principled mechanism for distinguishing between the models, the IWG decided to simply average them. This had the effect of weighting each model as one third of the SCC."). In other words, the SC-GHG Estimates are just a simple average of three flawed models— nothing more. *See id.* at 383 n.75 (noting that "[t]his approach has not been met with universal approval" in the expert community); Cf *Settling Devotional Claimants v. Copyright Royalty Bd.*, 797 F.3d 1106, 1109 (D.C. Cir. 2015) (an "arbitrary splitting of the baby" is not reasoned decision making).

h. Unreliability is further introduced in the IWG2021 approach to calculating the present dollar value for the "social cost" of a greenhouse gas (i.e., the "discount rate"). *Id.* at 16–22. IWG2021 calculated the social cost of each gas at four different values using three different discount rates – 5%, 3%, and 2.5%, and a 95% probability distribution for the 3% rate. Using these different discount rates, the "social cost" of carbon dioxide ranges from $14 per metric ton to $152 per metric ton, depending on the discount rate selected. *Id.* at 5. The Working Group admits that "the range of discount rates reflects both uncertainty and, at least in part, different policy or value judgments." *Id.* at 27. According to the Working Group, "the choice of a discount rate ... raises highly contested and exceedingly difficult questions of science, economics, ethics, and law." *Id.* at 17 (emphasis added). But rather than explain the proper discount rate to use in this action, EPA arbitrarily averages the discount rates together without attempting to explain which is more appropriate or why an average would appropriately address the "highly contested and exceedingly difficult questions of science, economics, ethics, and law" identified by IWG2021.

Third, regardless of the validity of using the interim social cost of carbon estimates, it is arbitrary for EPA to take credit for CO_2 decreases associated with the Proposed Rule when EPA is simultaneously rendering any such emission emissions irrelevant in its contemporaneously proposed GHG NSPS rulemaking requiring carbon capture on these very same sources.[14] EPA is required to account for other rulemaking actions it has proposed when evaluating a given proposed rulemaking.[15] Accordingly, EPA cannot double count anticipated CO_2 emission reductions from this rulemaking when this rulemaking would not in fact cause such reductions, or at least not to the same magnitude, when EPA's other related rulemakings for this same source category are accounted for.

Fourth, EPA's estimated benefits related to decreased Ozone emissions is flawed because it accounts for decreases in Ozone exposures generally, without accounting for the fact that EPA has in another contemporaneous rulemaking determined that Montana emission sources *do not* significantly contribute to any out of state Ozone concentrations above EPA's national ambient air quality standards for ozone, and thus any benefits related to reduced ozone related to Colstrip emissions cannot be assumed to occur outside Montana.[16]

Fifth, although EPA estimates that a vastly disproportionate majority of costs and emission reductions (e.g., of PM) will be localized at Montana power plants,[17] EPA does not appear to limit its modeling of benefits from reduced PM emission exposures to populations actually within a scope that could be affected by such plants, or otherwise account for the localized nature of benefits from reduced emission exposures to populations near relevant facilities EPA anticipates PM emission reductions to actually occur. And it would be arbitrary to account for health benefits nationwide from reduced exposures without first demonstrating that such populations are actually geographically capable of benefitting from any reduction in emissions from Colstrip and the other facilities from which EPA anticipates the Proposed Rule to force PM reductions.

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[14] *See e.g.,* "New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule," 88 Fed. Reg. 33240 (May 23, 2023).

[15] *See e.g., Portland Cement Association v. EPA,* 665 F.3d 177 (D.C. Cir 2011) (holding in the context of EPA publishing related but separate NSPS and NESHAP rulemakings that "Basing its decision on a premise the agency itself has already planned to disrupt is arbitrary and capricious" and "Reasoned decision-making requires an agency to examine the relevant data and articulate a satisfactory explanation for its action[s]. The impending [regulatory change regarding an] undeniably related source category is clearly a relevant factor or an important aspect of the problem that must be considered." And "Since agencies have an obligation to deal with newly acquired evidence in some reasonable fashion, or to reexamine their approaches if a significant factual predicate changes, an agency must have a similar obligation to acknowledge and account for a changed regulatory posture the agency creates— especially when the change impacts a contemporaneous and closely related rulemaking." And "The refrain that EPA must promulgate rules based on the information it currently possesses simply cannot excuse its reliance on that information when its own process is about to render it irrelevant.") (internal quotation marks and citations omitted)

[16] *See* "Federal ''Good Neighbor Plan'' for the 2015 Ozone National Ambient Air Quality Standards," 88 Fed. Reg. 36654 (June 5, 2023) (e.g., at 36710, estimating the highest contribution from all Montana combined to still be almost an order of magnitude below EPA's de-minimis screening threshold or 0.7 ppb).

[17] *E.g.* 2023 Technology Review for the Coal- and Oil-Fired EGU Source Category, at 80, Appendix D, Docket ID. EPA-HQ-OAR-2018-0794-5789 ("Technology Review TSD").

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Sixth, EPA's cost analysis does not appear to account for lost revenues during the downtime required to engineer and retrofit additional control technologies to comply with the Proposed Rule. Such downtime would be significant, and ignoring this relevant factor arbitrarily skews EPA's cost assumptions extremely low and as a result makes them significantly flawed. EPA's cost analysis likewise does not appear to account for other indirect impacts of such temporary retrofit induced shutdowns, including unavailability of power during the retrofit, security risks associated with even temporarily reduced electric generation capacity, and increased costs to the utilities, coal suppliers, and ratepayers purchasing needed makeup power on the open market.

Seventh, EPA fails to provide any consideration for the life of sources in determining the feasibility or cost effectiveness of the Proposed Rule. This conflicts with EPA policy in related rulemakings, where EPA has expressly accounted for the life of sources in determining whether a particularly costly control technology can be cost justified. For example, in EPA's recently proposed greenhouse gas NSPS emission standards under section 111(d) for the very same coal fired power plants subject to the Proposed Rule, EPA proposed to account for existing life of sources by exempting or otherwise requiring alternative more cost effective compliance alternatives for sources that were scheduled to retire before January 1, 2040.[18] It is arbitrary for EPA to fail to account for the life of the plant in one rule and not the other. It is further arbitrary to fail to account for the life of a facility where EPA's own proposed rules (both the Proposed Rule and EPA's contemporaneous NSPS rules targeting coal fired power plants) impose costs of such a magnitude as to affects the feasibility and cost justification of coal fired power plants continuing operations beyond 2040.[19][20] This is especially true here, where EPA's cost analysis assumes that large capital expenditures (e.g. a baghouse) can be annualized based on the life of the equipment, without even attempting to account for the fact that such large expenditures would have a much higher annualized cost if the facility were forced to close sooner than the life of the fabric filter control system, due to costs imposed by EPA's contemporaneously proposed GHG NSPS. Accordingly, EPA must at minimum provide compliance flexibilities to avoid forcing the choice between unjustified cost and premature retirement for sources that would not be able to recoup the additional control device capital expenditure investments over a longer cost period.

Eighth, EPA entirely fails to consider, quantitatively or qualitatively, the downstream economic costs of the Proposed Rule. As discussed elsewhere in these comments, the Proposed Rule threatens the viability of Colstrip, especially when considered in concert with EPA's contemporaneously proposed GHG NSPS. In addition to the direct costs imposed on Colstrip, its owner/operators, its workers, and the Colstrip community, impacts on Colstrip would also impact Westmoreland Mining Holdings, which operates the Rosebud mine that supplies coal to Colstrip.

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[18] See e.g., "New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule," 88 Fed. Reg. 33240 (May 23, 2023).

[19] EPA has already recognized that its proposed NSPS standards and associated costs are likely to force a shift away from at least some coal power plants. See e.g. "TSD-Resource Adequacy" at 5, table 1, Docket ID. EPA-HQ-OAR-2023-0072-0034 (predicting that the GHG NSPS will lead to the shutdown of over 39 GW of coal fired power plant capacity by 2040).

[20] See fn.11 above, citing *Portland Cement Association v. EPA*, 665 F.3d 177 (D.C. Cir 2011).

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As discussed in detail in the Barkey Report (attached hereto), a closure of the Rosebud mine would be devastating for the State of Montana.[21] Among other things, closure would lead to a Montana economy that:

    a. Loses over 1,800 jobs, with an average earnings per year exceeding $62,000;

    b. Experiences a shortfall of more than $40 million in state government revenue; and

    c. Faces a loss of revenue to business in excess of $330 million per year.

Impacts Summary[2]

CATEGORY	UNITS	IMPACTS BY YEAR					
		2020	2021	2022	2023	2024	2025
Total employment	Jobs	-1,716	-1,852	-1,893	-1,872	-1,819	-1,754
Personal Income	Millions	-$95.6	-$101.4	-$109.2	-$113.0	-$114.8	-$115.4
Disposable personal income		*-$81.1*	*-$86.1*	*-$92.9*	*-$96.4*	*-$98.0*	*-$98.6*
State Tax and Nontax Revenue		-$39.0	-$41.0	-$42.7	-$43.8	-$44.4	-$44.7
Output		-$325.9	-$347.8	-$355.2	-$353.4	-$346.8	-$338.5
Earnings per Lost Job	Dollars	$61,998	$60,722	$61,828	$62,896	$63,940	$64,921
Population	People	-568	-998	-1,337	-1,592	-1,777	-1,909

These economic costs to the state of Montana and its citizens are critical considerations that EPA failed to consider and that, once considered, would not allow EPA to reasonably or rationally finalize the Proposed Rule as being "necessary" under section 112(d)(6), particularly when much of the putative benefits are limited to Montana, where much of the impact of the regulation will be felt.

Ninth, EPA's focus on contextualizing costs associated with the Proposed Rule (including retrofits and costs associated with temporary shutdowns, among others) in terms of the electric utility industry as a whole arbitrarily ignores the disparate impacts of the rule's costs, which will not in fact be spread out industrywide. At Colstrip in particular, multiple of the utilities with an ownership share in Colstrip are forced to exit before 2030 or in some cases 2025, due to their state PUC mandates to shift away from coal. This places a disproportional funding obligation on the remaining owners (post 2025). Likewise, the sole merchant utility owner is most impacted. And cost impacts are particularly significant for merchant utility owners who are unable to pass through costs to ratepayers.

The Proposed Rule Does Not Adequately Demonstrate the Achievability and Feasibility of the Proposed Limits.

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[21] The Barkey Report was prepared in 2019 in the context of administrative litigation concerning a Montana Major Facility Siting Act certificate revision that purported to permit Colstrip to use coal from non-Rosebud mines. Accordingly, the impacts on the Colstrip community would, in fact, be far greater if Colstrip were to close because the Barkey Report only accounts for the closure of the mining operations in support of Colstrip, whereas both the powerplant and its dedicated Rosebud mine may not continue to operate if the Proposed Rule is finalized. Moreover, although the terms of the report itself were focused on a specific time horizon, Westmoreland attests to the accuracy and relevance of this recent econometric study under 2023 conditions; if anything, the impact would be greater today on a monetized basis due to inflation.

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Under 42 U.S.C. § 7412(d)(2), EPA's promulgation of new emissions standards can only be the "maximum degree of reduction in emissions" that EPA determines are *achievable* for new or existing sources after balancing factors such as cost, non-air-quality health and environmental concerns, and energy implications. EPA claims the Proposed Rule is "achievable" here for new and existing sources under this standard but, in reality, EPA reached this (incorrect) determination using an arbitrary and self-serving set of criteria and data. EPA also acknowledges that the Proposed Rule will require modifications to the Colstrip facility but does nothing to analyze how such modifications affect its "achievability" analysis.

First, EPA supports its achievability analysis based on a document titled "2023 Technology Review for the Coal- and Oil-Fired EGU Source Category."[22] Therein, EPA states that when assessing the emission rates actually achieved in practice by existing coal fired power plants, it "removed units from [its] analysis that … will shut down or no longer burn coal/oil by December 31, 2028." But, at the same time, EPA included "EGUs [already] planning to convert to natural gas by the proposed compliance date" that are not subject to the rule, and thus concluded that since those EGUs "already meet a 6.0E-03 lb/MMBtu potential standard" they will have "no associated upgrade costs or emission reductions assumed in this analysis." As such, EPA has cherry picked the available data to support its belief that lower emissions standards are "achievable." EPA on the one hand arbitrarily excludes from consideration facilities that likely do not meet the agency's preferred emissions rate based on something these facilities *might* do in the future, while on the other hand including facilities that support EPA's desired outcome despite acknowledging such facilities will not even be subject to the Proposed Rule. Such analysis does not evidence objective and reasoned agency decision making.

Second, and similarly, § 7412(d)(3)(A) requires EPA to exclude from its minimum "achievability" analysis for existing sources those that "within 18 months before the emission standard is proposed or within 30 months before such standard is promulgated, whichever is later, first achieved a level of emission rate or emission reduction which complies, or would comply if the source is not subject to such standard, with the lowest achievable emission rate [] applicable to the source category and prevailing at the time[.]" But EPA has not excluded any sources from its technical analysis of achievable rates on this basis. This again results in a skewed analysis towards a lower "achievable" emissions standard using a method explicitly prohibited by the CAA. *See* 5 U.S.C. § 706(2) (reviewing court shall hold unlawful and set aside agency actions that are "not in accordance with law" and "in excess of statutory [] limitations"); *see also Bethesda Health, Inc. v. Azar*, 389 F. Supp. 3d 32, 41 (D.D.C. 2019) (setting aside as arbitrary and capricious agency action that contradicts its own regulations). And although this requirement is only expressly listed with respect to setting the initial MACT floor, it would be unreasonable and arbitrary to interpret requirements imposed under technology review not to be subject to the same requirement since EPA could otherwise easily circumvent the statutory limit at will simply by adding such sources back to its achievability analysis under each successive technology review period. In any case EPA has not identified any rationale for exempting Section 112(d)(6) technology review determinations from this same constraint. In accordance with the CAA, EPA must determine what the LAER rate

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[22] Docket ID. EPA-HQ-OAR-2018-0794-5789

is for this category, and then exclude from its achievability analysis any sources that already meet the lower emissions limit contemplated in the Proposed Rule.

Third, in EPA's "Technical Memo," EPA acknowledges (at 9) that the Proposed Rule would require installation of fabric filter controls (such as a baghouse) at Colstrip. But—contrary to EPA's obligations under the CAA—EPA fails to consider the economic or technical feasibility of doing so. *See* § 7412(d)(2) (EPA must "tak[e] into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements"). Installation of a baghouse at Colstrip's two generating units would likely costs tens of millions of dollars to design, install, and maintain—assuming, that is, retrofitting the units with a baghouse is even technically possible in the first place given spatial constraints, changes in fluegas rates, temperatures, constituents of the locally permitted coal, and compatibility with the existing venturi-type wet-scrubbers. EPA considers none of these limitations here, despite being obligated to do so by statute. What's more, EPA has in the past accounted for feasibility of standards imposed under a technology review, and thus cannot depart from that practice without providing any rationale. *See, e.g., Nat'l Ass'n of Battery Recyclers, Inc. v. E.P.A.*, 716 F.3d 667, 674 (D.C. Cir. 2013); *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502 (2009).

The Alternative Potential Standard is Not Justified.

In addition to all the reasons EPA has not adequately justified a 0.01 lb PM/MMBtu standard, there are additional reasons EPA cannot and should not consider any stricter limit such as the alternative 6.0E-03 lb. PM/MMBtu potential standard EPA requests comment on.

First, EPA acknowledges that any limit below 0.01 lb PM/MMBtu would be more stringent than the PM limit applicable to new sources. See Proposed Rule at 24857 & n.5. But EPA has identified no rationale—and thus it would be arbitrary and capricious— to impose a stricter limit on *existing* sources than on new sources, especially where it costs more, and requires greater resources and downtime, to retrofit existing units so that it can achieve the same standards as a new source. *See Watson Lab'ys, Inc. v. Sebelius*, 2012 WL 6968224, at *19 (D.D.C. Oct. 22, 2012) (agency decision arbitrary and capricious where "it produces absurd results that are contrary to the purpose of the [statute].", vacated as moot, 2013 WL 11250319 (D.C. Cir. June 10, 2013).

Second, EPA's technical memorandum titled "Particulate Control Cost Development Methodology" notes (at 2) that suppliers of control technology that will be needed to comply with a stricter than 0.010 lb/MMBtu standard will not provide any performance guarantees below a 0.010 lb/MMBtu threshold. And even at the 0.010 lb/MMBtu level, suppliers only guarantee such performance "depending on the application." It would be arbitrary and contrary to the evidence before the agency to finalize an industrywide requirement below 0.010 lb/MMBtu level in the face of such acknowledged unavailability of vendor guarantees.[23] It is critical to obtain vendor guarantees from suppliers when constructing or retrofitting facilities and associated control

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[23] Indeed, the fact that even at the 0.010 lb/MMBtu level, suppliers only guarantee such performance "depending on the application" likewise means that it would be arbitrary and contrary to the evidence before the agency to finalize an industrywide requirement even at that level, because a level below what control technology vendors can consistently guarantee on an industrywide basis cannot be said to be "necessary" from a strict technological feasibility perspective, absent some other justification such as residual risk.

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systems, to ensure that the purchased equipment can comply with applicable standards. It would be arbitrary and capricious for EPA to ignore this relevant factor by mandating emissions standards that hold source operators to standards that industry suppliers needed to achieve those standards will not even guarantee. *See FCC v. Prometheus Radio Project*, 141 S. Ct. 1150, 1158 (2021) (When an agency acts, it must "reasonably consider[] the relevant issues and reasonably explain[]" its actions) (citations omitted); *see also Michigan v. EPA*, 576 U.S. 743, 751–52 (2015) ("[A]gency action is lawful only if it rests on a consideration of the relevant factors" and "important aspect[s] of the problem.") (internal quotations and citations omitted). Furthermore, EPA has previously acknowledged the importance of being able to obtain vendor guarantees when setting the emission standards, and thus it would be arbitrary for EPA to ignore that consideration here without providing adequate rationale for the reversal in course.[24]

Third, EPA's own technical supporting documents concede that emission limits below 0.010 lb/MMBtu are not likely attainable using an electrostatic precipitator (ESP) unless (1) a separate fabric filter is installed or (2) the ESP is itself converted to a fabric filter.[25] And yet these same documents also note that such conversions are not universally possible because ESPs vary in size. *Id.* EPA makes no effort to analyze the extent of this reality at facilities implicated by the Proposed Rule. Nor does EPA consider the significant increases in energy disruption if a greater percentage of facilities must be idled during necessary retrofits, if such retrofits are even possible. There are a variety of costs involved in this disruption that are each meaningful, cumulatively very substantial, and none considered by EPA's existing analysis in the Proposed Rule. And EPA conducts no feasibility analysis to conclude that a limit below 0.010 lb/MMBtu is physically attainable by any substantial number of sources that currently rely on an ESP. And EPA acknowledges that the substantially higher compliance costs on the industry compared to the proposed 0.010 lb/MMBtu standard, but nowhere provides rationale for how such higher costs could qualify as cost effective.[26] It would be arbitrary and capricious to impose this alternative lower standard without having accomplished any of this necessary prerequisite analysis.

Fourth, Given EPA's acknowledgement that emission limits below 0.010 lb/MMBtu are generally unattainable by a significant portion of existing facilities absent retrofit, and EPA's selection of only certain time periods of data to review, the proposed alternative standard appears to be an attempt to set a standard that seeks to improve upon the best-performing period of reporting from various plants. But that is not a lawful use of a technology-based review under section 112(d)(6), which does not provide for EPA to update standards in order to drive technology, but instead only allows EPA to update standards as "necessary" to account for already

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[24] *E.g.* ,"Standards of Performance for New Stationary Sources: Electric Arc Furnaces and Argon-Oxygen Decarburization Vessels in Steel Plants" 49 Fed. Reg. 43838, 43,840 (Oct. 31, 1984) (in the context of setting PM limits for electric arc furnaces, concluding "However, the Agency has determined that the mass standard should not be lowered. This is because it was determined that, to guarantee fabric filter compliance with [a more stringent grain loading standard], vendors might increase capital costs of fabric filters as much as 25 percent [docket references omitted]. This increase in costs would result from the increased air-to-cloth ratio and other designed factors needed to ensure continuous compliance with a more stringent emission limit.").

[25] e.g., "Particulate Control Cost Development Methodology," at 2, Docket ID. EPA-HQ-OAR-2018-0794-5834

[26] *See* 2023 Technology Review for the Coal- and Oil-Fired EGU Source Category, Appendix D, Docket ID. EPA-HQ-OAR-2018-0794-5789 (estimating annual costs would increase by an order of magnitude)

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existing historic "developments in practices, processes, and control technologies," not to improve on such developments.

EPA Should Not Eliminate the Alternative Option to Demonstrate Compliance Via Tests of Individual or Total Regulated Metal HAPs Rather than fPM.

EPA proposes to eliminate the existing alternative option to test for the specific metal HAPs subject to the NESHAP for this source category (i.e., 40 C.F.R. Part 63, Subpart UUUUU), and proposes to only rely on the surrogate of fPM going forward. Proposed Rule at 24886. But this proposal is arbitrary because EPA's own data demonstrates that ratios of metal HAP to fPM can significantly vary[27], and thus that it is possible for a source to be in compliance with the limits on individual metal HAP regulatable under Subpart UUUUU, even if emitting amounts of total fPM above the proposed 0.010 lb/MMBtu standard.[28] It is particularly arbitrary to remove individual metal HAP measurements as a compliance option for Colstrip, given that EPA's own data appears to indicate that Colstrip's coal sources and unique control system have a lower ratio of metal HAP to PM than most other sources analyzed by EPA.[29]

Finally, EPA's stated rationale for eliminating individual and total metal HAP standards is arbitrary. Specifically, EPA claim that companies currently demonstrate compliance almost solely through fPM testing is irrelevant because EPA has not proposed to retain the standard which companies currently demonstrate compliance with through fPM testing. It would be arbitrary to eliminate compliance demonstration options on this basis without first demonstrating that companies will also not use (or need to use) any option other than fPM to demonstrate compliance with the Proposed Rule's lower standards. EPA has wholly failed to attempt such rationale here, ignoring a highly relevant factor in determining whether individual and total metal HAP standards should continue to be included in the rulemaking.

The Proposed Rule Does Not Appropriately Account for Environmental Impacts Of the Controls Required to Achieve the Proposed Emission Standards, Including Increased Air Pollution and New Non-Air Waste Streams.

Section 112(d) of the CAA explicitly states that in making its achievability determinations, EPA must "tak[e] into account the cost of achieving such emission reduction, and any non-air quality health *and environmental impacts and energy requirements.*" (emphasis added). And although this requirement is only expressly listed with respect to setting the MACT floor, it would be unreasonable and arbitrary to interpret requirements imposed under technology review not to be subject to the same requirement, and in any case EPA has not identified any rationale for exempting RtR determinations from this same constraint. EPA has failed to reasonably account for such environmental impacts from the Proposed Rules for multiple reasons.

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[27] See "Quarterly MATS Metals and PM2.5 data" Docket ID EPA-HQ-OAR-2018-0794-5789_attachment_1 (showing Metal to PM ratios ranging all the way from 0.000808448 to 0.025126035).
[28] *Motor Vehicle Mfrs. Assn. of United States, Inc. v. State Farm Mut. Automobile Ins. Co.,* 463 U.S. 29, 43 (1983) State Farm, 463 U.S. at 43, 103 S.Ct. 2856 (finding agency action arbitrary and capricious if the agency explained its decision in a way that "runs counter to the evidence before the agency").
[29] See "Quarterly MATS Metals and PM2.5 data" Docket ID EPA-HQ-OAR-2018-0794-5789_attachment_1 (showing Metal to PM ratio of ratio of 0.00225 for Colstrip, as compared to an industry average of 0.00413).

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Specifically, EPA does not appropriately account for the potential to actually *increase* some emissions of fossil fuels at the Colstrip facility based on the apparent need, under the Proposed Rule, to install a baghouse in line with the wet scrubbers at Colstrip. Specifically, EPA's "Particulate Control Cost Development Methodology" documents notes that installation of a baghouse downstream of a wet scrubber would require additional power generation due to "increased fan power to account for the added fabric filter pressure drop and, as applicable, air blowers and transport air drying equipment for the SO3 mitigation system." Despite this prediction, EPA currently accounts for the extra power needed only as an additional *economic* cost. EPA fails to account for the environmental impact that additional non-PM emissions would be associated with the need to supply the additional power for a baghouse. Nor would any generic acknowledgement of indirectly increased non-PM emissions be adequate to demonstrate reasoned decision making, because EPA cannot conclude that such increases in non-PM criteria pollutants and HAPs are justified by PM decreases without substantive analysis. *See Sierra Club v. Mainella*, 459 F. Supp. 2d 76, 100 (D.D.C. 2006) ("Merely describing an impact and stating a conclusion of non-impairment is insufficient[.]"

The Proposed Rule Fails to Account For Related Rulemakings.

When determining whether, and to what extent, changes to the existing MATS NESHAP standards may be necessary, EPA fails to account for the effects of its concurrent proposal to impose carbon capture and sequestration (CCS) on these very same existing coal fired power plants.[30] As the D.C. Circuit has held in the context of another occasion on which EPA contemporaneously proposed changes to section 111 NSPS standards and section 112 NESHAP standards for related source categories, "Reasoned decision-making requires an agency to examine the relevant data and articulate a satisfactory explanation for its action[s]. The impending [regulatory change regarding an] undeniably related source category is clearly a relevant factor or an important aspect of the problem that must be considered."[31] EPA's failure to consider the related impacts of this contemporaneous proposed rule affects the reasonableness of many aspects of the proposed rulemaking.

First, Source owners will need to determine how to make investments to comply with both the GHG NSPS and a potential CCS mandate in an integrated manner, taking into account the specific regulatory requirements that EPA imposes, market conditions, etc. But EPA's seriatim consideration of two tremendously impactful rulemakings that mutually ignore one another makes doing so infeasible. As a matter of rationality and simple fairness, EPA should exercise its

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[30] *See* "New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule," 88 Fed. Reg. 33240 (May 23, 2023) (GHG NSPS)

[31] *Portland Cement Association v. EPA*, 665 F.3d 177 (D.C. Cir 2011). *See also id.* ("Basing its decision on a premise the agency itself has already planned to disrupt is arbitrary and capricious" and "Since agencies have an obligation to deal with newly acquired evidence in some reasonable fashion, or to reexamine their approaches if a significant factual predicate changes, an agency must have a similar obligation to acknowledge and account for a changed regulatory posture the agency creates—especially when the change impacts a contemporaneous and closely related rulemaking." And "The refrain that EPA must promulgate rules based on the information it currently possesses simply cannot excuse its reliance on that information when its own process is about to render it irrelevant.") (internal quotation marks and citations omitted).

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discretion to determine that any revisions to the MATS must be done in conjunction with the GHG NSPS and with compliance deadlines that are coordinated with the GHG NSPS.

Second, EPA states in this concurrent proposed GHG NSPS rulemaking that CCS, and the additional control technologies required for CCS to work, may both cause co-reductions in fPM as well. Accordingly, it is arbitrary for EPA not to account for the impact of these planned fPM reductions on whether any additional controls on fPM were "necessary" for purposes of section 112(d)(6) at all.

Third, EPA fails to account for the proposed GHG NSPS rule in terms of compliance deadlines and availability for compliance extensions. Any sources that are required to install additional control technology as a result of both rules (such as Colstrip, which may be required to install both a fabric filter baghouse by the Proposed Rule, and CCS by the proposed GHG NSPS, as well as a series of upstream controls required to make both work, assuming it is technically possible to retrofit) will require additional time to engineer and design such systems to work in concert than a source would need simply to engineer and install systems required only for a single applicable rulemaking.

Fourth, it was arbitrary for EPA to deny the request for comment extension for the Proposed Rule to account for the interplay and effect of these two related rulemakings on each other. As raised in a prior extension request for this Proposed Rule, EPA published the proposed GHG NSPS halfway through the comment period for this Proposed Rule. And this newly proposed GHG NSPS fundamentally changed the technical and cost analysis with respect to the Proposed Rule, because if both rulemakings are finalized, sources will have to assess how this different control requirements required by each rulemaking interact with and affect each other rather than simply analyzing the Proposed Rule requirements by themselves as was required during the first portion of the public comment period for the Proposed Rule. This is particularly important for Colstrip which may be required to install both a fabric filter system under the Proposed Rule and CCS by the proposed GHG NSPS, as well as a series of upstream controls required to make both work, assuming it is technically possible to retrofit, all of which require additional analysis to determine feasibility and cost of designing each new system to work with the other newly required control system. EPA's unexplained denial arbitrarily prevented facilities, including Colstrip, from fully analyzing the technical interplay of these rules during the public comment period. In any case, EPA's failure to itself assess the technical effect of the GHG NSPS on the feasibility and cost of the Proposed Rule was itself arbitrary and inconsistent with reasoned decision-making.

EPA Cannot Publish Alternative Emission Limits Without First Issuing for Public Comment Additional Proposed Standards and their Basis.

The rulemaking procedures at section 307(d) of the CAA specifically require that a proposed rulemaking must "include a summary of—(A) the factual data on which the proposed rule is based; (B) the methodology used in obtaining the data and in analyzing the data; and (C) the major legal interpretations and policy considerations underlying the proposed rule" and "All data, information, and documents referred to in this paragraph on which the proposed rule relies

shall be included in the docket on the date of publication of the proposed rule."[32] Furthermore, any final "promulgated rule may not be based (in part or whole) on any information or data which has not been placed in the docket as of the date of such promulgation."[33] Relatedly, EPA has "an initial burden of promulgating and explaining a non-arbitrary, non-capricious rule" including an obligation to "explain how the standard proposed is achievable under the range of relevant conditions which may affect the emissions to be regulated."[34] Accordingly, EPA cannot finalize any emission standard other than those analyzed in the Proposed Rule absent a new proposed rule providing the opportunity for public comment on the necessity, appropriateness, feasibility, and cost effectiveness of any such newly proposed limits. To do otherwise would be unlawful and arbitrary.

Sincerely,

Jeremy Cottrell
General Counsel & Secretary
Westmoreland Mining LLC

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[32] 42 U.S.C. § 7607(d)(3)

[33] 42 U.S.C. § 7607(d)(6)(C)

[34] *National Lime Ass'n v. E. P. A.*, 627 F.2d 416, 433 (D.C. Cir. 1980) (in the context of a new source performance standard rulemaking procedure subject to 42 U.S.C. § 7607(d), holding that "an initial burden of promulgating and explaining a non-arbitrary, non-capricious rule rests with the Agency and we think that by failing to explain how the standard proposed is achievable under the range of relevant conditions which may affect the emissions to be regulated, the Agency has not satisfied this initial burden."); *see also Nat. Res. Def. Council v. EPA*, 755 F.3d 1010, 1023 (D.C. Cir. 2014) ("EPA retains a duty to examine key assumptions as part of its affirmative burden of promulgating and explaining a nonarbitrary, non-capricious rule and therefore EPA must justify that assumption even if no one objects to it during the comment period.") (citation, internal question marks, and ellipses omitted)

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Attachment: Barkey Report

The Economic Impacts of a Rosebud Mine Closure

By Patrick M. Barkey, Ph.D.

October 4, 2019

Patrick M Barkey Ph.D.
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Patrick M. Barkey, Ph.D.

__October 4, 2019__

(date)

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EXECUTIVE SUMMARY

Since the 1970s, the economy of Colstrip, Montana has been dominated by the operations of the Rosebud coal mine and the mine-mouth coal-fired electric generating plant that have operated continuously in this small community in eastern Montana since that time. Located on the northern portion of the Powder River Basin just south of the generating station, the Westmoreland's Rosebud mine has delivered coal to the generating units via conveyor to fuel their production. The mine and the generating units have thus been closely linked for decades, with production in each facility tied to the other.

Recent events have called into question the future of that relationship. In a future scenario where the Colstrip Steam Electric Station (SES) takes deliveries of its coal via rail or truck from a separate, possibly non-Montana, source, the continued operation of the Rosebud mine would no longer be viable. In the event that coal production at the facility were to end, the community, the region and the state as a whole would lose an important driver of its economic vitality.

This study is intended to assess the economic implications of the closure of the Rosebud mine, in a scenario where the Colstrip SES continues to operate with coal from another source. If the mine were to close, its wages paid to workers, purchases from vendors, and tax payments to governments would largely cease. The spending of those who receive those payments as income or revenues can be expected to be significantly curtailed, with further knock-on effects on economic activity. As the process continues, a new, lower level of economic activity emerges that shrinks the overall economic pie by more than that of the mine itself.

We assess the ultimate impact of the Rosebud mine closure with the use of an economic model that traces the interactions between the mine and the rest of the economy. Specifically developed for this purpose and calibrated with Montana-specific data, the REMI model was leased from Regional Economic Models, Inc. (www.remi.com) for use in this study. Since its development in the early 1980s, the REMI model has been the subject of dozens of peer-reviewed economic articles and has been employed in hundreds of applications.

A mine-closure scenario for the Montana economy was constructed for this study that consisted of three broad components. The first was the removal of the mine itself from the economy. Using information obtained from the mine owners on production, employment, payroll, taxes and vendor spending (Westmoreland, 2019), the direct contribution of its operations was removed from the economy. A second component was the remediation activities that would commence and continue after mine closure.

The third component were the operating changes, if any, at the Colstrip SES that might be expected to occur with coal deliveries by rail to that facility from a non-Montana source. While little information was available to detail actual plans and potential investments, a simplified scenario can at least represent the basics of how fuel source changes would affect economic flows.

SUMMARY OF FINDINGS

Our basic finding is that the shutdown of the Rosebud mine would be a significant economic event, both for the Colstrip community and to the remainder of the state. The loss of 337 jobs at the facility[1], producing 6.5 million tons of coal annually, would ultimately lead to a state economy that:

- Suffers a loss in excess of 1,800 jobs, across a broad mix of industries, with average earnings per job lost in excess of $62,000 per year;
- Has annual income received by households fall more than $100 million short of the amount that would have occurred had the mine remained in operation;
- Experiences a shortfall of more than $40 million per year in state government revenue;
- Sees local governments collect $8 million less per year in property tax revenue, most of which occurs in Rosebud County;
- Faces a loss of revenue to businesses in excess of $330 million per year compared to levels that would be maintained under continued operation;
- Has a population that is smaller by more than 1,900 people;

Impacts Summary[2]

		IMPACTS BY YEAR					
CATEGORY	UNITS	2020	2021	2022	2023	2024	2025
Total employment	Jobs	-1,716	-1,852	-1,893	-1,872	-1,819	-1,754
Personal income	Millions	-$95.6	-$101.4	-$109.2	-$113.0	-$114.8	-$115.4
Disposable personal income		-$81.1	-$86.1	-$92.9	-$96.4	-$98.0	-$98.6
State Tax and Nontax Revenue		-$39.0	-$41.0	-$42.7	-$43.8	-$44.4	-$44.7
Output		-$325.9	-$347.8	-$355.2	-$353.4	-$346.8	-$338.5
Earnings per Lost Job	Dollars	$61,998	$60,722	$61,828	$62,896	$63,940	$64,921
Population	People	-568	-998	-1,337	-1,592	-1,777	-1,909

These findings take into account the positive impacts that come from the $165 million that is expected to be spent in the decade following the closure on environmental remediation, as well as the modest increase in rail and material handling jobs that could be expected to occur as the Colstrip SES moves to use of non-Montana coal.

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[1] Since a permanent mine closure would occur after the announced date of closure for the smaller, older generating units of the Colstrip SES, the loss of employment and production directly linked to mine closure is slightly smaller than current levels, reflecting mine activity serving the remaining Colstrip SES units.

[2] Impacts in the table correspond to mine closure in year 2020. Impacts extend beyond the years shown. The nature and magnitude of the findings would not be materially affected by a different choice of start year for events associated with mine closure.

1. INTRODUCTION AND OVERVIEW

This is an analysis of the economic implications of the closure of the Rosebud mine located just south of the city of Colstrip in Rosebud County in eastern Montana. The mine has continuously served the coal needs of the four units of the 2,100 megawatt Colstrip Steam Electric Station (SES) since the 1970s, delivering coal to that facility via a 4.5 mile conveyor belt. The possibility that the SES would satisfy its coal needs from a different source in the future is the motivation for conducting this study, since the nature of coal markets and the limited transportation access of the mine to those markets would render its continued operation impossible.

The author of this report is Patrick M. Barkey, Ph.D. He was retained by BakerHostetler to conduct this analysis and to write this report. He is being compensated for this work. The amount of his compensation is not dependent on the outcome of the project. He has not testified in deposition or as an expert witness in any litigated matter in the past.

In addition to publicly available data (see References) the study has made use of operating and other information (Westmoreland, 2019) provided by Westmoreland Mining, LLC, the owner and operator of the Rosebud mine.

Ample evidence exists to support the conclusion that coal mining in Montana makes sizable contributions to the state economy (Barkey and Polzin, 2010; Barkey (2012); Bureau of Business and Economic Research (2015); Barkey (2018)). The high rates of employee compensation, the large component of inputs sourced from within the state, and the higher than average tax contribution of the coal mining industry all play a role in making coal production an important driver of activity in the economy as a whole.

The prosperity and relative affluence of the small community of Colstrip is testimony to that fact. Incorporated in 1998, the city of just over 9,000 people is home to one of the largest industrial facilities in the state, and has an assessed property tax base as large as urban areas many times its size. It has been largely immune to recessions, and has median household income almost 75 percent higher than the state as a whole. Located in the eastern portion of the state where economic growth has lagged that of the more populous urban areas to the west, these accomplishments stand out.

Yet the base on which that prosperity is built upon is narrow. Events which impact the coal-fired electric generation industry have an outsized importance for Colstrip, certainly. But they also have implications for the entire state, as this report demonstrates.

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2. ROSEBUD COUNTY PROFILE

Rosebud County, the home of the Westmoreland Rosebud mine and the community of Colstrip, is the 25th largest county by population, and the fourth largest by area in Montana. It is traversed by Interstate 94, which passes through Forsyth, the county seat, as the major transportation artery between Billings and Bismarck, North Dakota. A large portion of the Northern Cheyenne Indian Reservation lies within Rosebud County.
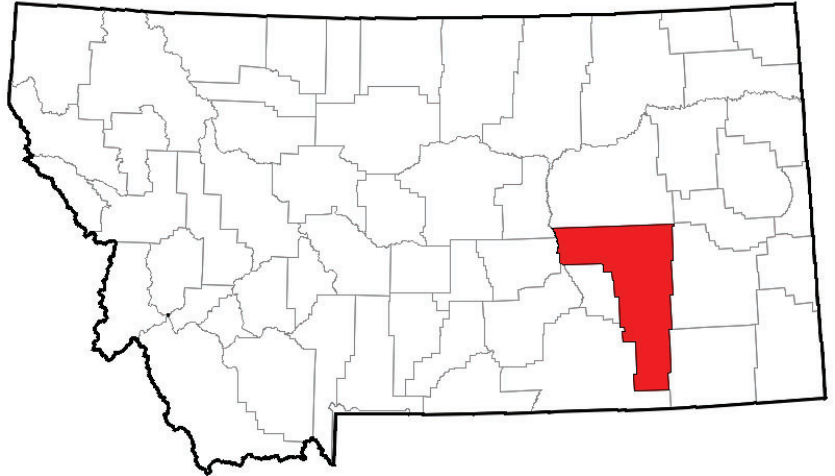
Like many other counties in eastern Montana, agriculture plays an important role in the economy. More uniquely, the southern and central portions of the county sit over the Powder River Basin, a rich coal-producing seam that produces 43 percent of all U.S. coal (Energy Information Administration, 2019). The two largest coal mines in Montana are either completely contained within the County (Rosebud mine) or straddle its border (Spring Creek mine). The county is also home to the 2,100 megawatt Costrip Steam Electric Station (SES) coal-fired power generator, one of the largest industrial facilities in the entire state.

As a whole, the county shares some of the same characteristics of other less populated counties in the eastern portion of the state. It has seen slight population decline since the Census of 2010. Its adult population is ranked low – 50th out of 56 counties – in the percent with at least a 4-year college degree. The outmigration of younger people has skewed its population slightly older than the state average, and much older than many of the more populous urban areas.

Rosebud County Profile

INDICATOR	Value	State Rank
Total Population	**9,063**	**25**
Percent Change Since 2010	**-1.8%**	**45**
Median Age	**36.5**	**49**
Percent Aged 65 or Older	**14.4%**	**27**
Percent with Bachelors Degree or Higher (Age 25+)	**18.8%**	**50**
Percent Without Health Insurance Coverage	**13.8%**	**42**

Rosebud County covers more than 5,000 square miles of territory, and the county-level data can mask some of the unique characteristics of the community. It is useful to examine the city of Colstrip and the remainder of the County separately. This can be accomplished with data from the American Community Survey, produced by the U.S. Census Bureau.

Population by Age, Race and Educational Status

Examining the population by race and Hispanic origin, we can clearly see the prominence of the American Indian population in the southeast portion of the state. While the city of Colstrip's share of American Indians is high in comparison to the state average, the balance of the County is almost 44

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percent American Indian. Colstrip also has a higher fraction of its population who consider themselves to be Hispanic or Latino, which potentially straddles multiple racial classifications.

The age profile of Colstrip reveals some of the importance of the Rosebud mine and the Colstrip SES as employers in the community. The city of Colstrip is dominated by prime-aged workers, more than either the rest of the County or the entire state. The population cohort aged 45-64 years makes up more than 40 percent of the population, almost double the share of the rest of the County.

The city has a markedly lower fraction of those 65 and older in its population, and a higher fraction of children. The latter could be influenced by the Colstrip school system which, thanks to the strong tax base, has outstanding resources that few other schools in the eastern portion of the state can match.

Race and Hispanic Origin

White
- Colstrip: 78.5%
- Rest of County: 53.8%
- Montana: 89.0%

American Indian
- Colstrip: 16.6%
- Rest of County: 43.8%
- Montana: 6.5%

Other
- Colstrip: 4.9%
- Rest of County: 2.4%
- Montana: 4.5%

Hispanic or Latino
- Colstrip: 12.4%
- Rest of County: 2.3%
- Montana: 3.6%
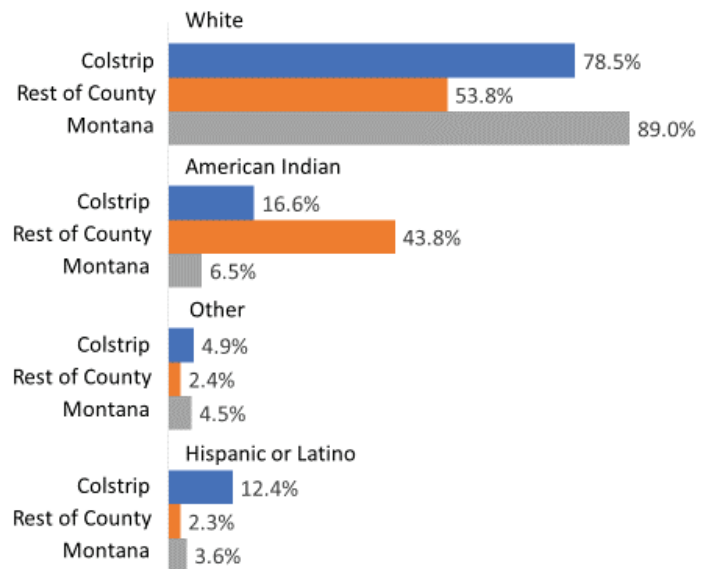
Source: 2017 American Community Survey 5-year Estimates

Age Distribution

Less than 15 years
- Colstrip: 25.0%
- Rest of County: 23.1%
- Montana: 18.3%

16-24 years
- Colstrip: 9.2%
- Rest of County: 14.9%
- Montana: 13.4%

25-44 years
- Colstrip: 19.7%
- Rest of County: 22.5%
- Montana: 24.1%

45-64 years
- Colstrip: 40.3%
- Rest of County: 22.3%
- Montana: 27.1%

65 or more years
- Colstrip: 5.9%
- Rest of County: 17.1%
- Montana: 17.1%
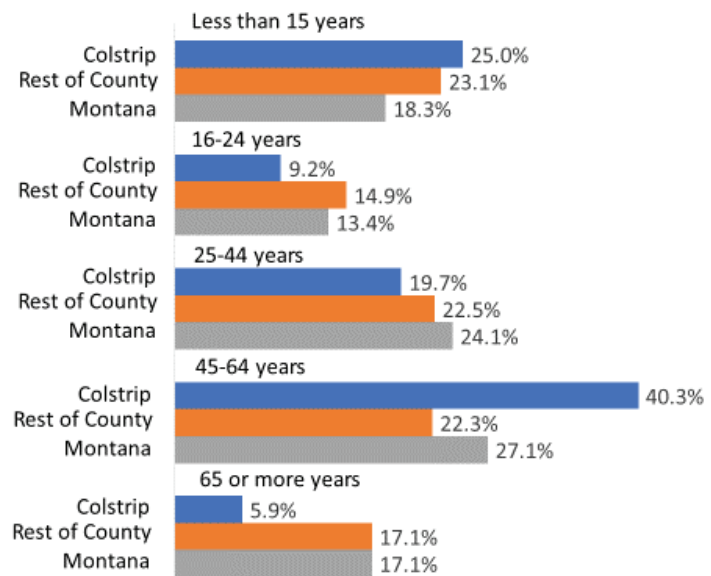
Source: 2017 American Community Survey 5-year Estimates

There are also significant differences between Colstrip and the balance of Rosebud County in educational attainment. The city has an extremely low fraction – just 1.2 percent -- of its adult population that lacks a high school diploma or GED. In contract, the rest of the county has more than double this fraction than the state as a whole.   Differences in other levels of educational attainment for the city and the balance of the County are not as marked, although the city of Colstrip does score slightly higher in terms of participation in College.

Educational Attainment

No High School Diploma
- Colstrip: 1.2%
- Rest of County: 16.2%
- Montana: 7.0%

High School Graduate
- Colstrip: 31.1%
- Rest of County: 33.4%
- Montana: 29.3%

Some College
- Colstrip: 44.0%
- Rest of County: 33.2%
- Montana: 32.9%

Bachelor Degree
- Colstrip: 18.3%
- Rest of County: 13.5%
- Montana: 20.6%

Graduate Degree
- Colstrip: 5.4%
- Rest of County: 3.6%
- Montana: 10.1%
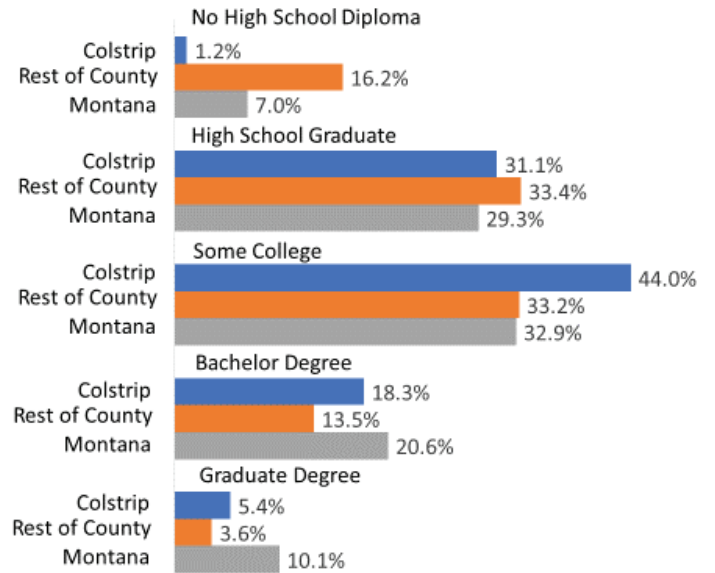
Source: 2017 American Community Survey 5-year Estimates

Employment and Income

The importance of the strong mining and industrial employers in both the city and the County can be seen from the occupation and industry classifications of the working population. Compared to the state average, Rosebud County workers – both in Colstrip and without – are much more prominent in those classifications. More than a third of Colstrip workers are employed in agriculture, mining or construction. The state average is less than 20 percent.

The other side of the coin finds Colstrip with a much smaller presence of workers for professional business services employers, which include finance, real estate, administrative and professional and technical services companies. Colstrip also has a smaller number of workers working for government, perhaps due to the fact that neither tribal government or the county seat are located there.

In terms of occupations, Colstrip workers are more prominent in construction trades, production and transportation activities, and much less likely to be in service and sales occupations.

Employment by Industry

Agriculture, Mining and Construction
- Colstrip: 34.0%
- Rest of County: 29.6%
- Montana: 19.2%

Trade, Transportation and Warehousing
- Colstrip: 26.6%
- Rest of County: 14.6%
- Montana: 24.2%

Education and Health
- Colstrip: 29.9%
- Rest of County: 32.3%
- Montana: 29.4%

Professional Business Services
- Colstrip: 6.0%
- Rest of County: 12.4%
- Montana: 19.6%

Public Administration
- Colstrip: 3.6%
- Rest of County: 11.1%
- Montana: 7.7%
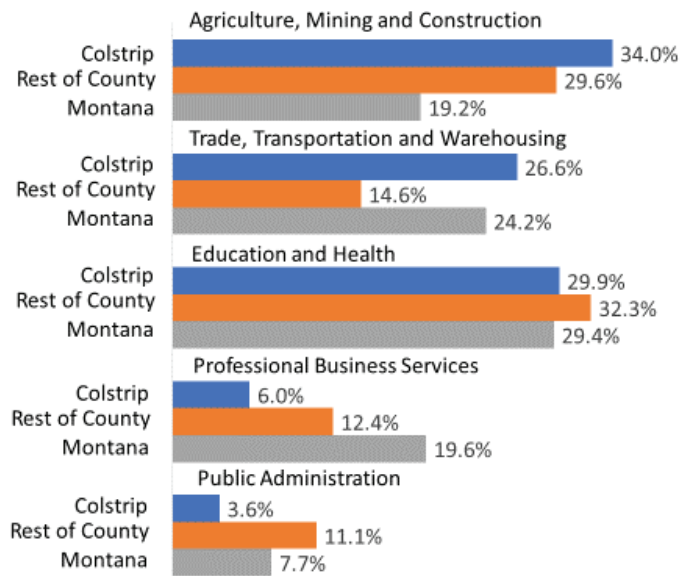
Source: 2017 American Community Survey 5-year Estimates

Employment by Occupation

Management and Administrative
- Colstrip: 31.8%
- Rest of County: 34.2%
- Montana: 36.5%

Service
- Colstrip: 14.5%
- Rest of County: 26.0%
- Montana: 19.0%

Sales
- Colstrip: 8.6%
- Rest of County: 13.5%
- Montana: 22.3%

Natural Resource and Construction
- Colstrip: 26.9%
- Rest of County: 17.6%
- Montana: 12.5%

Production and Transportation
- Colstrip: 18.3%
- Rest of County: 8.7%
- Montana: 9.7%
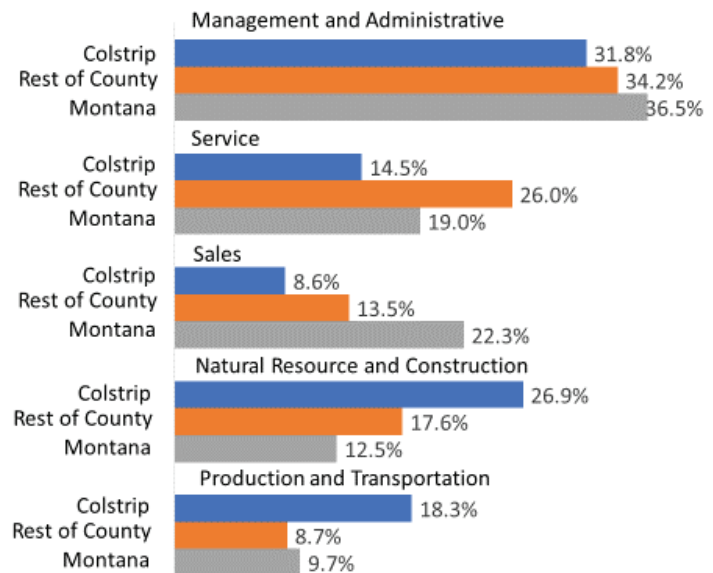
Source: 2017 American Community Survey 5-year Estimates

Perhaps the starkest contrast between Colstrip and the surrounding County is in measures of income. Household income includes income of all household members, with households encompassing both individual and family households. As can be seen from the figure, Colstrip has a very high fraction of its households with income towards the upper end of the distribution. To state it another way, just under 14 percent of Colstrip households make less than $50,000 per year. By contrast, nearly half the households in the state make less than that amount.

The fact that the jobs at both the Colstrip SES and the Rosebud mine pay salaries that extended into six figures in many cases is apparent from the fraction of Colstrip households with income higher than $100,000 per year. The balance of the county is dramatically different than the city, with nearly a third of households having annual income of $25,000 or less.

Summary measures of income underscore these differences. Median household income in Colstrip, at $88,452, is more than 75 percent higher than the state average. Rosebud County (balance of county data are not available for these measures) is much closer to the state average for both median household income and median family income. The latter excludes single person households. The comparatively larger presence of children in Colstrip brings the differences in per capita income closer than the other two measures between different geographies.

Annual Household Income

Less than $25,000
- Colstrip: 4.9%
- Rest of County: 31.3%
- Montana: 23.6%

$25,000 to $50,000
- Colstrip: 8.9%
- Rest of County: 23.8%
- Montana: 25.6%

$50,000 to $100,000
- Colstrip: 45.8%
- Rest of County: 30.4%
- Montana: 31.2%

$100,000 to $200,000
- Colstrip: 39.2%
- Rest of County: 10.4%
- Montana: 15.9%

More than $200,000
- Colstrip: 1.2%
- Rest of County: 4.0%
- Montana: 3.7%

Source: 2017 American Community Survey 5-year Estimates

Income

Median Household Income
- Colstrip: $88,542
- Rosebud County: $54,709
- Montana: $50,801

Median Family Income
- Colstrip: $95,168
- Rosebud County: $70,716
- Montana: $65,843

Per Capita Income
- Colstrip: $31,612
- Rosebud County: $23,832
- Montana: $28,706

Source: 2017 American Community Survey 5-year Estimates

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The differences in income and other characteristics between Colstrip and the balance of Rosebud County produce significant differences in poverty outcomes as well. As shown in the figure, less than 5 percent of all families in Colstrip were below the poverty line in 2017, compared to nearly 15 percent in the rest of the County. It is particularly unfortunate that poverty rates are so alarmingly high for two categories most at risk – American Indian families and female headed families. For these groups, as much as a third or more fall under the poverty line, and the differences in these fractions is not appreciably different for different areas.

Poverty Rates

All Families
- Colstrip: 4.9%
- Rest of County: 14.9%
- Montana: 9.1%

White Families
- Colstrip: 1.3%
- Rest of County: 3.3%
- Montana: 7.7%

American Indian Families
- Colstrip: 45.3%
- Rest of County: 36.8%
- Montana: 33.4%

Female-Headed Families
- Colstrip: 29.2%
- Rest of County: 30.0%
- Montana: 31.7%

Source: 2017 American Community Survey 5-year Estimates
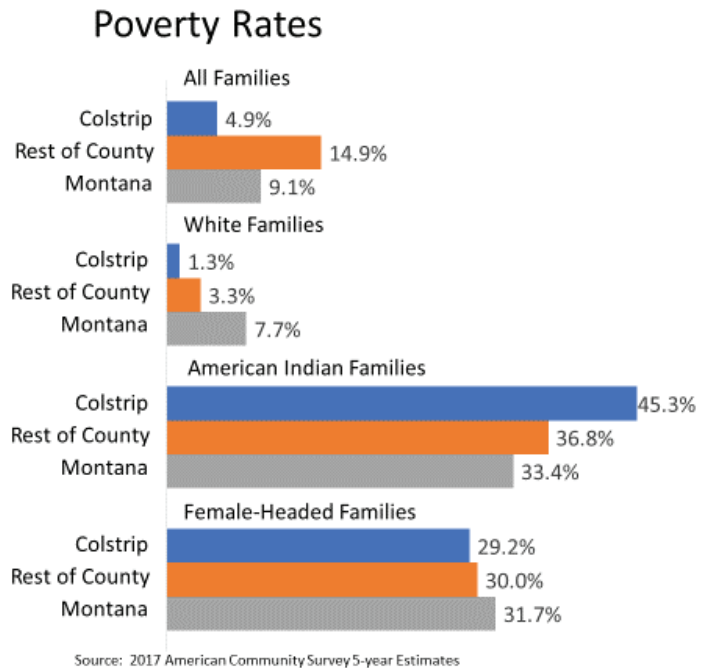
It is apparent from the Census data that the energy and natural resource jobs connected – literally, by conveyor – to the electric generation activities in Colstrip have made an enormous impact on the economic status of many who live there. There is another aspect to the presence of the Colstrip SES and the Rosebud mine in the economy that is not captured by this data. That is the economic stability the relatively steady operation of these facilities has produced.

Employment, Rosebud County, 1975-2018

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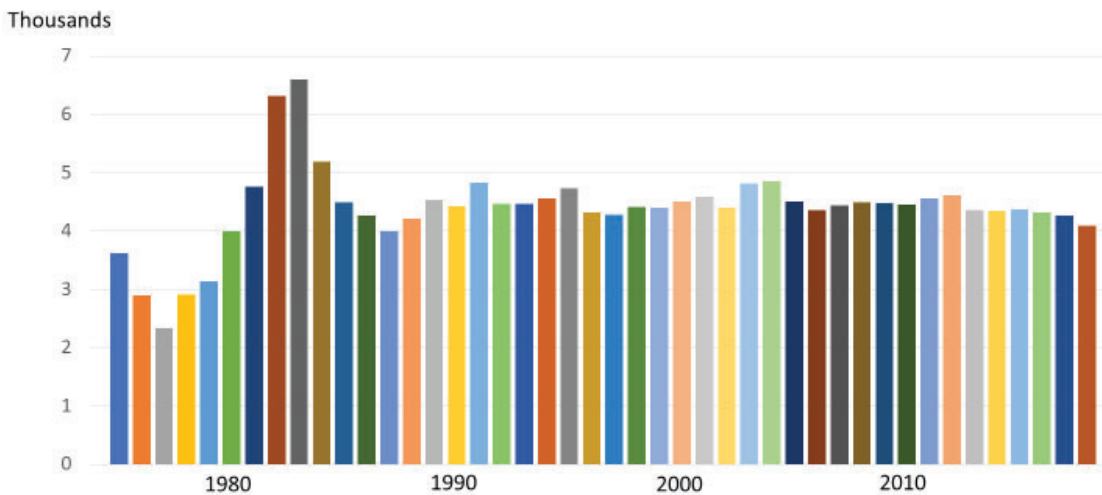
Employment in Rosebud county has fluctuated in a very narrow range at roughly 4,000 since the early 1990s, as shown in the figure above. During this interval of time the national economy experienced 3 recessions, the last of which produced a pronounced decline in the state economy. During the early 1980s Rosebud County employment showed strong gains as the construction of the two newer, larger generating units at the Colstrip SES was completed, again during a period of considerable economic turbulence in the national economy.

The capital intensive nature of wealth generation in Colstrip, in a county with less than 10,000 people, stands out in a state that is not home to many industrial facilities of the same size. County Gross Domestic Product, or GDP, is a measure of economic output. In year 2015, the most recent year for which data are available, Rosebud County GDP was almost $90,000 per capita, easily the highest of any county in the state.

GDP Per Capita by County, 2015
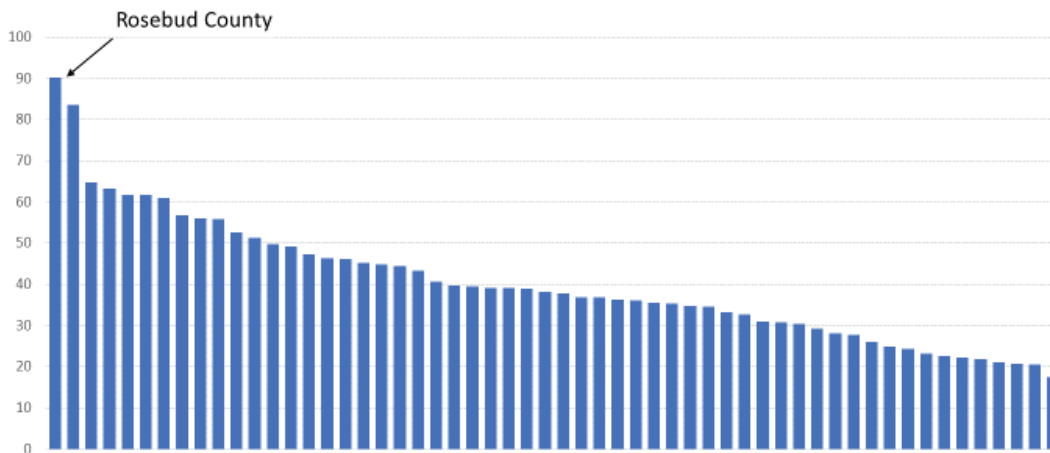
Source: U.S. Bureau of Economic Analysis

Conclusion

The presence of the Colstrip SES and the Rosebud mine within and immediately adjacent to the city of Colstrip has fostered the growth and development of a community like few others in the state. As a result of the high wages jobs, significant vendor spending and tax contributions of these facilities, the Colstrip community:

- has median household income of $88,452, more than 75 percent higher than the state;
- has poverty rates of just 4.9 percent for families, much lower than either the state (9.1 percent) or the remainder of Rosebud County (14.9 percent);
- has just 1.2 percent of its adult population lacking a high school diploma or equivalent, compared to 7.0 percent for the state and 16.2 percent for the balance of the County;
- was not visibly impacted by any of the three most recent national economic recessions, including the Great Recession of 2008-09;

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Its economic success stands in even greater contrast to its eastern Montana peers, who have seen much more evident economic booms and busts, and generally have incomes less that the state as a whole. In this portion of the state that has enjoyed less prosperity than average, its achievements stand out as a remarkable exception.

3. RESEARCH APPROACH

Regional economic impacts occur because of events or activities that create new expenditures within that region. New spending – that is, spending which is over and above existing expenditures, and which does not displace other spending elsewhere in the region – not only adds to economic activity in its own right, but it also induces further spending as the recipients of wages, sales, and tax revenues spend a portion of their income in the local economy. Changes in the path of investment, migration, prices, and wages are also possible.

This study uses an economic model, calibrated to represent the interactions specific to the Montana economy, to estimate the economic impacts resulting from events that comprise the Rosebud mine closure scenario. Leased from Regional Economic Models, Inc., the REMI model is one of the best known and most respected analytical tools in the policy analysis arena. It is constructed using national, state and sub-state area data on income, employment, spending, prices, trade flows and population from public data sources, including the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Census Bureau. A full description of the data sources and estimation methodology used to construct and calibrate the model can be found at https://www.remi.com/wp-content/uploads/2019/08/Data-Sources-and-Estimation-Procedures.pdf .

The REMI model forecasts employment, income, expenditures, and populations for regions based on a model containing over 100 stochastic and dynamic relationships, as well as a number of identities. A full explanation of the design and operation of the model can be found in Treyz (1993).

The REMI Modeling Methodology

The REMI model is a state-of-the-art policy analysis model that brings together three powerful tools to address a wide range of applied research questions: an input-output model that captures the connectivity between industries in the economy, an econometric model that accounts for the adjustment in markets to changes in economic opportunity and rates of return, and a demographic model that can relate changes in migration to age-structure of the population and labor supply. The model is based on extensive and detailed data on income, employment, prices, population, and spending in the national, state and sub-state economies (REMI, 2019).

The basic philosophy of the REMI model is that regions of the country compete for investment, jobs and people. When events – such as a new business opening or an existing business closing -- cause changes in a regional economy that impact economic opportunity or rates of return, spending and population flows occur between regions to bring the economy to a new resting point. The REMI model used in this analysis pertained to the state of Montana as a whole, with the U.S. economy as a backdrop.

The model itself has been extensively documented and evaluated in a number of peer-reviewed economic journals (see, e.g., Treyz, et. al., 1992; Crihfield, 1992; Rickman and Schwer, 1993). It has been used in hundreds of published studies on topics including energy, tourism, taxes, transportation, and economic development. An extensive bibliography of REMI studies can be found at the REMI web site, www.remi.com .

The basic approach of using the REMI model to produce the results for this study is illustrated in Figure 1, below. The analysis started with a baseline projection for the Montana economy, using the status quo assumption that the Rosebud mine continues to operate. Next, the analysis employed the REMI model a second time, simulating an alternative scenario where the events described in the Rosebud mine closure scenario occur and the mine's contributions are removed from the economy.

Figure 1. Policy analysis using the REMI model
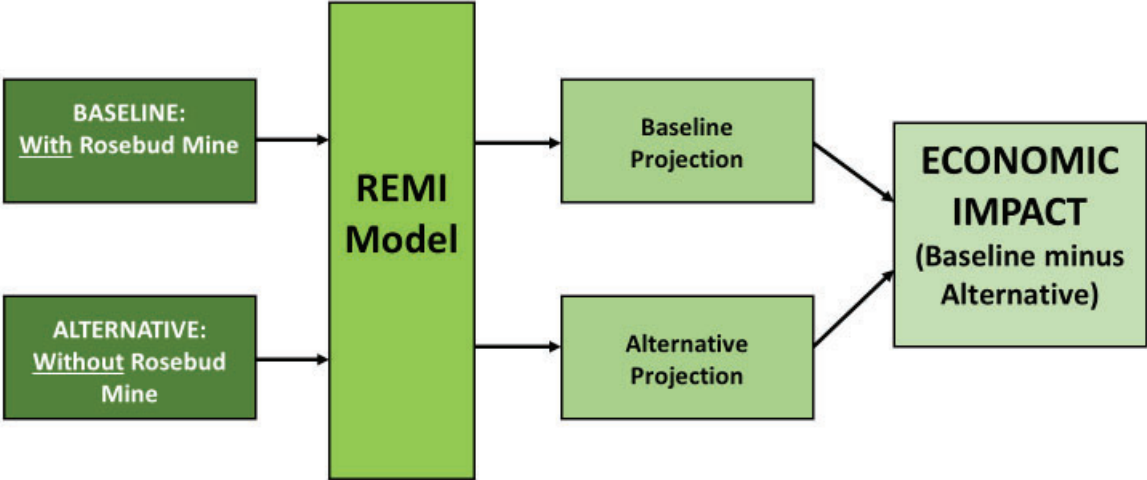
The difference between economic activity in baseline scenario and the alternative scenario is the ultimate economic impact of the events precipitating closure of the Rosebud mine.

The REMI model utilizes historical data on production, prices, trade flows, migration, and technological advances to calibrate the relationship between five basic blocks of the state economy, as shown in Figure 2, below.

Figure 2 Schematic model of REMI Linkages

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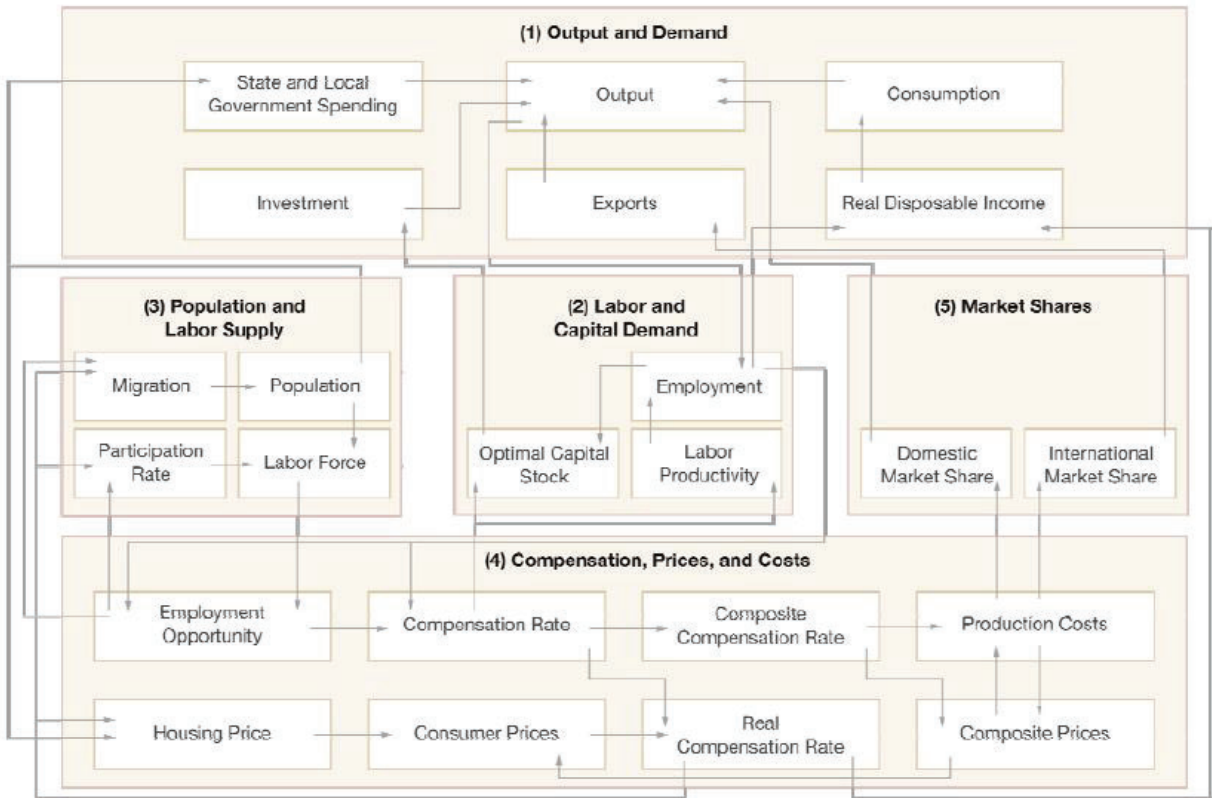
These blocks are:

(1) Output and Demand;
(2) Labor and Capital Demand;
(3) Population and Labor Supply;
(4) Compensation, Prices and Costs; and
(5) Market Shares.

The differences in production, labor demand, and intermediate demand associated with the closure of the Rosebud mine perturbs this system, causing changes and adjustment that feedback on each other and eventually come to a new equilibrium. This new equilibrium, or resting point for the economy, is the alternative projection depicted in Figure 1.

The underlying philosophy of the REMI model is that regions throughout the country compete for investment, jobs, and people. When events occur in one region that change economic opportunity, demand, or productivity, they set off a chain reaction of events that cause resources to flow toward better investment and production opportunities, followed over time by workers and households toward better employment opportunities and higher wages.

At its heart of the REMI model is an 82-sector input/output matrix that models the technological interdependence of production sectors of the economy, as well as extensive trade and capital flow data. Together, these components enable the estimates of the shares of each sector's demand that can be met by local production. Simplified illustrations of the schematic model in Figure 2 are provided on the following pages, in figures 3 through 7.

Figure 3 OUTPUT LINKAGES
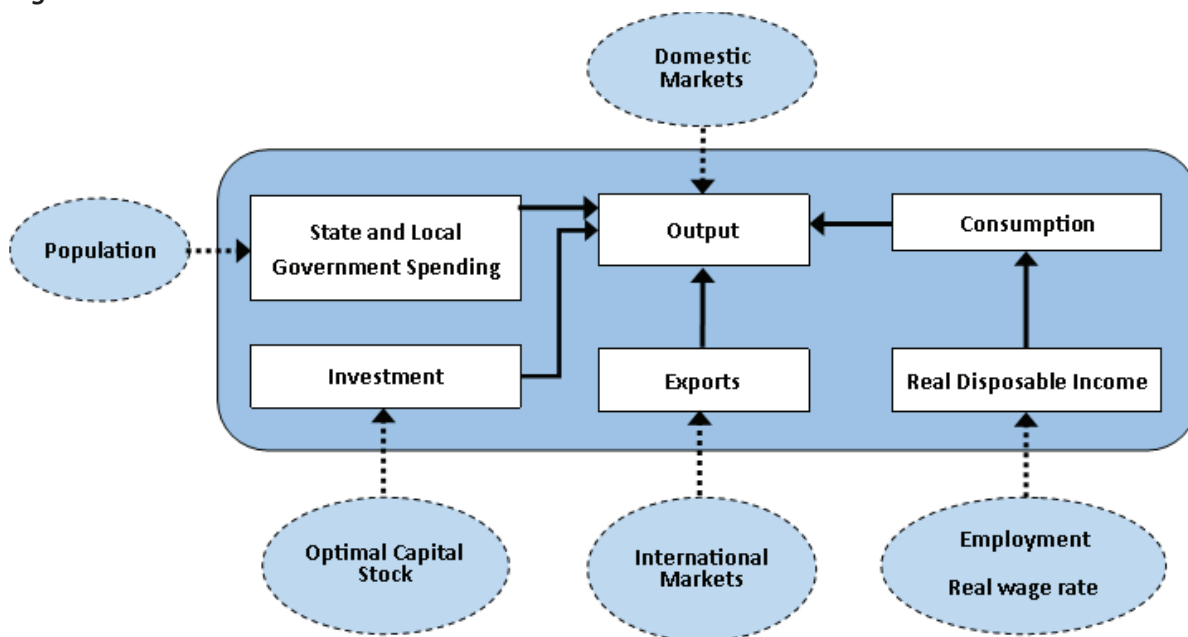
Figure 4 LABOR AND CAPITAL DEMAND LINKAGES
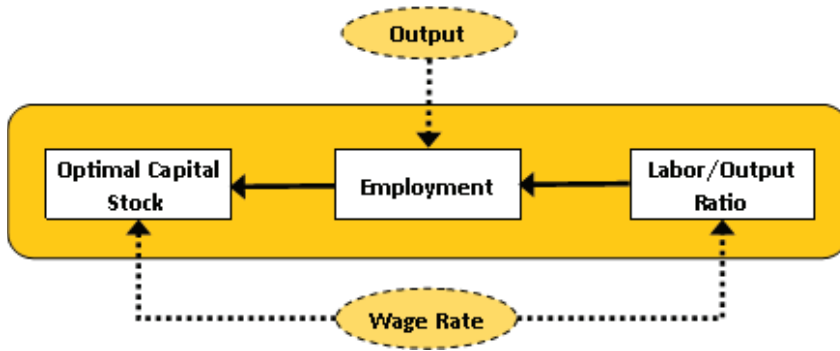
Figure 5 Demographic Linkages

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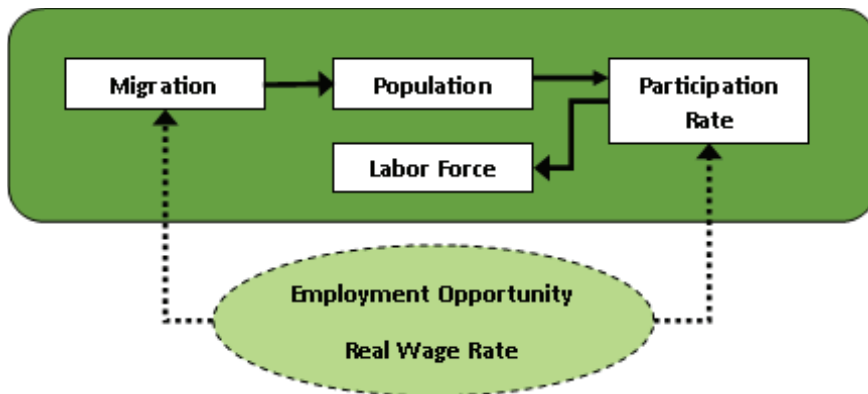
Figure 6 WAGES, PRICES AND PRODUCTION COSTS LINKAGES
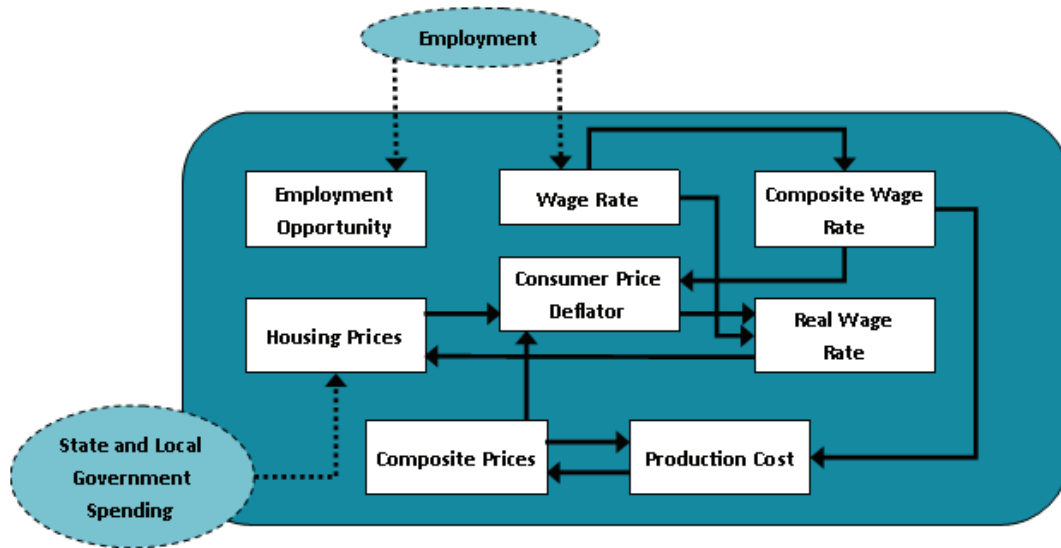
Figure 7 MARKET SHARE LINKAGES
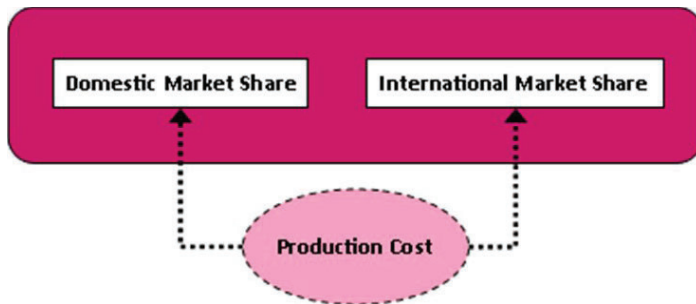
The use of the model involves (a) carefully constructing an input scenario that faithfully represents the changes in the economy that are the subject of analysis, and (b) using the model to produce an alternate projection of the economy that incorporates those changes. The model's purpose is to trace and quantify how events in specific sectors or industries ultimately move the overall economy to a new level of activity.

Conclusion

The REMI model is a powerful, flexible, well-documented and well-respected tool for conducting policy analysis in general, and the analysis of the Rosebud mine closure in particular. We now turn to the use of the model for this study.

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4. THE ROSEBUD MINE CLOSURE SCENARIO

In the event that the Colstrip SES switched sources for its coal away from the Rosebud mine, the mine would lose its only significant customer. Because of this, it would lose its ability to operate in an economic manner. This study constructs, analyzes, and describes a scenario that includes the closure and reclamation of the Rosebud mine.

While any number of events can occur to affect the future, the objective of this study is to explore and quantify the economic implications of a specific event, namely, the closure of the mine. The outcome of this analysis is not a forecast – it is the difference between two different forecasts of the state economy: a forecast that continues its operation, and a forecast that includes the closure of the Rosebud mine.

Because the closure of the two smaller, older generating units (Units 1 and 2) of the Colstrip SES is scheduled to take place in the very near future, the baseline projection of the economy entails slightly reduced levels of activity at the Rosebud mine than currently exist today. The changes in the economy that would occur in the event that the mine ceased operation are measured against this lower baseline.

The first step in this analysis is to carefully construct the Rosebud mine closure scenario. This is meant to describe how an economy with no Rosebud mine would differ from the baseline. In the language of economic impact analysis, these are the *direct impacts*.

Additionally, there are other economic activities that occur that are not part of the production of coal but are nonetheless linked to the cessation of activities at the mine. These include (a) the environmental remediation activities that would commence after production ends, and (b) the new transport and material handling activities that can be expected to occur at the Colstrip SES due to the shift to rail delivery of its fuel source. These are often referred to as *indirect impacts*.

These changes to the economy are presented to an economic model (REMI) that translates them into changes in the broader economy as spending, production, income and employment changes propagate. These total impacts include the direct and indirect impacts, and also include the other changes in economic activity that are induced by the mine closure.

In this analysis, no changes in the (post Unit 1 and 2 closure) operation of the Colstrip SES are assumed – its production levels and thus electricity markets are assumed to be unaffected by the change in fuel source. It is implicitly assumed that Montana coal is not used for the Colstrip SES in the Rosebud closure scenario. In the event of a fuel switch at the Colstrip SES, the Rosebud mine is almost certain to close. We can attach no such certainty to the ultimate source of whatever new fuel is acquired, but the proximity and capacity of the Wyoming mines in the Powder River Basin make it quite plausible that non-Montana coal would be used.

Direct Impacts: Rosebud Mine Operations

The Rosebud mine has produced output in the neighborhood of 8.5 million tons of low-sulphur, subbituminous coal for use almost exclusively to the Colstrip SES since 2012 (see graph). The coal is delivered by conveyor to the electric generating units 4.5 miles away. After the closure of Units 1 and 2 of the Colstrip SES, this output will fall to approximately 6.5 million annual tons.

Rosebud Mine Annual Production, Tons

A line chart titled "Rosebud Mine Annual Production, Tons" showing annual production from 2001 to 2017, with the y-axis ranging from 0 to 16,000,000. Production starts around 11,300,000 in 2001, dips to about 10,000,000 in 2002, rises to a peak of about 13,400,000 in 2005, remains around 12,500,000-13,000,000 through 2008, drops to about 10,400,000 in 2009, rises to about 12,200,000 in 2010, then declines to about 8,000,000 in 2012, rises to about 9,700,000 in 2015, and ends around 8,600,000 in 2017.

In the scenario where the fuel for the Colstrip SES comes from another source and the Rosebud mine closes, this production is lost to the economy.

The post Unit 1 and 2 closure operations of the Rosebud mine will employ 337 Westmoreland employees, in addition to a small number of non-company contractors, on an annual basis. As can be seen from the table, those jobs pay total compensation of approximately $40.6 million per year, an average compensation level of approximately $120,000 per employee.

Rosebud Mine Operational Information

CATEGORY	UNITS	2020
Headcount employment	Jobs	337
Employee compensation	$ Millions	$40.6
Mine production	Million tons	6.5

Additionally, the company pays vendors and suppliers for everything from diesel fuel to scientific services. Spending for inputs, some of which the company itself supplies, will be on the order of $31 million annually.

Operations of the mine also entail tax and royalty payments to all levels of government. Of special importance are the taxes and royalties that are paid by all coal producers to state and local government.

Taxes Applied to Montana Coal Production		
Tax Description	**Recipient**	**Tax Rates**
Coal Severance Tax	State Government	15% of Contract Sales Price
Gross Proceeds Tax	Local Government	5% of Contract Sales Price
Resource Indemnity and Ground Water Assessment Tax	State Government	.4% of Contract Sales Price
State Royalty Assessment	State Government	Statutorily Set by DNRC
Federal Royalty Assessment	State & Federal Government	12.5% of Contract Sales Price
Federal Black Lung Tax	Federal Government	$0.55 per ton
Federal Reclamation Tax	Federal Government	$0.28 per ton
State Funds	State & Federal Funds	Federal Funds	

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These taxes comprise an important component of the Rosebud mine's direct impact. Based on recent history, we have used the estimates for mine-related tax and royalty payments shown in the table, adjusted to incorporate the closure of Units 1 and 2 of the Colstrip SES.

Closure of the mine ceases production ends these payments. The government spending and services supported by these payments is assumed to be reduced accordingly. The alternative, raising taxes on other taxpayers, was considered a less reasonable scenario.

Rosebud Mine Coal Tax Payments ($ Millions)

CATEGORY	REMITTED TO	AMOUNT
Coal Severance Tax	State	$18.2
Gross Proceeds Tax	Local	$6.0
Resource Indemnity and Ground Water Assessment Tax	State	$0.5
State Royalty Assessment	State	$0.5
Federal Royalty Assessment	State and Federal	$12.0

Rosebud Mine Closure: Indirect Impacts

The closure of the Rosebud mine would be closely associated with two other events with economic implications. One is the environmental remediation activities to return the land to a natural state. Planning and bonding such activity are pre-requisites for permitting.

Westmoreland currently has a $165 million bond set aside for remediation. We assume that the remediation activity funded by this bond will take place over a 10-year period commencing immediately after mine closure. Since the source of funds for this activity comes from the company owners, this activity adds jobs, income, and other spending flows to the local economy.
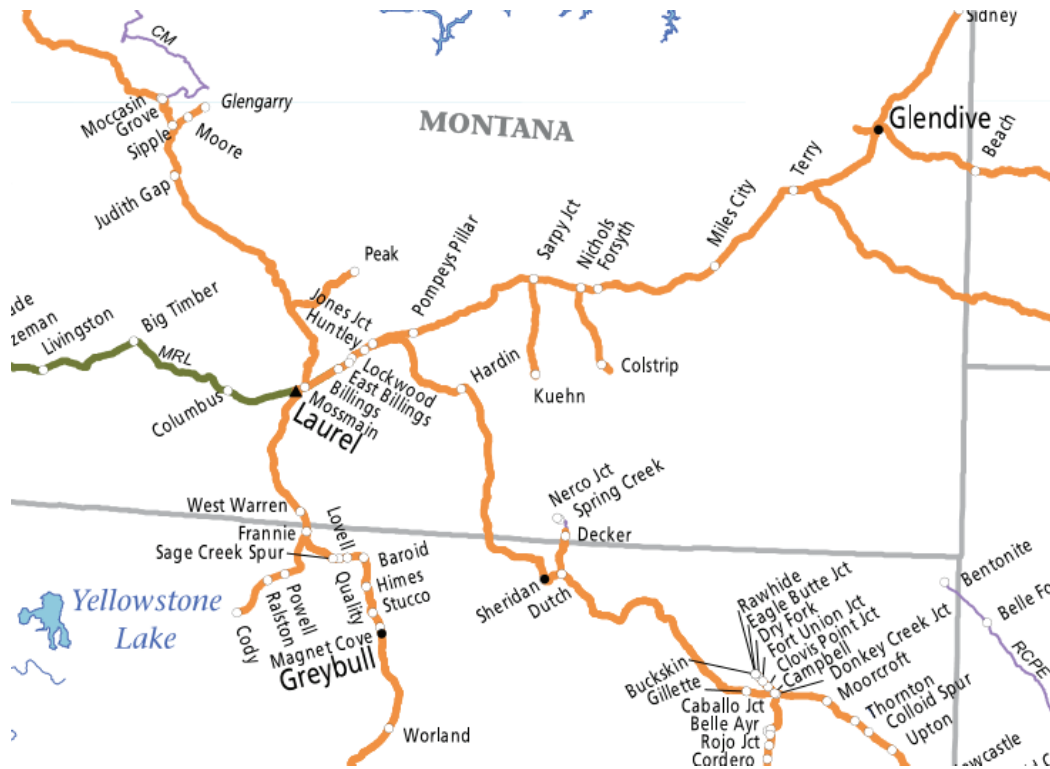
A second category of indirect impacts has to do with investments and operations at the Colstrip SES to accommodate the delivery of coal by rail instead of conveyor. No information was made available as to the size and scope of the capital investments needed at the Colstrip SES site. We did, however, make a projection of the new rail activity that could occur. While not definitive, it does serve to illuminate the order of magnitude of impacts that are associated with rail transport.

We begin with the assumption that Colstrip SES coal is sourced from Campbell County, Wyoming, where the largest coal mines in the world are located immediately adjacent to rail transport. The BNSF rail network map suggests an approximate rail distance of just under 300 miles along these corridors, travelling through Sheridan, Lockwood, Forsyth, and finally south to Colstrip. Approximately 200 miles of that route lies within the state of Montana, and at a cost of $0.03 per ton-mile for rail transport, it represents a demand for $58 million for rail transport services for the 6.5 million tons of annual coal consumption for the Colstrip SES.

This demand for rail transport services does increase rail employment and investment in the state, and it is incorporated into the analysis.

Conclusion

The Rosebud mine has served the coal needs of the adjacent Colstrip Steam Electric Station (SES) generating facility for more than 40 years. If this relationship were severed and those needs were satisfied elsewhere, the mine's operation would cease. This section has described the changes in economic activity that could reasonably be expected in a mine closure scenario, including the cessation of mining operations, the environmental remediation of the mine site, and changes in coal delivery at the Colstrip SES. All of the changes are measured against a baseline that incorporates the closure of the two smaller, older units of the Colstrip SES.

As described previously, these changes comprise the Rosebud mine closure scenario that is used to produce an alternative projection of the state economy that reflects those events. We now turn to an examination of those outcomes.

5. THE ECONOMIC IMPACTS OF A ROSEBUD MINE CLOSURE

An assessment of the economic implications of the closure of Westmoreland's Rosebud Mine adjacent to Colstrip, Montana involves (a) assessing the economic changes directly and indirectly associated with the event, and (b) using an economic model to track how those changes propagate across the broader economy to estimate the ultimate impact of the closure.

The economic impacts reported here include all changes in the economy that can be expected to occur in a Rosebud mine closure scenario described in the previous section. As will be seen, the impacts extend beyond the industry and workers directly affected, and are several orders of magnitude larger than the activity of the mine itself. The impacts induced in the economy beyond the mine and beyond Colstrip occur because of the spending flows from coal production that are received as income and revenue by individuals, businesses and governments.

The impacts summarized in this report are not a forecast. They are the difference between two forecasts of the future for the state economy – a status quo forecast, and a forecast that incorporates the changes that would occur in a mine closure scenario. Since many measurements of economic activity are in dollar terms, all such measures have been corrected for inflation and can be understood as measures of dollar in terms of their purchasing power in the year 2019.

The closure scenario assumes that the fuel switching at the Colstrip SES and the mine closure take place in the year 2020. This is clearly not realistic – an actual sequence of events that would produce a mine closure would doubtless take years to occur. But the specificity of the assumption is useful in understanding the results. The findings would be fundamentally unchanged for a different choice of specific timing.

Impact Summary

Our basic finding is that the closure of the Rosebud mine would be a significant economic event, both for the community of Colstrip and the rest of the state. The loss of 337 mining jobs and the production of 6.5 million tons of coal in Colstrip ultimately contribute to a total job loss statewide of more than 1,800 jobs, as shown in the Table. The magnitude of the induced impacts on the rest of the economy occur in part because of the high-paying nature of the mining jobs, and the outsized impact that mining activity has on state and local tax revenues.

Impacts Summary

CATEGORY	UNITS	IMPACTS BY YEAR					
		2020	2021	2022	2023	2024	2025
Total employment	**Jobs**	**-1,716**	**-1,852**	**-1,893**	**-1,872**	**-1,819**	**-1,754**
Personal income	**Millions**	**-$95.6**	**-$101.4**	**-$109.2**	**-$113.0**	**-$114.8**	**-$115.4**
Disposable personal income		*-$81.1*	*-$86.1*	*-$92.9*	*-$96.4*	*-$98.0*	*-$98.6*
State Tax and Nontax Revenue		**-$39.0**	**-$41.0**	**-$42.7**	**-$43.8**	**-$44.4**	**-$44.7**
Output		**-$325.9**	**-$347.8**	**-$355.2**	**-$353.4**	**-$346.8**	**-$338.5**
Earnings per Lost Job	**Dollars**	**$61,998**	**$60,722**	**$61,828**	**$62,896**	**$63,940**	**$64,921**
Population	**People**	**-568**	**-998**	**-1,337**	**-1,592**	**-1,777**	**-1,909**

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Other measures of economic activity reflect on different aspects of the mine closure's impact.

- Personal income received by Montana households would be reduced by more than $110 million per year, compared to levels that would occur if the mine remained in operation. In terms of after-tax, or disposable income, this is a decline of almost $100 million in purchasing power of Montana households.

- The revenue received by state government would be more than $40 million less each year due to the closure of the mine, reflecting revenue from both tax and non-tax sources. Revenue changes occur directly from the payments of the mine in natural resource taxes, and indirectly from closure-induced changes in income and population.

- Output, defined as gross receipts of business and non-business organizations would be more than $340 million lower due to mine closure across the state;

- The state of Montana would have fewer people, amounting ultimately to more than 1,900, in the wake of events that led to closure of the Rosebud mine as described in this report. Those shortfalls widen with time as individuals and families move in response to changes in economic opportunities.

Not all of the changes in the economy that would take place in the aftermath of a Rosebud mine closure are coincident with the actual closure events. We report on changes for a six year period – projected economic impacts beyond six years can be found in the Appendix.

The changes summarized in the table refer to the economy of the state as a whole. While it can be expected that the largest portion of these impacts are experienced in Colstrip and the surrounding region itself, there are also impacts felt in other parts of the state. These occur primarily due to the cutbacks in state government that are caused by the revenue impacts of the closure.

These impacts reflect all of the direct and indirect impacts associated with mine closure described in the previous section – the negative as well as the positive. They include, for example, the positive impacts that occur due to mine remediation activities as well as the additional rail activity that would occur in a mine closure scenario. The fact that the net impacts are negative is because of the dominant effect of the mine closure itself.

Employment Impacts

The dynamic nature of the economic changes that can be expected to occur in a mine closure scenario can be seen by examining impacts over a longer period of time, as we present for total employment impacts shown in the Figure below. There are several factors at work in the behavior of total employment in response to mine closure-related events.

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Employment Impacts by Year
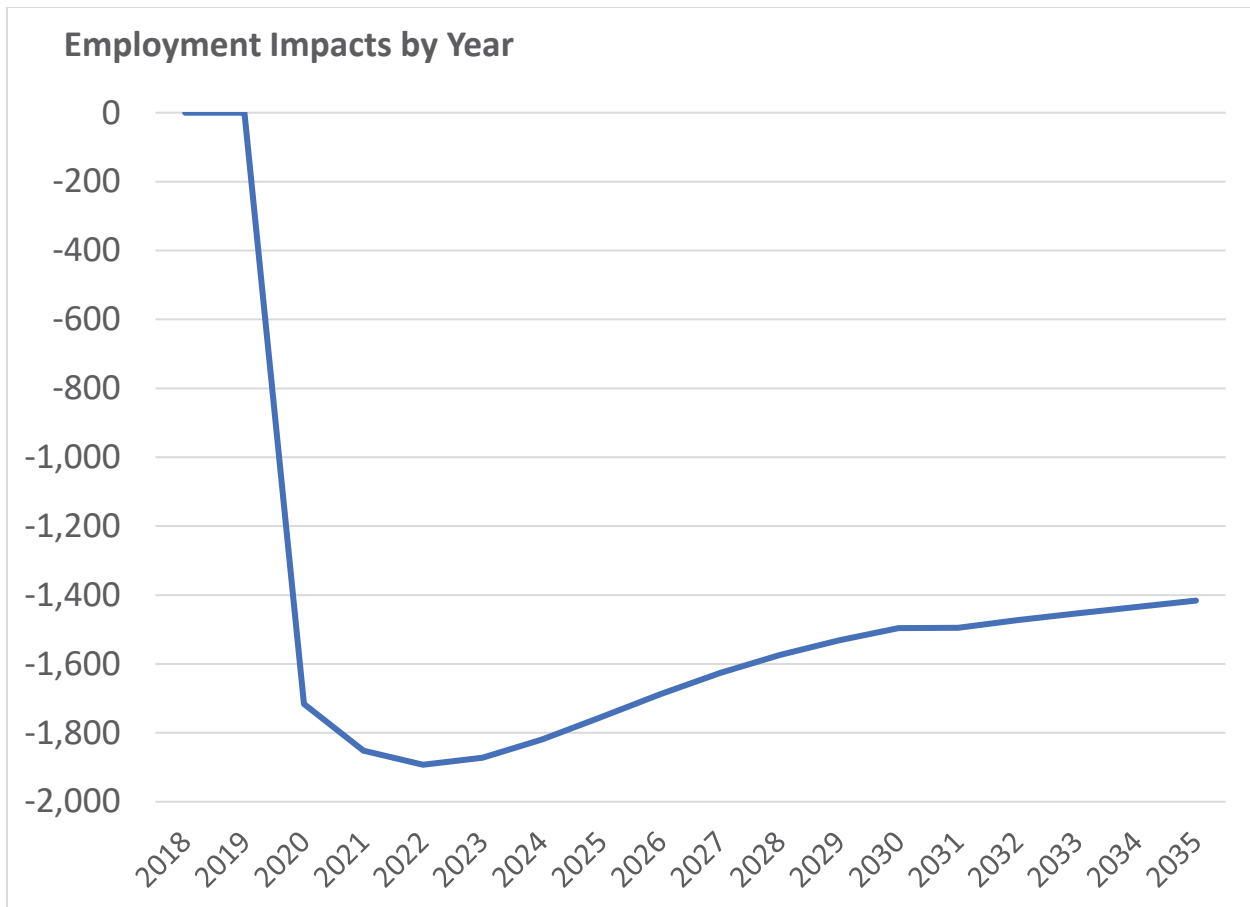
The first observation is simply to note that the job impacts which commence in year 2020 when closure takes place change over time. While many factors are at work in contributing to this outcome, three stand out as being particularly important.

- Short-term construction overshoot. In the years immediately following the closure, the economy will have excess capital – both in structures and equipment. Construction will be initially depressed as that excess supply is gradually absorbed. Thus impacts build for an interval beyond the year that closure takes place, recovering slightly thereafter.

- Productivity impacts. Over medium and long intervals of time, the productivity changes that can be expected to occur that reduce labor requirements in capital intensive industries such as mining result in smaller employment impacts for any physical output loss. Thus employment impacts moderate slightly over longer time horizons.

- Migration and demographic impacts. The migration of individuals and families not only happens more slowly that other changes, the demographic changes that migration induces show up in more complex ways. This is the main reason why population impacts continue to exhibit variation decades after the closure event.

Another important aspect of the economic implications of Rosebud mine closure events can be seen from a more detailed examination of job impacts, as shown in the table below.

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State Employment Impacts

INDUSTRY	NUMBER OF JOBS					
	2020	2021	2022	2023	2024	2025
State and local government	-540	-602	-633	-646	-650	-646
Mining	-384	-382	-369	-358	-347	-337
Construction	-256	-310	-318	-301	-271	-237
Retail trade	-151	-159	-165	-164	-161	-156
Accommodation and food services	-75	-83	-90	-95	-98	-99
Health care and social assistance	-68	-69	-70	-69	-67	-66
Other services, except public administration	-59	-57	-56	-55	-53	-50
Professional and technical services	-33	-37	-38	-38	-37	-36
Wholesale trade	-26	-26	-26	-24	-23	-22
Arts, entertainments and recreation	-20	-20	-20	-19	-18	-18
Transportation and warehousing	-14	-14	-13	-11	-9	-8
Administrative and waste services	-9	-11	-11	-11	-10	-9
Manufacturing	-11	-11	-11	-10	-10	-9
Other private	-70	-72	-73	-70	-66	-62
TOTAL	-1,716	-1,852	-1,893	-1,872	-1,819	-1,754

Employment Impacts by Industry, 2022

Industry	Value
State and local government	-633
Mining	-369
Construction	-318
Retail trade	-165
Accommodation and food services	-90
Health care and social assistance	-70
Other services, except public administration	-56
Professional and technical services	-38
Wholesale trade	-26
Arts, entertainments and recreation	-20
Transportation and warehousing	-13
Administrative and waste services	-11
Manufacturing	-11
Other private	-73

Perhaps the most striking aspect of the industry profile of employment impacts is the fact that the sector of the state economy that makes the largest contribution to the total is state and local government, not mining. There are several reasons for this outcome.

The first is that mining is a capital-intensive industry, and the loss of output affects relatively fewer workers as a result. By contrast, government is primarily services with a relatively larger labor requirements for each dollar of output. A second reason for the large state and local government employment impact has to do with the disproportionate tax burden borne by natural resource industries in general, and coal mining in particular. As we detail below, the Rosebud mine directly pays more than $25 million to state and local government in taxes and royalties.

A third reason for the impact on government has to do with changes in population that occur due to mine closure-related events. This clearly affects tax revenues, but it also impacts important nontax revenue sources such as transfers from the Federal government. Those transfer flows change because their apportionment formulas are linked to population.

More generally, the employment impacts demonstrate how closure related events propagate through the rest of the economy. Removing almost $100 million in spending power from the state economy lowers demand and thus labor needs for a wide range of industries, including retail trade, health care and construction.

Personal Income Impacts

While reductions in employment associated with mine closure events clearly produce a loss in wage income for Montana households, the reduction in economic activity that occurs due to closure also produces other outcomes affecting income. This can be seen for a more detailed look at personal income impacts shown in the Table below.

The Table presents an income accounting that is in standard use by Federal statistics agencies, applied to the changes in income that can be expected to occur in a mine closure scenario. As can be seen, while the bulk of changes due to closure events do occur in earnings – more specifically, in wages and salaries – property income is affected as well. The latter exceed $9 million per year in year 2025. These reductions occur due to population declines, as well as the lower demand for housing and commercial real estate that result from lower levels of economic activity.

The definition of personal income, as can be seen from the Table below, is net of pension and social security contributions and thus is closer to income available for spending than raw compensation. Disposable income, which nets out personal income taxes, is even closer to that concept.

CATEGORY		INCOME PER YEAR ($ Millions)					
		2020	**2021**	**2022**	**2023**	**2024**	**2025**
TOTAL EARNINGS		**-106.4**	**-112.5**	**-117.0**	**-117.7**	**-116.3**	**-113.9**
	Total wages and salary disbursements	**-77.6**	**-81.2**	**-84.2**	**-85.0**	**-84.5**	**-83.3**
SUPPLEMENTS TO WAGES AND SALARIES		**-18.9**	**-20.4**	**-21.7**	**-22.4**	**-22.7**	**-22.7**
	Employer contributions for employee pension and insurance funds	-12.5	-13.5	-14.3	-14.8	-15.0	-15.0
	Employer contributions for government social insurance	-6.4	-6.9	-7.4	-7.6	-7.7	-7.7
	Proprietors' income w/inventory valuation and capital consumption adjustments	-10.0	-10.9	-11.1	-10.4	-9.2	-7.9
LESS:	Contributions for government social insurance	-13.9	-14.7	-15.4	-15.8	-15.8	-15.7
	Employee and self-employed contributions for government social insurance	-7.5	-7.8	-8.1	-8.2	-8.1	-8.0
	Employer contributions for government social insurance	-6.4	-6.9	-7.4	-7.6	-7.7	-7.7
PLUS:	Adjustment for residence	0.4	1.2	1.2	1.0	0.8	0.5
	Gross in	-1.5	-0.9	-1.0	-1.1	-1.3	-1.5
	Gross out	-1.9	-2.1	-2.2	-2.2	-2.1	-2.1
EQUALS:	**Net earnings**	**-92.1**	**-96.5**	**-100.4**	**-100.9**	**-99.7**	**-97.6**
PLUS:	Property income	-3.1	-3.8	-5.6	-7.1	-8.3	-9.2
	Dividends	-1.1	-1.3	-1.9	-2.4	-2.7	-2.9
	Interest	-1.4	-1.7	-2.7	-3.5	-4.1	-4.7
	Rent	-0.6	-0.7	-1.1	-1.3	-1.5	-1.6
	Transfer payments	-0.5	-1.1	-3.1	-5.0	-6.8	-8.5
EQUALS:	**Personal Income**	**-95.6**	**-101.4**	**-109.2**	**-113.0**	**-114.8**	**-115.4**
LESS:	Personal current taxes	-14.5	-15.3	-16.2	-16.6	-16.8	-16.7
DISPOSABLE PERSONAL INCOME		**-81.1**	**-86.1**	**-92.9**	**-96.4**	**-98.0**	**-98.6**

Output Impacts

Income to business and non-business organizations is significantly impacted by the events described in the Rosebud mine closure scenario. We show how economic output, or gross receipts for goods and services, if affected for major industry categories by Rosebud mine closure events. The definition of output in this table differs slightly from the more generally used definition – in the REMI model, output is equal to gross receipts with the exception of retail and wholesale trade industries, where markup is used instead.

The figure below gives a slightly different portrayal of impacts by industry than the pattern of impacts for employment. In terms of output, mining itself is the industry that experiences the largest decline. The sizable impacts felt by other businesses, most notably construction, retail trade and health care, also are of note. These impacts give more information on the kinds of business and non-business activity that would ultimately feel the effect of a closure of the Rosebud mine.

INDUSTRY	OUTPUT PER YEAR ($ Millions)					
	2020	2021	2022	2023	2024	2025
Mining	-167.6	-170.0	-169.6	-169.2	-168.8	-168.5
State and local government	-53.7	-60.2	-63.9	-65.8	-66.6	-66.8
Construction	-43.2	-53.6	-56.1	-53.9	-49.3	-43.9
Retail trade	-11.6	-12.5	-13.3	-13.5	-13.5	-13.4
Health care and social assistance	-7.5	-7.8	-8.1	-8.2	-8.1	-8.1
Wholesale trade	-5.7	-6.0	-6.0	-5.9	-5.7	-5.5
Accommodation and food services	-4.5	-5.0	-5.5	-5.8	-5.9	-6.0
Other services, except public administration	-4.0	-3.9	-3.9	-3.9	-3.8	-3.6
Manufacturing	-3.9	-3.9	-3.8	-3.5	-3.2	-2.9
Professional and technical services	-3.4	-3.8	-4.0	-4.0	-4.0	-3.9
Transportation and warehousing	1.8	2.1	2.6	3.1	3.6	4.0
Arts, entertainments and recreation	-1.3	-1.3	-1.3	-1.3	-1.3	-1.2
Administrative and waste services	1.1	1.0	0.9	1.0	1.0	1.1
Other private	-22.3	-22.8	-23.3	-22.5	-21.2	-19.8
TOTAL	-325.9	-347.8	-355.2	-353.4	-346.8	-338.5

Output Impacts by Industry, $ Millions, 2022

Industry	Value
Mining	-169.6
State and local government	-63.9
Construction	-56.1
Retail trade	-13.3
Health care and social assistance	-8.1
Wholesale trade	-6.0
Accommodation and food services	-5.5
Other services, except public administration	-3.9
Manufacturing	-3.8
Professional and technical services	-4.0
Transportation and warehousing	2.6
Arts, entertainments and recreation	-1.3
Administrative and waste services	0.9
Other private	-23.3

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State and Local Revenue Impacts

The outsized role of coal mining and other natural resource industries in the state revenue base makes events which affect production and sales of especial importance to Montana. A closure of the second largest coal mine in the state can be expected to have a noticeable impact on revenues. Since Federal tax revenues flow outside the state and have only a limited impact on Federal spending, we focus on the impacts at the state and local level.

The revenue impacts that are estimated by the REMI model are classified by the same categories defined by the Census of Governments conducted by the U.S. Census Bureau. As can be seen from the tax and nontax revenue impacts of the events associated with the Rosebud mine closure shown in the Table and Figure below, some of these categories directly correspond to specific taxes, such as the individual income tax. The general sales tax category, of course, registers no impact because the state of Montana has no general sales tax.

The second largest revenue impact to state government is not a tax source. It is the broad category of intergovernmental revenue that is almost totally comprised of transfers from the Federal government. This reflects everything from highway funding to health care programs, and is affected by changes in income and population that go into the apportionment formulas. The largest impact is in the selected sales tax category, where mining royalties (both from state land and the remittance of a portion of royalties from federal land) and severance taxes are included.

Aside from a small levy to support the University system, there is no statewide property tax in Montana. Those impacts are not included in the Table.

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State Revenue Impacts

CATEGORY	REVENUE PER YEAR ($ Millions)					
	2020	2021	2022	2023	2024	2025
Intergovernmental Revenue	-7.9	-8.9	-9.8	-10.4	-10.8	-11.2
General Sales Tax	0.0	0.0	0.0	0.0	0.0	0.0
Selective Sales Tax	-20.6	-20.9	-21.1	-21.1	-21.2	-21.2
License Taxes	-0.5	-0.6	-0.6	-0.6	-0.6	-0.6
Individual Income Tax	-2.8	-3.0	-3.2	-3.2	-3.2	-3.2
Corporate Income Tax	-0.8	-0.8	-0.9	-0.9	-0.8	-0.8
Other Taxes	-1.3	-1.3	-1.4	-1.5	-1.5	-1.5
Current Charges	-1.4	-1.4	-1.6	-1.6	-1.6	-1.6
Miscellaneous General Revenue	-1.2	-1.3	-1.4	-1.4	-1.5	-1.5
Utility Revenue	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2
Liquor Store Revenue	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Insurance Trust Revenue	-2.2	-2.3	-2.5	-2.6	-2.6	-2.7
TOTAL	-39.0	-41.0	-42.7	-43.8	-44.4	-44.7

State Revenue Impacts, $ Millions, 2022

Category	Value
Intergovernmental Revenue	-11.2
General Sales Tax	0.0
Selective Sales Tax	-21.2
License Taxes	-0.6
Individual Income Tax	-3.2
Corporate Income Tax	-0.8
Other Taxes	-1.5
Current Charges	-1.6
Miscellaneous General Revenue	-1.5
Utility Revenue	-0.2
Liquor Store Revenue	-0.2
Insurance Trust Revenue	-2.7
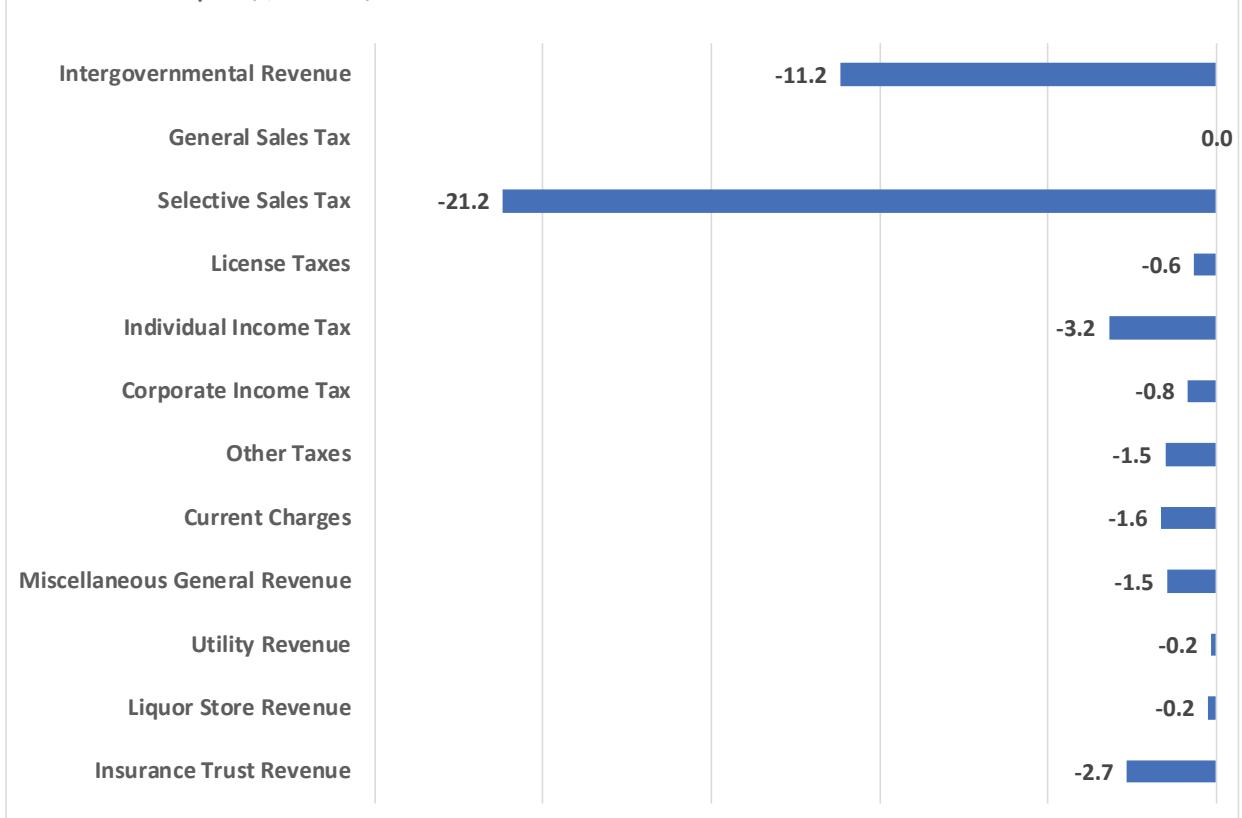
Property tax impacts are almost totally felt by local governments, and can be expected to be significant. Aside from the six largest cities, the city of Colstrip has the highest assessed value for property tax in the state. Actual tax impacts depend on a number of factors that are difficult to project, including the

setting of mill rates of remaining property. But it is possible to describe the kinds of revenue declines that could be expected to occur in the mine closure scenario addressed by this report.

The results reported here were produced by combining the impacts on residential and nonresidential capital stock produced by REMI model with effective tax rates by property class and county across the state. Because changes in capital occur slowly in response to economic events, the property tax impacts display a lagged response to mine closure events.
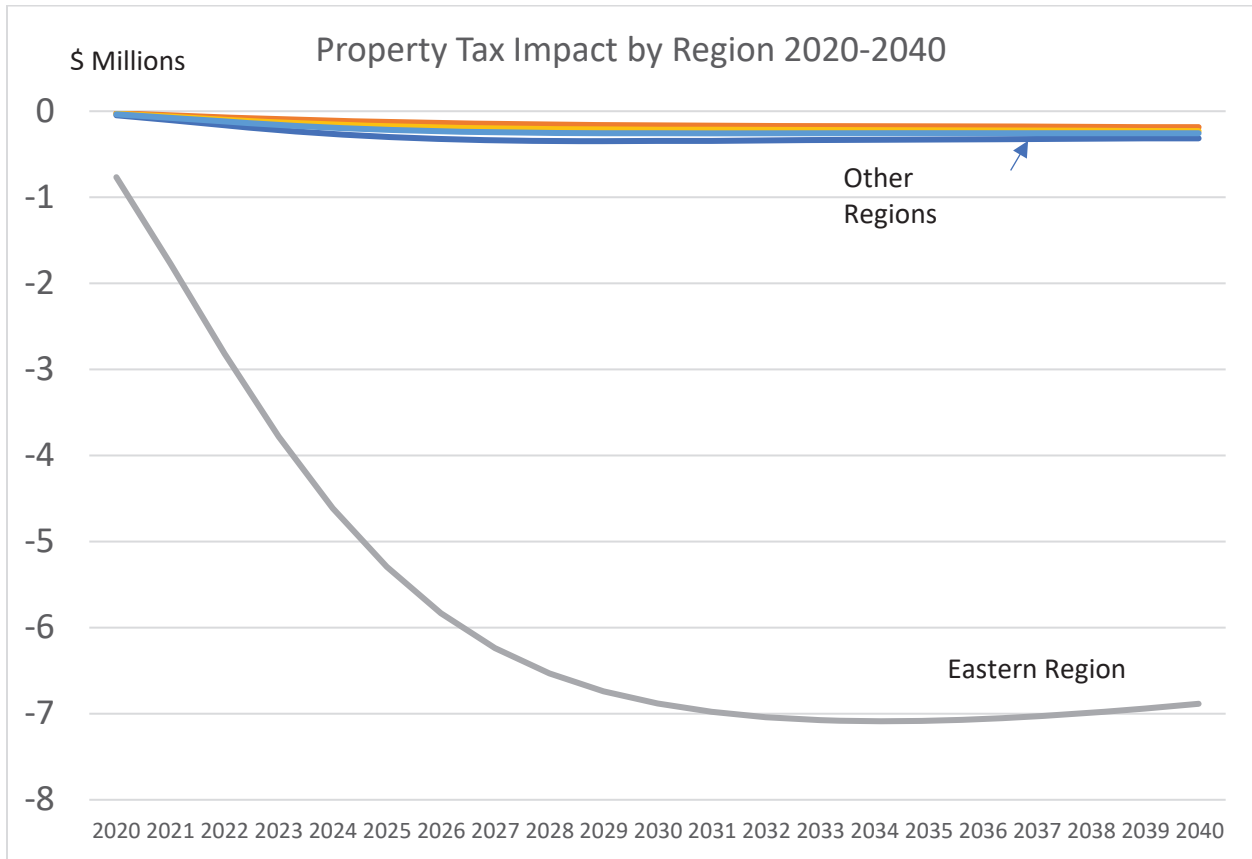
The results are shown for five regions of the state in the Figure above. As can be seen, the property tax impact for the eastern region of the state, which includes Rosebud County where the mine is located, dominate the overall impacts. The impacts in the east exceed $7 million in lost annual revenue per year.

Population Impacts

The movement of people and families to places of greater economic opportunity is an important part of this analysis. Those movements are coincident with, and often caused by, changes in business investment towards and away from regions in response to profitability and return. It can be expected that declines in opportunity in the small community of Colstrip would produce considerable migration from the community. Even at the state level, population impacts would be noticeable.

Population Impacts by Age

AGE COHORT	POPULATION IMPACT					
	2020	2021	2022	2023	2024	2025
Ages 0-14	-140	-251	-343	-418	-477	-523
Ages 15-24	-126	-206	-254	-274	-276	-267
Ages 25-64	-302	-539	-734	-889	-1,007	-1,094
Ages 65+	0	-2	-6	-11	-18	-26
TOTAL	-568	-998	-1,337	-1,592	-1,777	-1,909

Population Impacts by Age, 2025
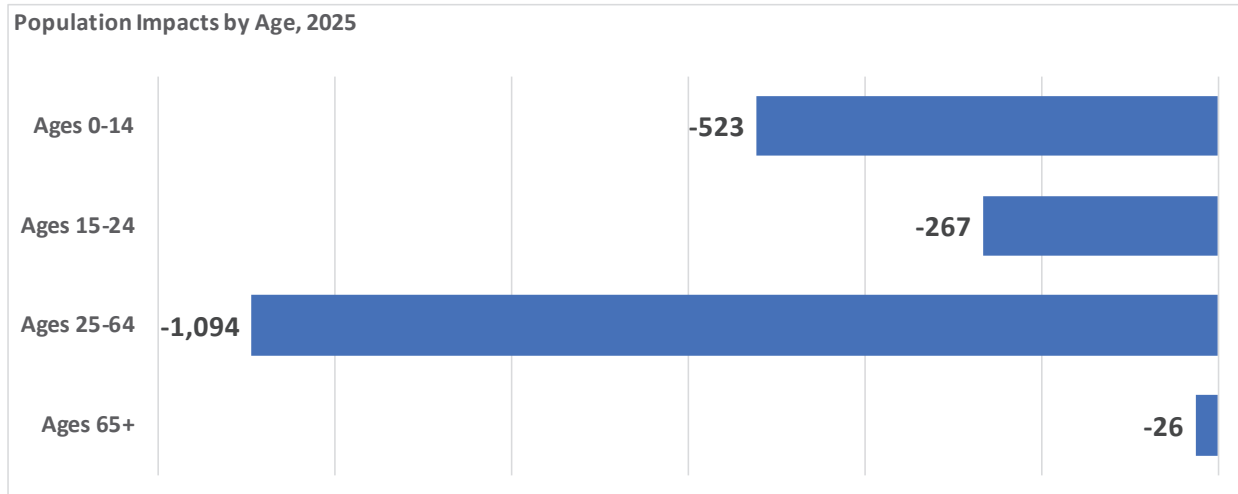
The impacts on population caused by mine closure events are dominated by working age people and their children, as can be seen from the figure above. This has implications for demand for local government services, especially K-12 schools. Population impacts continue to evolve in subsequent years.

Conclusion

The closure of the Rosebud mine would be a significant economic event. Even after taking into account the new economic activity associated with remediation of the mine site, as well as additional rail jobs created from rail delivery of coal to the Colstrip SES, the net result of a fuel switch would be:

- a loss in excess of 1,800 jobs in the state economy, across a broad mix of industries;
- a reduction in annual income received by households of more than $100 million per year, compared to levels that would have occurred had the mine remained in operation;
- a shortfall of more than $40 million per year in state government revenue;
- a decline in local property tax revenue in excess of $7 million per year, most of which occurs in Rosebud County;
- a loss of revenue to businesses in excess of $300 million per year compared to levels that would be maintained under continued operation;
- a state population that is smaller by more than 1,900 people;

6. SUMMARY AND CONCLUSION

This study is intended to assess the economic implications of the closure of the Rosebud mine, in a scenario where the Colstrip SES continues to operate with coal from another source. If the mine were to close, its wages, vendor purchases, and tax payments to workers, businesses and governments would largely cease. The spending of those who receive those payments as income or revenues can be expected to be significantly curtailed, with further knock-on effects on economic activity. As the process continues, an equilibrium level of activity emerges that shrinks the overall economic pie by more than that of the mine itself.

We assess the ultimate impact of the Rosebud mine closure with the use of an economic model that traces the interactions between the mine and the rest of the economy. Specifically developed for this purpose and calibrated with Montana-specific data, the REMI model was leased from Regional Economic Models, Inc. (www.remi.com) for use in this study. Since its development in the early 1980s, the REMI model has been the subject of dozens of peer-reviewed economic articles and has been employed in hundreds of applications.

A mine-closure scenario for the Montana economy was constructed for this study that consisted of three broad components. The first was the removal of the mine itself from the economy. Using information obtained from the mine owners on production, employment, payroll, taxes and vendor spending, the direct contribution of its operations was removed from the economy. A second component was the remediation activities that would commence and continue subsequent to mine closure.

The third component were the operating changes, if any, at the Colstrip SES that might be expected to occur with coal deliveries by rail to that facility from a non-Montana source. While little information was available to detail actual plans and potential investments, a simplified scenario can at least represent the basics of how fuel source changes would affect economic flows.

SUMMARY OF FINDINGS

Our basic finding is that the shutdown of the Rosebud mine would be a significant economic event, both for the Colstrip community and to the remainder of the state. The loss of the facility's 337 jobs, currently mining 6.5 million tons of coal annually, would ultimately lead to a state economy that:

- Suffers a loss in excess of almost 1,900 jobs, across a broad mix of industries;
- Has annual income received by households fall more than $100 million short of the amount that would have occurred had the mine remained in operation;
- Experiences a shortfall of more than $40 million per year in state government revenue;
- Sees local governments collect $7 million less per year in property tax revenue, most of which occurs in Rosebud County;
- Faces a loss of revenue to businesses in excess of $300 million per year compared to levels that would be maintained under continued operation;
- Has a population that is smaller by more than 1,900 people;

Impacts Summary

CATEGORY	UNITS	IMPACTS BY YEAR					
		2020	2021	2022	2023	2024	2025
Total employment	Jobs	-1,716	-1,852	-1,893	-1,872	-1,819	-1,754
Personal income	Millions	-$95.6	-$101.4	-$109.2	-$113.0	-$114.8	-$115.4
Disposable personal income		*-$81.1*	*-$86.1*	*-$92.9*	*-$96.4*	*-$98.0*	*-$98.6*
State Tax and Nontax Revenue		-$39.0	-$41.0	-$42.7	-$43.8	-$44.4	-$44.7
Output		-$325.9	-$347.8	-$355.2	-$353.4	-$346.8	-$338.5
Earnings per Lost Job	Dollars	$61,998	$60,722	$61,828	$62,896	$63,940	$64,921
Population	People	-568	-998	-1,337	-1,592	-1,777	-1,909

These findings take into account the positive impacts that come from the $165 million that is expected to be spent in the decade following the closure on environmental remediation, as well as the modest increase in rail and material handling jobs that could be expected to occur as the Colstrip SES moves to use of non-Montana coal.

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Current headcount employment – 365
Total compensation to employees - $44M annually
Total annual mine production – 8.5 million tons
Employment and compensation of outside contractors – 4 employees, $15M/year
Selected vendor and supplier purchases -- $8M/year electricity, $10M/year diesel
Taxes paid: Montana Severance Tax – 23M /year
                 Rosebud County Gross Proceeds Tax - $8M/year
                 Federal Royalties - $13M/year

Bond amount for remediation - $165M

Note: Employment and other measures used in the analysis incorporate reductions from these amounts to account for the impact of the closure of Colstrip SES Units 1 and 2 in the baseline scenario.

APPENDIX 1: REMI TABLES

Summary

Region	Comparison Type	Forecast	Comparison Forecast
Montana	Differences	Westmoreland Shutdown Post1and2	Standard Regional Control

Category	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Employment	Individuals (Jobs)		0.000	-1716.455	-1851.973	-1892.618	-1871.783	-1819.331	-1754.040	-1687.595	-1625.836	-1573.938	-1531.020	-1496.067
Private Non-Farm Employment	Individuals (Jobs)		0.000	-1176.778	-1249.764	-1259.691	-1225.317	-1169.818	-1107.546	-1046.949	-992.925	-948.781	-913.432	-886.312
Residence Adjusted Employment	Individuals		0.000	-1702.460	-1824.223	-1867.377	-1851.420	-1805.309	-1746.773	-1686.573	-1630.498	-1583.703	-1544.985	-1513.331
Population	Individuals		0.000	-568.216	-997.782	-1337.341	-1591.959	-1777.074	-1909.481	-2001.623	-2062.205	-2101.659	-2125.971	-2139.229
Labor Force	Individuals		0.000	-427.680	-706.292	-908.732	-1050.001	-1136.611	-1184.804	-1207.785	-1213.279	-1208.059	-1197.573	-1183.176
Gross Domestic Product	Millions of Fixed (2019) Dollars		0.000	-199.704	-213.063	-217.918	-217.036	-213.282	-208.439	-203.468	-198.946	-195.221	-192.308	-190.283
Output	Millions of Fixed (2019) Dollars		0.000	-325.891	-347.753	-355.220	-353.373	-346.844	-338.521	-329.970	-322.350	-316.116	-311.303	-308.026
Value-Added	Millions of Fixed (2019) Dollars		0.000	-199.704	-213.063	-217.918	-217.036	-213.282	-208.439	-203.468	-198.946	-195.221	-192.308	-190.283
Personal Income	Millions of Fixed (2019) Dollars		0.000	-95.626	-101.421	-109.150	-113.036	-114.801	-115.356	-115.261	-114.896	-114.721	-114.681	-114.702
Disposable Personal Income	Millions of Fixed (2019) Dollars		0.000	-81.125	-86.121	-92.942	-96.407	-98.046	-98.622	-97.789	-96.836	-96.912	-96.998	-97.131
Real Disposable Personal Income	Millions of Fixed (2012) Dollars		0.000	-73.795	-78.340	-84.545	-87.697	-89.188	-89.711	-88.954	-88.087	-88.156	-88.234	-88.355
Real Disposable Personal Income per Capita	Thousands of Fixed (2012) Dollars		0.000	-0.049	-0.038	-0.031	-0.024	-0.018	-0.013	-0.009	-0.005	-0.003	-0.001	0.000
PCE-Price Index	2012=100 (Nation)		0.000	-0.003	-0.024	-0.027	-0.029	-0.029	-0.029	-0.029	-0.029	-0.028	-0.027	-0.027

Employment by Industry

Region	Category	Comparison Type	Forecast	Comparison Forecast
Montana	Employment	Differences	Westmoreland Shutdown PostLand2	Standard Regional Control

Industries	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Forestry and Logging; Fishing, hunting and trapping	Individuals (Jobs)	0.000	0.000	0.000	-0.210	-0.142	-0.072	-0.009	0.042	0.080	0.109	0.128	0.138	0.141
Support activities for agriculture and forestry	Individuals (Jobs)	0.000	0.000	0.000	-0.024	0.204	0.418	0.601	0.744	0.846	0.916	0.955	0.967	0.959
Oil and gas extraction	Individuals (Jobs)	0.000	0.000	0.000	-0.265	0.497	1.174	1.730	2.146	2.429	2.599	2.672	2.662	2.586
Mining (except oil and gas)	Individuals (Jobs)	0.000	0.000	-378.541	-377.334	-365.958	-355.856	-346.316	-337.089	-328.466	-319.923	-311.881	-304.196	-296.419
Support activities for mining	Individuals (Jobs)	0.000	0.000	-4.164	-4.301	-3.971	-3.428	-2.814	-2.205	-1.642	-1.204	-0.830	-0.517	-0.258
Utilities	Individuals (Jobs)	0.000	0.000	-5.104	-4.468	-4.031	-3.602	-3.225	-2.924	-2.700	-2.547	-2.461	-2.427	-2.432
Construction	Individuals (Jobs)	0.000	0.000	-256.458	-310.170	-318.215	-300.673	-270.693	-236.844	-204.485	-175.746	-152.063	-133.523	-119.511
Wood product manufacturing	Individuals (Jobs)	0.000	0.000	-1.491	-1.646	-1.616	-1.467	-1.268	-1.061	-0.874	-0.719	-0.598	-0.508	-0.447
Nonmetallic mineral product manufacturing	Individuals (Jobs)	0.000	0.000	-0.556	-0.577	-0.541	-0.472	-0.392	-0.314	-0.247	-0.191	-0.149	-0.118	-0.097
Primary metal manufacturing	Individuals (Jobs)	0.000	0.000	-0.047	-0.047	-0.045	-0.040	-0.035	-0.030	-0.025	-0.022	-0.019	-0.017	-0.016
Fabricated metal product manufacturing	Individuals (Jobs)	0.000	0.000	-0.839	-0.880	-0.853	-0.782	-0.695	-0.607	-0.530	-0.464	-0.414	-0.376	-0.350
Machinery manufacturing	Individuals (Jobs)	0.000	0.000	-0.224	-0.226	-0.214	-0.194	-0.174	-0.155	-0.138	-0.124	-0.113	-0.104	-0.098
Computer and electronic product manufacturing	Individuals (Jobs)	0.000	0.000	-0.201	-0.157	-0.097	-0.031	0.028	0.077	0.117	0.142	0.158	0.168	0.173
Electrical equipment, appliance, and component manufacturing	Individuals (Jobs)	0.000	0.000	-0.001	0.002	0.005	0.007	0.010	0.011	0.012	0.012	0.013	0.013	0.012
Motor vehicles, bodies and trailers, and parts manufacturing	Individuals (Jobs)	0.000	0.000	-0.172	-0.181	-0.181	-0.175	-0.167	-0.157	-0.149	-0.141	-0.135	-0.130	-0.126
Other transportation equipment manufacturing	Individuals (Jobs)	0.000	0.000	-0.019	-0.019	-0.018	-0.016	-0.014	-0.012	-0.011	-0.010	-0.009	-0.009	-0.009
Furniture and related product manufacturing	Individuals (Jobs)	0.000	0.000	-1.003	-1.060	-1.087	-1.066	-1.028	-0.982	-0.935	-0.897	-0.870	-0.849	-0.839
Miscellaneous manufacturing	Individuals (Jobs)	0.000	0.000	-0.318	-0.257	-0.191	-0.119	-0.053	0.002	0.045	0.077	0.098	0.112	0.118
Food manufacturing	Individuals (Jobs)	0.000	0.000	-2.041	-2.118	-2.143	-2.105	-2.041	-1.973	-1.909	-1.851	-1.807	-1.774	-1.755
Beverage and tobacco product manufacturing	Individuals (Jobs)	0.000	0.000	-1.756	-2.026	-2.245	-2.383	-2.470	-2.519	-2.538	-2.542	-2.540	-2.527	-2.513
Textile mills; Textile product mills	Individuals (Jobs)	0.000	0.000	-0.286	-0.271	-0.257	-0.238	-0.219	-0.202	-0.186	-0.173	-0.163	-0.154	-0.149
Apparel manufacturing; Leather and allied product manufacturing	Individuals (Jobs)	0.000	0.000	-0.432	-0.362	-0.301	-0.239	-0.187	-0.145	-0.112	-0.094	-0.084	-0.076	-0.076
Paper manufacturing	Individuals (Jobs)	0.000	0.000	-0.008	-0.008	-0.010	-0.008	-0.007	-0.007	-0.007	-0.006	-0.006	-0.006	-0.006
Printing and related support activities	Individuals (Jobs)	0.000	0.000	-0.234	-0.207	-0.179	-0.148	-0.121	-0.098	-0.081	-0.067	-0.058	-0.052	-0.048
Petroleum and coal products manufacturing	Individuals (Jobs)	0.000	0.000	-0.579	-0.515	-0.435	-0.351	-0.274	-0.207	-0.153	-0.115	-0.087	-0.066	-0.051
Chemical manufacturing	Individuals (Jobs)	0.000	0.000	-0.109	-0.094	-0.078	-0.060	-0.044	-0.029	-0.017	-0.007	0.001	0.007	0.011
Plastics and rubber products manufacturing	Individuals (Jobs)	0.000	0.000	-0.461	-0.478	-0.474	-0.455	-0.430	-0.403	-0.378	-0.353	-0.333	-0.316	-0.302
Wholesale trade	Individuals (Jobs)	0.000	0.000	-25.743	-26.137	-25.653	-24.482	-23.056	-21.619	-20.295	-19.156	-18.261	-17.569	-17.068
Retail trade	Individuals (Jobs)	0.000	0.000	-150.633	-159.442	-164.580	-164.088	-160.762	-156.172	-150.980	-146.241	-142.488	-139.413	-137.276
Air transportation	Individuals (Jobs)	0.000	0.000	-0.707	-0.696	-0.669	-0.624	-0.576	-0.528	-0.485	-0.451	-0.425	-0.403	-0.387
Rail transportation	Individuals (Jobs)	0.000	0.000	5.505	5.686	5.846	5.970	6.042	6.055	6.018	5.938	5.831	5.703	5.553
Water transportation	Individuals (Jobs)	0.000	0.000	-0.011	-0.010	-0.010	-0.009	-0.009	-0.008	-0.007	-0.007	-0.007	-0.006	-0.006
Truck transportation	Individuals (Jobs)	0.000	0.000	-9.375	-9.663	-9.394	-8.820	-8.133	-7.445	-6.817	-6.282	-5.857	-5.526	-5.278
Couriers and messengers	Individuals (Jobs)	0.000	0.000	-0.657	-0.467	-0.263	-0.059	0.122	0.270	0.383	0.468	0.523	0.554	0.566
Transit and ground passenger transportation	Individuals (Jobs)	0.000	0.000	-6.468	-6.566	-6.516	-6.307	-6.040	-5.765	-5.509	-5.284	-5.109	-4.971	-4.873
Pipeline transportation	Individuals (Jobs)	0.000	0.000	-0.418	-0.164	0.077	0.288	0.465	0.600	0.690	0.746	0.772	0.774	0.759
Scenic and sightseeing transportation; Support activities for transportation	Individuals (Jobs)	0.000	0.000	-1.333	-1.148	-0.944	-0.733	-0.539	-0.375	-0.245	-0.149	-0.084	-0.043	-0.023
Warehousing and storage	Individuals (Jobs)	0.000	0.000	-0.838	-0.832	-0.808	-0.769	-0.726	-0.685	-0.649	-0.619	-0.597	-0.582	-0.573
Publishing industries, except Internet	Individuals (Jobs)	0.000	0.000	-0.020	0.040	0.095	0.142	0.179	0.206	0.224	0.234	0.239	0.241	0.240
Motion picture and sound recording industries	Individuals (Jobs)	0.000	0.000	-0.487	-0.478	-0.465	-0.438	-0.407	-0.376	-0.348	-0.337	-0.332	-0.331	-0.334
Data processing, hosting, and related services; Other information services	Individuals (Jobs)	0.000	0.000	-0.335	-0.353	-0.364	-0.367	-0.366	-0.363	-0.361	-0.359	-0.360	-0.361	-0.364
Broadcasting, except Internet	Individuals (Jobs)	0.000	0.000	-0.228	-0.237	-0.240	-0.236	-0.230	-0.224	-0.219	-0.217	-0.216	-0.217	-0.220
Telecommunications	Individuals (Jobs)	0.000	0.000	-0.645	-0.506	-0.370	-0.247	-0.148	-0.078	-0.034	-0.014	-0.013	-0.025	-0.048
Monetary authorities - central bank; Credit intermediation and related activities	Individuals (Jobs)	0.000	0.000	-0.659	0.142	0.888	1.536	2.057	2.444	2.708	2.868	2.941	2.948	2.901
Securities, commodity contracts, other investments; Funds, trusts, other financial vehicles	Individuals (Jobs)	0.000	0.000	-4.124	-3.792	-3.384	-2.943	-2.535	-2.189	-1.911	-1.713	-1.577	-1.491	-1.451
Insurance carriers and related activities	Individuals (Jobs)	0.000	0.000	-1.159	-1.047	-0.906	-0.749	-0.602	-0.482	-0.392	-0.335	-0.307	-0.304	-0.322
Real estate	Individuals (Jobs)	0.000	0.000	-46.357	-50.033	-53.676	-53.851	-52.199	-49.785	-47.231	-44.853	-42.966	-41.562	-40.653
Rental and leasing services; Lessors of nonfinancial intangible assets	Individuals (Jobs)	0.000	0.000	-8.202	-8.337	-8.152	-7.820	-7.430	-7.036	-6.675	-6.361	-6.101	-5.887	-5.711
Professional, scientific, and technical services	Individuals (Jobs)	0.000	0.000	-33.489	-36.880	-38.132	-37.945	-37.025	-35.823	-34.630	-33.669	-32.939	-32.421	-32.081
Management of companies and enterprises	Individuals (Jobs)	0.000	0.000	-0.032	0.028	0.086	0.136	0.176	0.205	0.223	0.233	0.236	0.234	0.227
Administrative and support services	Individuals (Jobs)	0.000	0.000	-25.980	-26.893	-27.249	-26.726	-25.791	-24.735	-23.724	-22.839	-22.150	-21.636	-21.284

	Individuals (Jobs)	0.000	0.000											
Waste management and remediation services	Individuals (Jobs)	0.000	0.000	16.482	16.247	16.056	15.947	15.865	15.785	15.716	15.633	15.553	15.471	15.365
Educational services; private	Individuals (Jobs)	0.000	0.000	-2.326	-2.313	-2.261	-2.127	-1.961	-1.793	-1.637	-1.502	-1.396	-1.317	-1.264
Ambulatory health care services	Individuals (Jobs)	0.000	0.000	-34.161	-33.970	-34.143	-33.619	-32.885	-32.152	-31.470	-31.069	-30.965	-31.074	-31.443
Hospitals; private	Individuals (Jobs)	0.000	0.000	-11.891	-12.765	-13.235	-13.310	-13.217	-13.074	-12.926	-12.821	-12.797	-12.824	-12.909
Nursing and residential care facilities	Individuals (Jobs)	0.000	0.000	-4.102	-3.900	-3.651	-3.312	-2.980	-2.699	-2.483	-2.340	-2.275	-2.267	-2.313
Social assistance	Individuals (Jobs)	0.000	0.000	-17.826	-18.386	-18.786	-18.640	-18.231	-17.709	-17.129	-16.680	-16.377	-16.168	-16.086
Performing arts, spectator sports, and related industries	Individuals (Jobs)	0.000	0.000	-3.088	-2.765	-2.568	-2.322	-2.082	-1.873	-1.701	-1.577	-1.492	-1.439	-1.418
Museums, historical sites, and similar institutions	Individuals (Jobs)	0.000	0.000	-0.026	0.003	0.030	0.057	0.080	0.099	0.113	0.124	0.131	0.136	0.139
Amusement, gambling, and recreation industries	Individuals (Jobs)	0.000	0.000	-17.149	-16.940	-17.069	-16.840	-16.476	-16.081	-15.692	-15.352	-15.125	-14.956	-14.887
Accommodation	Individuals (Jobs)	0.000	0.000	-14.365	-14.063	-14.319	-14.200	-13.946	-13.666	-13.394	-13.193	-13.092	-13.053	-13.088
Food services and drinking places	Individuals (Jobs)	0.000	0.000	-60.372	-68.504	-76.004	-80.735	-83.615	-85.227	-85.870	-85.969	-85.901	-85.645	-85.362
Repair and maintenance	Individuals (Jobs)	0.000	0.000	-20.161	-19.385	-19.011	-18.192	-17.249	-16.337	-15.513	-14.826	-14.325	-13.955	-13.736
Personal and laundry services	Individuals (Jobs)	0.000	0.000	-17.399	-15.924	-15.994	-15.743	-15.402	-15.056	-14.722	-14.457	-14.288	-14.175	-14.147
Religious, grantmaking, civic, professional, and similar organizations	Individuals (Jobs)	0.000	0.000	-19.925	-20.081	-20.224	-19.803	-19.119	-18.320	-17.466	-16.795	-16.304	-15.948	-15.737
Private households	Individuals (Jobs)	0.000	0.000	-1.479	-1.331	-1.156	-0.954	-0.762	-0.595	-0.459	-0.357	-0.288	-0.241	-0.219
State and Local Government	Individuals (Jobs)	0.000	0.000	-539.677	-602.210	-632.927	-646.465	-649.513	-646.494	-640.646	-632.911	-625.156	-617.589	-609.756
Federal Civilian	Individuals (Jobs)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Federal Military	Individuals (Jobs)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Farm	Individuals (Jobs)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Output

Region	Category	Comparison Type	Forecast	Comparison Forecast
Montana	Output	Differences	Westmoreland Shutdown Post1and2	Standard Regional Control

Industries	Units	Year 2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Forestry and Logging; Fishing, hunting and trapping	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.041	-0.023	0.012	0.027	0.040	0.049	0.057	0.063	0.067	0.069
Support activities for agriculture and forestry	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.009	0.001	0.021	0.030	0.037	0.043	0.047	0.049	0.051	0.051
Oil and gas extraction	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.180	0.212	0.398	0.564	0.703	0.816	0.909	0.982	1.037	1.080
Mining (except oil and gas)	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-166.698	-169.124	-168.988	-168.861	-168.743	-168.637	-168.550	-168.473	-168.403	-168.338
Support activities for mining	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.740	-0.738	-0.640	-0.525	-0.411	-0.305	-0.223	-0.153	-0.094	-0.046
Utilities	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-3.761	-2.769	-2.324	-1.925	-1.592	-1.327	-1.128	-0.989	-0.899	-0.850
Construction	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-43.229	-56.055	-53.870	-49.314	-43.892	-38.527	-33.685	-29.620	-26.408	-24.002
Wood product manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.445	-0.511	-0.477	-0.423	-0.363	-0.307	-0.259	-0.220	-0.191	-0.171
Nonmetallic mineral product manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.207	-0.219	-0.184	-0.153	-0.122	-0.094	-0.071	-0.052	-0.039	-0.029
Primary metal manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.014	-0.015	-0.014	-0.013	-0.011	-0.010	-0.009	-0.008	-0.008	-0.007
Fabricated metal product manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.152	-0.166	-0.157	-0.144	-0.130	-0.116	-0.105	-0.096	-0.089	-0.085
Machinery manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.043	-0.045	-0.043	-0.040	-0.037	-0.034	-0.032	-0.030	-0.028	-0.028
Computer and electronic product manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.025	-0.013	-0.005	0.003	0.010	0.016	0.021	0.024	0.027	0.029
Electrical equipment, appliance, and component manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002
Motor vehicles, bodies and trailers, and parts manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.052	-0.058	-0.057	-0.056	-0.054	-0.052	-0.050	-0.049	-0.048	-0.048
Other transportation equipment manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.003	-0.003	-0.003	-0.003	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002
Furniture and related product manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.086	-0.100	-0.100	-0.099	-0.097	-0.094	-0.093	-0.092	-0.091	-0.092
Miscellaneous manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.035	-0.023	-0.016	-0.009	-0.002	0.003	0.007	0.010	0.012	0.013
Food manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.820	-0.862	-0.845	-0.817	-0.789	-0.763	-0.740	-0.725	-0.715	-0.712
Beverage and tobacco product manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.321	-0.417	-0.446	-0.466	-0.479	-0.487	-0.492	-0.496	-0.497	-0.499
Textile mills; Textile product mills	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.015	-0.018	-0.012	-0.011	-0.010	-0.010	-0.009	-0.008	-0.008	-0.008
Apparel manufacturing; Leather and allied product manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.025	-0.018	-0.015	-0.011	-0.008	-0.005	-0.003	-0.002	-0.001	0.000
Paper manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.002	-0.002	-0.002
Printing and related support activities	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.040	-0.033	-0.028	-0.024	-0.020	-0.016	-0.014	-0.012	-0.011	-0.010
Petroleum and coal products manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-1.450	-1.160	-0.970	-0.785	-0.619	-0.479	-0.380	-0.304	-0.248	-0.207
Chemical manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.033	-0.028	-0.025	-0.022	-0.020	-0.017	-0.015	-0.014	-0.013	-0.013
Plastics and rubber products manufacturing	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.103	-0.113	-0.111	-0.108	-0.104	-0.100	-0.096	-0.092	-0.090	-0.088
Wholesale trade	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-5.723	-6.024	-5.899	-5.696	-5.474	-5.259	-5.081	-4.951	-4.864	-4.827
Retail trade	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-11.550	-13.259	-13.513	-13.522	-13.412	-13.223	-13.066	-12.975	-12.930	-12.980
Air transportation	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.323	-0.320	-0.305	-0.288	-0.270	-0.252	-0.240	-0.230	-0.223	-0.218
Rail transportation	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	4.378	5.077	5.389	5.657	5.871	6.032	6.155	6.242	6.301	6.339
Water transportation	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Truck transportation	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-1.654	-1.749	-1.687	-1.599	-1.507	-1.421	-1.350	-1.296	-1.258	-1.236
Couriers and messengers	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.062	-0.045	-0.005	0.013	0.028	0.041	0.051	0.058	0.062	0.065
Transit and ground passenger transportation	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.242	-0.249	-0.245	-0.237	-0.228	-0.220	-0.213	-0.207	-0.203	-0.200
Pipeline transportation	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.087	0.030	0.084	0.133	0.173	0.204	0.227	0.243	0.253	0.259
Scenic and sightseeing transportation; Support activities for transportation	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.194	-0.140	-0.109	-0.080	-0.055	-0.034	-0.018	-0.007	0.001	0.005
Warehousing and storage	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.031	-0.031	-0.030	-0.028	-0.027	-0.026	-0.025	-0.024	-0.024	-0.023
Publishing industries, except Internet	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.005	0.024	0.037	0.048	0.056	0.062	0.066	0.069	0.070	0.072
Motion picture and sound recording industries	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.069	-0.068	-0.065	-0.062	-0.058	-0.055	-0.054	-0.055	-0.055	-0.057
Data processing, hosting, and related services; Other information services	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.078	-0.087	-0.089	-0.090	-0.091	-0.091	-0.092	-0.093	-0.094	-0.096
Broadcasting, except Internet	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.039	-0.040	-0.039	-0.037	-0.035	-0.034	-0.032	-0.032	-0.031	-0.031
Telecommunications	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.345	-0.268	-0.102	-0.025	0.041	0.094	0.135	0.166	0.187	0.202
Monetary authorities - central bank; Credit intermediation and related activities	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.150	0.133	0.264	0.379	0.473	0.548	0.607	0.649	0.680	0.700
Securities, commodity contracts, other investments; Funds, trusts, other financial vehicles	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.301	-0.262	-0.234	-0.207	-0.184	-0.164	-0.150	-0.140	-0.133	-0.130
Insurance carriers and related activities	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-0.207	-0.155	-0.122	-0.089	-0.061	-0.037	-0.019	-0.006	0.002	0.007
Real estate	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-14.049	-16.498	-16.590	-16.081	-15.311	-14.462	-13.663	-13.001	-12.486	-12.144
Rental and leasing services; Lessors of nonfinancial intangible assets	Millions of Fixed (2019) Dollars	0.000	0.000	0.000	-3.143	-3.276	-3.228	-3.137	-3.040	-2.948	-2.874	-2.816	-2.775	-2.750
Professional, scientific, and technical services	Millions of Fixed (2019) Dollars	0.000	0.000	-3.416	-3.809	-4.002	-4.034	-3.982	-3.896	-3.803	-3.736	-3.689	-3.663	-3.661
Management of companies and enterprises	Millions of Fixed (2019) Dollars	0.000	0.000	-0.006	0.003	0.012	0.021	0.028	0.034	0.039	0.043	0.045	0.047	0.048
Administrative and support services	Millions of Fixed (2019) Dollars	0.000	0.000	-1.924	-2.026	-2.090	-2.081	-2.037	-1.980	-1.923	-1.875	-1.838	-1.814	-1.804
Waste management and remediation services	Millions of Fixed (2019) Dollars	0.000	0.000	3.048	3.036	3.034	3.040	3.050	3.059	3.069	3.077	3.083	3.088	3.091
Educational services; private	Millions of Fixed (2019) Dollars	0.000	0.000	-0.107	-0.109	-0.110	-0.106	-0.100	-0.094	-0.088	-0.082	-0.078	-0.075	-0.073

	Millions of Fixed (2019) Dollars													
Ambulatory health care services		0.000	0.000	-4.447	-4.499	-4.600	-4.595	-4.556	-4.514	-4.472	-4.471	-4.508	-4.574	-4.685
Hospitals; private		0.000	0.000	-2.099	-2.317	-2.471	-2.547	-2.589	-2.620	-2.645	-2.680	-2.728	-2.787	-2.862
Nursing and residential care facilities		0.000	0.000	-0.286	-0.279	-0.269	-0.250	-0.229	-0.211	-0.197	-0.188	-0.184	-0.184	-0.188
Social assistance		0.000	0.000	-0.714	-0.745	-0.771	-0.772	-0.761	-0.745	-0.725	-0.710	-0.701	-0.695	-0.695
Performing arts, spectator sports, and related industries		0.000	0.000	-0.106	-0.095	-0.088	-0.079	-0.069	-0.061	-0.054	-0.049	-0.045	-0.043	-0.042
Museums, historical sites, and similar institutions		0.000	0.000	-0.003	-0.001	0.002	0.005	0.008	0.010	0.012	0.013	0.015	0.015	0.016
Amusement, gambling, and recreation industries		0.000	0.000	-1.194	-1.191	-1.214	-1.207	-1.189	-1.168	-1.145	-1.126	-1.115	-1.107	-1.108
Accommodation		0.000	0.000	-1.417	-1.406	-1.450	-1.453	-1.440	-1.423	-1.404	-1.394	-1.393	-1.398	-1.414
Food services and drinking places		0.000	0.000	-3.133	-3.587	-4.021	-4.304	-4.488	-4.605	-4.667	-4.701	-4.723	-4.732	-4.744
Repair and maintenance		0.000	0.000	-1.485	-1.445	-1.437	-1.390	-1.331	-1.271	-1.216	-1.170	-1.137	-1.112	-1.101
Personal and laundry services		0.000	0.000	-1.266	-1.185	-1.204	-1.196	-1.179	-1.159	-1.138	-1.122	-1.113	-1.107	-1.110
Religious, grantmaking, civic, professional, and similar organizations		0.000	0.000	-1.219	-1.251	-1.280	-1.270	-1.241	-1.203	-1.158	-1.124	-1.101	-1.085	-1.080
Private households		0.000	0.000	-0.022	-0.020	-0.018	-0.016	-0.013	-0.011	-0.009	-0.007	-0.006	-0.005	-0.005
State and Local Government		0.000	0.000	-53.687	-60.217	-63.866	-65.752	-66.590	-66.837	-66.741	-66.492	-66.184	-65.863	-65.572
Federal Civilian		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Federal Military		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Farm		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Income Profile

Region	Comparison Type	Forecast	Comparison Forecast
Montana	Differences	Westmoreland Shutdown Post1and2	Standard Regional Control

					Year									
Category	Units	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Earnings by Place of Work	Millions of Fixed (2019) Dollars	0.000	0.000	-106.416	-112.455	-117.017	-117.727	-116.327	-113.874	-111.032	-108.251	-105.843	-103.850	-102.219
Total Wages and Salaries	Millions of Fixed (2019) Dollars	0.000	0.000	-77.571	-81.168	-84.207	-84.966	-84.450	-83.272	-81.831	-80.389	-79.139	-78.102	-77.234
Supplements to Wages and Salaries	Millions of Fixed (2019) Dollars	0.000	0.000	-18.880	-20.386	-21.716	-22.385	-22.652	-22.698	-22.621	-22.471	-22.320	-22.191	-22.059
Employer contributions for employee pension and insurance funds	Millions of Fixed (2019) Dollars	0.000	0.000	-12.469	-13.469	-14.349	-14.791	-14.968	-14.999	-14.948	-14.849	-14.748	-14.663	-14.575
Employer contributions for government social insurance	Millions of Fixed (2019) Dollars	0.000	0.000	-6.411	-6.917	-7.367	-7.594	-7.684	-7.699	-7.673	-7.622	-7.571	-7.528	-7.484
Proprietors' income with inventory valuation and capital consumption adjustments	Millions of Fixed (2019) Dollars	0.000	0.000	-9.965	-10.901	-11.093	-10.376	-9.224	-7.904	-6.580	-5.391	-4.384	-3.557	-2.926
Less: Contributions for Government Social Insurance	Millions of Fixed (2019) Dollars	0.000	0.000	-13.913	-14.709	-15.424	-15.770	-15.828	-15.736	-15.566	-15.366	-15.183	-15.029	-14.891
Employee and Self-Employed Contributions for Government Social Insurance	Millions of Fixed (2019) Dollars	0.000	0.000	-7.502	-7.792	-8.057	-8.177	-8.144	-8.036	-7.893	-7.743	-7.612	-7.501	-7.407
Employer contributions for government social insurance	Millions of Fixed (2019) Dollars	0.000	0.000	-6.411	-6.917	-7.367	-7.594	-7.684	-7.699	-7.673	-7.622	-7.571	-7.528	-7.484
Plus: Adjustment for Residence	Millions of Fixed (2019) Dollars	0.000	0.000	0.432	1.215	1.179	1.028	0.802	0.542	0.289	0.049	-0.174	-0.365	-0.521
Gross Inflow	Millions of Fixed (2019) Dollars	0.000	0.000	-1.489	-0.876	-0.986	-1.140	-1.332	-1.537	-1.732	-1.913	-2.081	-2.225	-2.342
Gross Outflow	Millions of Fixed (2019) Dollars	0.000	0.000	-1.921	-2.092	-2.165	-2.168	-2.134	-2.079	-2.021	-1.962	-1.907	-1.860	-1.821
Equals: Net Earnings by Place of Residence	Millions of Fixed (2019) Dollars	0.000	0.000	-92.071	-96.531	-100.413	-100.928	-99.698	-97.596	-95.177	-92.836	-90.834	-89.186	-87.849
Plus: Property Income	Millions of Fixed (2019) Dollars	0.000	0.000	-3.070	-3.800	-5.637	-7.125	-8.305	-9.249	-10.024	-10.657	-11.212	-11.686	-12.059
Personal Dividend Income	Millions of Fixed (2019) Dollars	0.000	0.000	-1.091	-1.326	-1.918	-2.354	-2.682	-2.938	-3.145	-3.337	-3.522	-3.680	-3.807
Personal Interest Income	Millions of Fixed (2019) Dollars	0.000	0.000	-1.352	-1.727	-2.659	-3.477	-4.143	-4.688	-5.145	-5.499	-5.801	-6.062	-6.273
Rental Income of Persons	Millions of Fixed (2019) Dollars	0.000	0.000	-0.627	-0.746	-1.060	-1.294	-1.481	-1.624	-1.734	-1.821	-1.890	-1.944	-1.979
Plus: Personal Current Transfer Receipts	Millions of Fixed (2019) Dollars	0.000	0.000	-0.485	-1.090	-3.100	-4.982	-6.798	-8.510	-10.061	-11.403	-12.675	-13.810	-14.794
Equals: Personal Income	Millions of Fixed (2019) Dollars	0.000	0.000	-95.626	-101.421	-109.150	-113.036	-114.801	-115.356	-115.261	-114.896	-114.721	-114.681	-114.702
Less: Personal current taxes	Millions of Fixed (2019) Dollars	0.000	0.000	-14.502	-15.300	-16.208	-16.628	-16.755	-16.734	-17.472	-18.060	-17.808	-17.683	-17.570
Equals: Disposable personal income	Millions of Fixed (2019) Dollars	0.000	0.000	-81.125	-86.121	-92.942	-96.407	-98.046	-98.622	-97.789	-96.836	-96.912	-96.998	-97.131

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By Age

Region	Category	Race	Gender	Comparison Type	Forecast	Comparison Forecast
Montana	Population	All Races	Total	Differences	Westmoreland Shutdown Post1and2	Standard Regional Control

Ages	Units	Year												
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
All Ages	Individuals	0.000	0.000	-568.216	-997.782	-1337.341	-1591.959	-1777.074	-1909.481	-2001.623	-2062.205	-2101.659	-2125.971	-2139.229
Age 0	Individuals	0.000	0.000	-18.375	-28.907	-37.220	-43.094	-46.946	-49.211	-50.196	-50.084	-49.140	-47.497	-45.258
Age 1	Individuals	0.000	0.000	-10.638	-26.029	-34.601	-41.114	-45.540	-48.311	-49.771	-50.149	-49.652	-48.460	-46.663
Age 2	Individuals	0.000	0.000	-10.691	-18.436	-31.912	-38.720	-43.809	-47.169	-49.141	-49.993	-49.983	-49.230	-47.871
Age 3	Individuals	0.000	0.000	-10.457	-18.324	-24.210	-35.964	-41.384	-45.432	-48.012	-49.391	-49.863	-49.600	-48.683
Age 4	Individuals	0.000	0.000	-10.085	-17.819	-23.894	-28.123	-38.537	-42.953	-46.249	-48.257	-49.269	-49.498	-49.076
Age 5	Individuals	0.000	0.000	-9.553	-17.060	-23.096	-27.602	-30.564	-40.027	-43.731	-46.485	-48.144	-48.926	-49.004
Age 6	Individuals	0.000	0.000	-9.202	-16.272	-22.144	-26.669	-29.954	-32.001	-40.778	-43.959	-46.378	-47.815	-48.452
Age 7	Individuals	0.000	0.000	-8.845	-15.660	-21.159	-25.579	-28.930	-31.337	-32.726	-40.999	-43.859	-46.063	-47.361
Age 8	Individuals	0.000	0.000	-8.480	-15.037	-20.346	-24.452	-27.747	-30.257	-32.032	-32.940	-40.904	-43.558	-45.629
Age 9	Individuals	0.000	0.000	-8.115	-14.406	-19.521	-23.498	-26.528	-29.017	-30.922	-32.237	-32.850	-40.617	-43.143
Age 10	Individuals	0.000	0.000	-7.719	-13.751	-18.671	-22.519	-25.472	-27.735	-29.649	-31.117	-32.151	-32.578	-40.222
Age 11	Individuals	0.000	0.000	-7.362	-13.094	-17.819	-21.530	-24.402	-26.623	-28.338	-29.835	-31.035	-31.891	-32.202
Age 12	Individuals	0.000	0.000	-7.023	-12.489	-16.974	-20.545	-23.325	-25.499	-27.197	-28.514	-29.756	-30.786	-31.532
Age 13	Individuals	0.000	0.000	-6.712	-11.923	-16.197	-19.580	-22.261	-24.373	-26.047	-27.365	-28.438	-29.517	-30.441
Age 14	Individuals	0.000	0.000	-6.401	-11.385	-15.459	-18.681	-21.215	-23.260	-24.895	-26.206	-27.291	-28.209	-29.187
Age 15	Individuals	0.000	0.000	-5.156	-10.165	-14.232	-17.459	-19.997	-22.018	-23.679	-25.021	-26.145	-27.105	-27.942
Age 16	Individuals	0.000	0.000	-5.405	-9.102	-13.149	-16.328	-18.837	-20.838	-22.456	-23.809	-24.955	-25.948	-26.822
Age 17	Individuals	0.000	0.000	-6.852	-10.406	-12.885	-15.806	-18.076	-19.904	-21.394	-22.623	-23.727	-24.707	-25.591
Age 18	Individuals	0.000	0.000	-8.740	-13.221	-15.217	-16.258	-18.014	-19.411	-20.615	-21.609	-22.519	-23.379	-24.252
Age 19	Individuals	0.000	0.000	-10.744	-16.581	-19.152	-19.384	-19.000	-19.689	-20.286	-20.851	-21.483	-22.133	-22.825
Age 20	Individuals	0.000	0.000	-14.417	-21.267	-24.541	-24.745	-23.066	-21.251	-20.866	-20.646	-20.687	-20.971	-21.394
Age 21	Individuals	0.000	0.000	-17.435	-27.142	-30.892	-31.303	-29.196	-25.788	-22.675	-21.304	-20.450	-20.070	-20.080
Age 22	Individuals	0.000	0.000	-19.448	-31.626	-37.873	-38.430	-36.264	-32.228	-27.374	-23.162	-21.084	-19.762	-19.077
Age 23	Individuals	0.000	0.000	-19.112	-33.392	-42.169	-45.275	-43.299	-39.238	-33.782	-27.848	-22.945	-20.408	-18.786
Age 24	Individuals	0.000	0.000	-18.778	-32.811	-43.746	-49.434	-50.051	-46.213	-40.757	-34.242	-27.631	-22.278	-19.447
Age 25	Individuals	0.000	0.000	-17.337	-31.425	-42.369	-50.451	-53.839	-52.734	-47.610	-41.177	-34.036	-27.011	-21.389
Age 26	Individuals	0.000	0.000	-17.092	-29.805	-40.846	-48.978	-54.788	-56.478	-54.102	-48.014	-40.966	-33.419	-26.130
Age 27	Individuals	0.000	0.000	-16.611	-29.209	-38.962	-47.269	-53.193	-57.352	-57.804	-54.491	-47.805	-40.362	-32.559
Age 28	Individuals	0.000	0.000	-15.715	-28.073	-37.870	-45.037	-51.255	-55.615	-58.601	-58.164	-54.283	-47.225	-39.540
Age 29	Individuals	0.000	0.000	-14.820	-26.523	-36.238	-43.595	-48.791	-53.534	-56.788	-58.933	-57.959	-53.725	-46.440
Age 30	Individuals	0.000	0.000	-13.469	-24.641	-33.942	-41.438	-47.003	-50.858	-54.595	-57.085	-58.740	-57.444	-53.002
Age 31	Individuals	0.000	0.000	-12.572	-22.637	-31.567	-38.796	-44.619	-48.932	-51.849	-54.871	-56.903	-58.255	-56.763
Age 32	Individuals	0.000	0.000	-11.783	-21.164	-29.127	-36.114	-41.775	-46.423	-49.856	-52.104	-54.697	-56.444	-57.611
Age 33	Individuals	0.000	0.000	-11.181	-19.936	-27.322	-33.442	-38.942	-43.487	-47.300	-50.097	-51.937	-54.259	-55.830
Age 34	Individuals	0.000	0.000	-10.579	-18.894	-25.761	-31.404	-36.115	-40.560	-44.314	-47.524	-49.934	-51.519	-53.674
Age 35	Individuals	0.000	0.000	-9.800	-17.724	-24.290	-29.542	-33.880	-37.614	-41.324	-44.520	-47.372	-49.545	-50.975

Age	Individuals															
Age 36	Individuals	0.000	0.000	-9.169		-16.485		-22.771	-27.825	-31.856	-35.279	-38.327	-41.515	-44.375	-47.003	-49.030
Age 37	Individuals	0.000	0.000	-8.689		-15.504		-21.268	-26.121	-30.018	-33.182	-35.955	-38.508	-41.377	-44.025	-46.515
Age 38	Individuals	0.000	0.000	-8.471		-14.864		-20.167	-24.534	-28.259	-31.311	-33.840	-36.131	-38.374	-41.037	-43.550
Age 39	Individuals	0.000	0.000	-8.241		-14.486		-19.406	-23.348	-26.616	-29.518	-31.952	-34.012	-36.000	-38.043	-40.573
Age 40	Individuals	0.000	0.000	-8.357		-14.324		-19.086	-22.628	-25.457	-27.892	-30.168	-32.126	-33.880	-35.665	-37.575
Age 41	Individuals	0.000	0.000	-8.153		-14.299		-18.803	-22.227	-24.684	-26.700	-28.525	-30.337	-31.996	-33.552	-35.208
Age 42	Individuals	0.000	0.000	-7.866		-13.884		-18.623	-21.825	-24.206	-25.879	-27.308	-28.685	-30.209	-31.677	-33.108
Age 43	Individuals	0.000	0.000	-7.438		-13.283		-17.970	-21.481	-23.689	-25.332	-26.449	-27.454	-28.560	-29.903	-31.252
Age 44	Individuals	0.000	0.000	-7.009		-12.541		-17.132	-20.659	-23.236	-24.745	-25.863	-26.582	-27.332	-28.268	-29.499
Age 45	Individuals	0.000	0.000	-6.395		-11.663		-16.049	-19.581	-22.254	-24.191	-25.222	-25.977	-26.463	-27.058	-27.892
Age 46	Individuals	0.000	0.000	-5.964		-10.735		-14.933	-18.331	-21.065	-23.141	-24.631	-25.323	-25.861	-26.203	-26.704
Age 47	Individuals	0.000	0.000	-5.584		-10.027		-13.795	-17.067	-19.716	-21.890	-23.547	-24.718	-25.206	-25.609	-25.864
Age 48	Individuals	0.000	0.000	-5.295		-9.436		-12.926	-15.815	-18.377	-20.495	-22.270	-23.624	-24.601	-24.961	-25.281
Age 49	Individuals	0.000	0.000	-5.000		-8.935		-12.174	-14.833	-17.051	-19.109	-20.849	-22.337	-23.505	-24.360	-24.642
Age 50	Individuals	0.000	0.000	-4.718		-8.424		-11.514	-13.969	-15.995	-17.739	-19.440	-20.909	-22.222	-23.275	-24.054
Age 51	Individuals	0.000	0.000	-4.422		-7.930		-10.834	-13.193	-15.054	-16.635	-18.044	-19.491	-20.796	-21.999	-22.980
Age 52	Individuals	0.000	0.000	-4.148		-7.438		-10.195	-12.405	-14.206	-15.649	-16.915	-18.086	-19.378	-20.579	-21.714
Age 53	Individuals	0.000	0.000	-3.937		-7.001		-9.582	-11.682	-13.359	-14.765	-15.909	-16.949	-17.972	-19.165	-20.301
Age 54	Individuals	0.000	0.000	-3.716		-6.636		-9.022	-10.984	-12.581	-13.882	-15.006	-15.936	-16.836	-17.767	-18.898
Age 55	Individuals	0.000	0.000	-3.347		-6.141		-8.455	-10.277	-11.789	-13.047	-14.093	-15.022	-15.827	-16.643	-17.519
Age 56	Individuals	0.000	0.000	-3.116		-5.601		-7.828	-9.620	-11.019	-12.215	-13.236	-14.101	-14.913	-15.640	-16.404
Age 57	Individuals	0.000	0.000	-2.979		-5.276		-7.216	-8.943	-10.330	-11.426	-12.394	-13.241	-13.994	-14.731	-15.407
Age 58	Individuals	0.000	0.000	-2.992		-5.141		-6.897	-8.334	-9.655	-10.737	-11.604	-12.398	-13.132	-13.810	-14.497
Age 59	Individuals	0.000	0.000	-3.037		-5.189		-6.782	-8.031	-9.057	-10.069	-10.918	-11.609	-12.289	-12.946	-13.573
Age 60	Individuals	0.000	0.000	-3.234		-5.376		-6.938	-7.988	-8.802	-9.501	-10.265	-10.926	-11.496	-12.094	-12.697
Age 61	Individuals	0.000	0.000	-3.025		-5.419		-7.005	-8.058	-8.698	-9.207	-9.676	-10.264	-10.811	-11.304	-11.851
Age 62	Individuals	0.000	0.000	-2.671		-4.949		-6.851	-7.985	-8.677	-9.047	-9.354	-9.669	-10.156	-10.636	-11.085
Age 63	Individuals	0.000	0.000	-2.387		-4.393		-6.224	-7.718	-8.527	-8.976	-9.166	-9.337	-9.564	-9.990	-10.430
Age 64	Individuals	0.000	0.000	-2.155		-3.935		-5.542	-7.001	-8.197	-8.785	-9.071	-9.139	-9.231	-9.405	-9.795
Age 65	Individuals	0.000	0.000	0.000		-2.131		-3.874	-5.448	-6.879	-8.050	-8.622	-8.902	-8.969	-9.062	-9.236
Age 66	Individuals	0.000	0.000	0.000		0.000		-2.106	-3.811	-5.353	-6.755	-7.901	-8.459	-8.733	-8.799	-8.892
Age 67	Individuals	0.000	0.000	0.000		0.000		0.000	-2.080	-3.746	-5.256	-6.628	-7.749	-8.293	-8.560	-8.625
Age 68	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	-2.053	-3.680	-5.157	-6.499	-7.596	-8.125	-8.387
Age 69	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	-2.024	-3.611	-5.054	-6.366	-7.437	-7.952
Age 70	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	-1.993	-3.551	-4.968	-6.256	-7.308
Age 71	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	-1.960	-3.481	-4.867	-6.127
Age 72	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	0.000	-1.925	-3.412	-4.768
Age 73	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.887	-3.336
Age 74	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-1.847
Age 75	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 76	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 77	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 78	Individuals	0.000	0.000	0.000		0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Age 79	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 80	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 81	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 82	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 83	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 84	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 85	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 86	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 87	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 88	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 89	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 90	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 91	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 92	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 93	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 94	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 95	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 96	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 97	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 98	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age 99	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ages 100+	Individuals	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

VITA

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Education:

Ph.D., Economics, University of Michigan, 1986

  Thesis: Measurement Error and Seasonal Adjustment Error in Economic Time Series

  Chair: E. Phillip Howrey

M.S.W., School of Social Work, University of Michigan, 1980

B.A., Economics and Political Science, University of Michigan, 1978

Specializations:

Academic: Econometrics, economic modeling, forecasting and dynamic policy simulation, health care, labor economics, survey research

Computers: SAS programming on Windows, MVS and VMS platforms, using base SAS, STAT, IML, GRAPH, and AF modules

Employment History:

Director, Bureau of Business and Economic Research, and Associate Professor of Management and Marketing, School of Business Administration, The University of Montana, Missoula, MT 59812, 2008-present.

Direct and manage the activities of the BBER, an economic research unit founded at the University of Montana in 1948 to serve businesses, governments, and people throughout the state. The BBER's expertise in economic forecasting and analysis, health care research, survey research, forest products research, and high quality print and electronic publications have earned respect from stakeholders throughout Montana and its peers throughout the nation. The BBER currently employs approximately 20 research professionals and conducts approximately 30 contracted research projects each year.

Research Professor and Associate Director, Bureau of Business and Economic Research, School of Business Administration, The University of Montana, Missoula, MT, 2007 – 2008.

Serve as Director of the Bureau's Health Care Policy Research program. Duties include writing grant proposals and conducting sponsored research in areas affecting health care access, quality, and affordability for businesses, governments, and the people of Montana and the Rocky Mountain Region, with an emphasis on the role of economic incentives and the future of health care policy. Routine duties include conducting policy research projects, often in collaboration with other BBER staff, working with business media, and writing for academic and non-academic audiences on health care issues.

Director, Bureau of Business Research, Miller College of Business, Ball State University, Muncie, IN, 1993-2007.

Directed and conducted the outreach activities of the College of Business at Ball State University. Routine duties included supervising and carrying out specialized research projects, economic forecasting, liaison with University officials, governmental agencies, and the business community. Activities included writing for newspapers and periodicals, presentations and dissemination of information to the business public, and contracted research. Managed and directed a research center consisting of six full-time employees within the College of Business.

Research Analyst, American Electric Power, Columbus, OH, 1990-93.

Forecasted medium and long-term demand for electricity for a holding company for a ten-division, seven-state, investor-owned electric utility. Responsible for developing and maintaining large scale econometric models, as well as working with legal and financial departments on policy and regulatory matters.

Assistant Professor of Business Economics, School of Business, Indiana University, Bloomington, IN, 1985-90.

Taught courses in the Ph.D., MBA and undergraduate business programs, both in Bloomington and in Indianapolis. Also worked as adjunct research associate in the Indiana Business Research Center.

Research Projects/Publications:

Barkey, Patrick M. and Thale Dillon, "The Economic Contributions of the Sibanye-Stillwater Mine Operations in Montana," Sibanye-Stillwater U.S. Region, January 2019.

Barkey, Patrick M., Todd A. Morgan, Eric A. Simmons, Dan R. Loeffler and Steven W. Hayes, "The Impact of Timber Harvest Declines on the Ravalli County Economy," Ravalli County Commission, September 2018.

Barkey, Patrick M., "The Economic Contributions of Montana's Hardrock Mining Industry," Montana Mining Association, September 2018.

Barkey, Patrick M., George Haynes and Joel Schumacher, "The Economic Contributions of Hutterite Communities in Montana," Church, Harris, Johnson and Williams, June 2019.

Barkey, Patrick M., "Statewide Economic Performance: The Mystery of Poor Tax Revenues is Solved," Montana Economic Report, January 2019.

Barkey, Patrick M., "The Contributions of Hardrock Mining to the Montana Economy," Montana Economic Report, January 2019.

Barkey, Patrick M., "Facing the Challenge of Affordable Housing," Montana Economic Report, January 2019.

Barkey, Patrick M., "The U.S. and Global Economies: Can the U.S. Economy Do It Again?," Montana Economic Report, January 2019.

Barkey, Patrick M., "Major Economic Events of 2018: A Year of Strong Growth," Montana Economic Report, January 2019.

Barkey, Patrick M., "State Revenue Report: Revenue Collections Bounce Back Strongly," Montana Economic Report, January 2019.

Barkey, Patrick M., "Facing the Challenge of Affordable Housing," Montana Business Quarterly, Vol. 57 No. 1, (Spring 2019).

Bridge, Brandon and Patrick M. Barkey,"Homebuilding in Montana's Hot Markets," Montana Business Quarterly, Vol. 57 No. 1, (Spring 2019).

Barkey, Patrick M., "The Future of Colstrip," Montana Business Quarterly, Vol. 56 No. 3, (Fall 2018).

Bridge, Brandon and Patrick M. Barkey, "The Continuing Contributions of the Oil and Gas Industry to the Montana Economy," *Treasure State Journal*, 2018.

Barkey, Patrick M., "Research Update: Trends In the Montana Retail Beer Market Since 2012," Montana Tavern Owners Association, June 2018.

Barkey, Patrick M., "The Economic Impact of the Early Retirement of Colstrip Units 3 and 4," Montana Chamber Foundation, June 2018.

Barkey, Patrick M. and Todd A. Morgan, "Wildfire Emissions in Montana," *Montana Business Quarterly*, Vol. 55 No. 4, (Fall 2017).

Barkey, Patrick M., "Montana's Revenue Woes," *Montana Business Quarterly*, Vol. 55 No. 5, (Winter 2017).

Barkey, Patrick M., "Behind the Malaise in Montana Revenue Collections" *Montana Economic Report*, January 2018.

Barkey, Patrick M., "The U.S. and Global Economies: Is Stagnation Behind Us?" *Montana Economic Report*, January 2018.

Barkey, Patrick M., "Major Economic Events of 2017: Trump, Wildfires and Medicaid" *Montana Economic Report*, January 2018.

Barkey, Patrick M., "Montana's Regions and Cities: Western Growth Dominates" *Montana Economic Report*, January 2018.

Barkey, Patrick M., "Statewide Economic Performance: Unraveling the Mystery" *Montana Economic Report*, January 2018.

Barkey, Patrick M., "Statewide Economic Performance: A Tale of Two Years" *Montana Economic Report*, January 2017.

Barkey, Patrick M., "Real Estate and Residential Construction: Getting Back to Boom Times?" *Montana Economic Report*, January 2017.

Barkey, Patrick M., "The U.S. Economy: Is Optimism Finally Justified?" *Montana Economic Report*, January 2017.

Barkey, Patrick M., "Major Economic Events of 2016: Speed Bumps or Slowdown?" *Montana Economic Report*, January 2017.

Barkey, Patrick M., "Montana's Regions and Cities: Western Cities Lead the Way," *Montana Economic Report*, January 2017.

Barkey, Patrick M., "The Performance of the BBER Forecast: Recasting History," *Montana Economic Report*, January 2017.

Barkey, Patrick M., "Statewide Economic Performance: A Tale of Two Years," *Montana*

Economic Report, January 2017.

Barkey, Patrick M., "The Economic Contribution of the Montana Historical Society," prepared for the Montana Historical Society, October 2016.

Barkey, Patrick M. and Kyle Morrill, "The Economic Contribution of Grizzly Intercollegiate Athletics," The University of Montana Department of Athletics, August 2016.

Barkey, Patrick M., Paul Polzin and Terry Johnson, "Assessing the Future of Coal: Is There a Way Back Up?" *Montana Economic Report*, January 2016.

Barkey, Patrick M., "Statewide Economic Performance: A Year of Strong Growth," *Montana Economic Report*, January 2016.

Barkey, Patrick M., "Major Economic Events of 2015: The Economic Environment Evolves," *Montana Economic Report*, January 2016.

Barkey, Patrick M., "How Montana is Faring in the Post-Commodity Boom Economy," *Montana Business Quarterly*, Vol. 53 No. 3, (Autumn 2015).

Barkey, Patrick M., "The Economic Implications of Implementing the EPA Clean Power Plan in Montana," NorthWestern Energy, November 2015.

Barkey, Patrick M. and Kyle Morrill, "The Continuing Contributions of the Oil and Gas Industry to the Montana Economy." *The Treasure State Journal*, 2016.

"High Growth for High Tech," (with John Baldridge, Christina Henderson and Shannon Furniss), Montana Business Quarterly, Vol. 53, No. 2, Summer 2015.

"Montana Economic Outlook: The West is Back," Montana Business Quarterly, Vol. 52, No. 1, Spring 2014.

"U.S. Economic Outlook: The U.S. Economy Shines on the Global Stage" Montana Business Quarterly, Vol. 53, No. 1, Spring 2015.

"Montana Economic Outlook: More Balanced, But Slower Growth Ahead," Montana Business Quarterly, Vol. 53, No. 1, Spring 2015.

"Economic Outlook Update: The Boom Begins to Slow" Montana Business Quarterly, Vol. 52, No. 3, Autumn 2014.

"Economic Impact of Beer and Wine Distributors in Montana," (with Colin B. Sorenson), Montana Business Quarterly, Vol. 52, No. 3, Autumn 2014.

"The Economic Impact of Riverfront Triangle," Fox Partners, June 2015.

"Montana High-Tech Economic Benchmark Assessment," Montana High Tech Business Alliance, May 2015.

"MDT Operations and Maintenance Division and the INVEST Program," Montana Department of Transportation, March 2015.

"The Economic Impact of Trailhead Commerce Park," Beartooth Resource Conservation and Development, January 2015.

"Montana's eGovernment Services: Assessing the Last Decade," Montana Department of Administration and the Office of the Governor, January 2015.

"The Contribution of UM Research to the Montana Economy," Vice President for Research and Creative Scholarship, June 2014.

"Tight Oil Revolution: Game Changer for Montana's Economy," Montana Business Quarterly, Vol. 52, No. 2, Summer 2014.

"The Boom that Hasn't Gone Bust: The Maturation of the Oil Economy of the Bakken," Proceedings of the Sixty-First Annual Conference on the Economic Outlook, Research Seminar on Quantitative Economics, University of Michigan, Ann Arbor, MI, 2014.

"The Economic Impact of the Montana Board of Research and Commercialization Technology," Montana Board of Research and Commercialization Technology, April 2014.

"U.S. Economic Outlook: Is This Finally Next Year?" Montana Business Quarterly, Vol. 52, No. 1, Spring 2014.

"Montana Economic Outlook: The West is Back," Montana Business Quarterly, Vol. 52, No. 1, Spring 2014.

"Lewis and Clark County Outlook: Something Old, Something New," Montana Business Quarterly, Vol. 52, No. 1, Spring 2014.

"Missoula County: Better Growth Ahead," Montana Business Quarterly, Vol. 52, No. 1, Spring 2014.

"Yellowstone County: Next Door to a Boom," Montana Business Quarterly, Vol. 52, No. 1, Spring 2014.

"An Analysis of the Economic Impacts of Expanding Manufacturing Activity in Montana," Prospera Business Network, January 2014.

"Montana's Economy: The Recession's Shadow Still Lingers," Montana Business Quarterly, Vol. 51, No. 3, Autumn 2013.

"The Great Falls Development Authority Diversity Index," Great Falls Development Authority, August 2013.

"The Economic Impact of the Archie Bray Foundation for the Ceramic Arts," Archie Bray Foundation, July 2013.

"The Impact of State Taxes on Telecommunications Investment," (with Paul Polzin and Myles Watts), Montana Taxpayers Association, February 2013.

"The Economic Impact of the Salazar Settlement Distributions to Confederated Salish and Kootenai Tribes Members in Montana," Confederated Salish and Kootenai Tribes, January 2013.

"The Economic Impact of Increased Production at the Spring Creek Mine," Montana Chamber of Commerce, October 2012.

"The Montana Recovery: What's On Track and What's Not," Montana Business Quarterly, Vol. 50, No. 3, Autumn 2012.

"The Impact of Otter Creek Coal Development on the Montana Economy," (with Paul Polzin), Montana Contractors' Association, June 2012.

"Montana Economic Outlook: Recovery Still Stuck in the Starting Gate," Montana Business Quarterly, Vol. 50, No. 1, Spring 2012.

"Lewis and Clark County: A Distinctly Different Recession Experience," Montana Business Quarterly, Vol. 50, No. 1, Spring 2012.

"Missoula County: Still Waiting For Growth to Arrive," Montana Business Quarterly, Vol. 50, No. 1, Spring 2012.

"Yellowstone County: Economy Improves Moving East," Montana Business Quarterly, Vol. 50, No. 1, Spring 2012.

"The Economic Contribution of Rocky Mountain Laboratories," Rocky Mountain Laboratories, February 2012.

"Is Montana's Recovery at Risk? Challenges Abound for State Economic Growth," Montana Business Quarterly, Vol. 49, No. 3, Autumn 2011.

"Housing Affordability and Montana's Real Estate Markets," (with James T. Sylvester), Montana Association of REALTORS, June 2011.

"Paying for the Recession: Rebalancing Economic Growth," Montana Business Quarterly, Vol 49, No. 1, Spring 2011.

"Montana Outlook: Stronger Growth Ahead," Montana Business Quarterly, Vol 49, No.

1, Spring 2011.

"The Economic Impact of UM – Helena," Office of the President, University of Montana, March 2011.

"The Economic Impact of UM – Western," Office of the President, University of Montana, March 2011.

"The Economic Impact of Montana Tech," Office of the President, University of Montana, March 2011.

"The Economic Contribution of Colstrip Steam Electric Station Units 1-4," (with Paul E. Polzin), The Colstrip Steam Electric Station Owners, November 2010.

"Montana's Economy: Making Sense of Mixed Signals," Montana Business Quarterly, Vol 48, No. 3, Autumn 2010.

"Distance Learning in Montana: A Survey Based Assessment," (with John Baldridge and James T. Sylvester), The Office of the Commisioner of Higher Education, May 2010.

"The University of Montana: Growing Montana's Economy," Montana Business Quarterly, Vol 48, No. 2, Summer 2010.

"Recession Throws Migration Trends a Curve Ball," Montana Business Quarterly, Vol 48, No. 2, Summer 2010.

"U.S. Economy: Slow Getting Started," Montana Business Quarterly, Vol 48, No. 1, Spring 2010.

"Montana Outlook: The Transition to Growth," Montana Business Quarterly, Vol 48 No. 1, Spring 2010.

"The University of Montana: Growing Montana's Economy," The Office of the President, The University of Montana, February 2010.

"Smurfit-Stone Mill Closure Will Have Lasting Impacts on Montana's Economy," (with Todd A. Morgan and Paul E. Polzin), Montana Business Quarterly, Vol 47 No. 4, Winter 2009.

"Economic Outlook: Montana's Recovery is Closer," Montana Business Quarterly, Vol 47 No. 3, Autumn 2009.

"Are Montana's Wireless-only Adults Different From Their Neighbors? Evidence from the Montana Department of Transportations 2008 Seat Belt Survey," (with John Baldridge and James T. Sylvester), 2009 JSM Proceedings (forthcoming), Fall 2009.

"The Economic Cost of Alcohol Abuse in Montana," Montana Business Quarterly, Vol 47

No. 2, Summer 2009.

"Housing Affordability and Montana's Real Estate Markets," (with James T. Sylvester), Montana Business Quarterly, Vol 47 No. 2, Summer 2009.

"Labor Availability in North Central Montana," sponsored by Opportunity Link, June 2009.

"The Economic Cost of Alcohol Abuse in Montana," Montana Epidemiological Work Group, Montana Department of Health and Human Services, Montana, April 2009.

"Expanding Health Insurance Coverage," Montana Business Quarterly, Vol 47 No. 1, Spring 2009.

"The Available Labor Supply in Montana's Labor Markets," (with John Baldridge and James T. Sylvester), sponsored by Montana Department of Labor and Industry, February 2009.

"Housing Affordability and Montana's Real Estate Markets," (with James T. Sylvester) sponsored by Montana Association of Realtors and Montana Building Industry Association, January 2009.

"The Available Labor Supply in the Flathead County Labor Market," sponsored by Mountain West Development, November 2008.

"Bailouts and Meltdowns: What's Ahead for Montana's Economy?" Montana Business Quarterly, Vol 46 No. 3, Autumn 2008.

"The Economic Impact of Wild Horse Border Crossing Upgrades," sponsored by Bear Paw Development Corporation, March 2008.

"Challenges Ahead for Health Care Finance," Montana Business Quarterly, Vol 46 No. 1, Spring 2008.

"Montana Manufacturing: Bucking the National Trend" (with Steve Holland), Montana Business Quarterly, Vol. 46 No. 1, Winter 2008.

"The New Media Industry in Indiana: A Benchmarking Study," sponsored by the Office of the Provost, Ball State University, August 2007.

"Montana's Manufacturing Employment Rebound," Forward Focus, Montana Manufacturing Center, Fall 2007.

"Health Care Research," Montana Business Quarterly, Vol. 45 No. 2, Summer 2007.

"The Economic Impact of Tobacco Use in Indiana," Ball State Alumnus Magazine, Vol. 64 No. 2, September 2006.

"Economic and Demographic Trends Relevant to the West Lake Corridor Expansion," (contributing author), sponsored by the Northern Indiana Commuter Transportation District, May 2006.

"Benchmarking the Indianapolis Economy," sponsored by the Central Indiana Corporate Partnership, April 2006.

Solutions Report, Eastern Indiana Strategic Skills Initiative, sponsored by the Indiana Department of Workforce Development, March 2006.

Blackford County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Delaware County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Fayette County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Henry County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Jay Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Randolph County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Rush County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Union County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

Wayne County Wage and Benefit Survey Report, sponsored by the Department of Workforce Development Strategic Skills Initiative, February 2006.

"The Challenge for Growth in Indiana," in The Economic Impact of Telecom, Digital Policy Institute, Ball State University, Muncie, IN, February 2006.

Presentations (last 3 years):

"The Economic Contributions of Hutterite Communities in Montana," Hutterite All Colony Meeting, Fairhaven, MT, June 28, 2019.

"Facing the Challenge of Affordable Housing," Montana Housing Conference, Billings, MT, June 17, 2019.

"The Growth of the Tech Industry in Montana," Montana Law and Technology Conference, June 13, 2019.

"The Issue of Legalization of Recreational Cannabis in Montana," Billings Library Foundation, Billings, MT, June 6, 2019.

"The Economic Outlook for the U.S. and Montana," Pacific Northwest Regional Economic Conference, Seaside, OR, May 23, 2019.

"The Economic Outlook for the U.S. and Montana," University of Montana Cabinet, Missoula, MT, April 24, 2019.

"The Economic Contribution of Sibanye-Stillwater in Montana," Sibanye-Stillwater Community Meeting, Absarokee, MT, March 15, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Big Sky, MT, March 14, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Big Sky, MT, March 14, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Miles City, MT, March 13, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Miles City, MT, March 13, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Sidney, MT, March 12, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Sidney, MT, March 12, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Kalispell, MT, February 12, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Kalispell, MT, February 12, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Butte, MT, February 7, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Butte, MT, February 7, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Bozeman, MT, February 6, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Bozeman, MT, February 6, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Billings, MT, February 5, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Billings, MT, February 5, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Missoula, MT, February 1, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Missoula, MT, February 1, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Great Falls, MT, January 30, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Great Falls, MT, January 30, 2019.

"Facing the Challenge of Affordable Housing," Economic Outlook Seminar, Helena, MT, January 29, 2019.

"The Economic Outlook for the U.S. and Montana," Economic Outlook Seminar, Helena, MT, January 29, 2019.

"The Ravalli County Economy," Bitterroot Leadership Conference, Stevensville, MT, January 16, 2019.

"The Montana Economy: 2018 and Beyond," Montana Taxpayers Association, Helena, MT, December 5, 2018.

"Recent Trends in the Missoula Economy," Missoula Exchange Club, Missoula, MT, November 1, 2018.

"The Impact of Timber Harvest Declines on the Ravalli County Economy," Ravalli

County Commissioners, Hamilton, MT, October 29, 2018.

"The Economic Contribution of Montana's Hardrock Mining Industry," Montana Mining Association, Great Falls, MT, October 23, 2018.

"Economic Outlook Events: Getting Them Going and Keeping Them Going," Association for University Business and Economic Research, Salt Lake City, UT, October 14, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Missoula, MT, August 9, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Great Falls, MT, August 8, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Helena, MT, August 8, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Butte, MT, August 7, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Bozeman, MT, August 7, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Billings, MT, August 7, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Sidney, MT (by video), August 6, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Glasgow, MT (by video), August 6, 2018.

"U.S. and Montana Economic Outlook," Montana Chamber Economic Update Series, Kalispell, MT, August 2, 2018.

"U.S. and Montana Economic Outlook," Montana Independent Bankers, Missoula, MT, July 27, 2018.

"The Economic Impacts of Early Retirement of Colstrip Units 3 and 4," Colstrip Owners Meeting, Helena, MT, June 25, 2018.

"The State and National Economic Outlook," Missoula Republican Women, Missoula, MT, June 13, 2018.

"Explaining the Importance of the Colstrip Power Station for the Montana Economy," Montana Energy Summit, Billings, MT, May 31, 2018.

"The Montana Economic Outlook," Pacific Northwest Regional Economic Conference, Tacoma, WA, May 24, 2018.

"Back to the Future: A Regional Survey Research Center Responds to the Demise of Random-Digit Dial Surveys," (with John Baldridge), Pacific Northwest Regional Economic Conference, Tacoma, WA, May 23, 2018.

"The State and National Outlook," Blackfoot Communications, Missoula, MT, April 12, 2018.

"The State and National Outlook," BBER Economic Outlook Seminar, Havre, MT, March 14, 2018.

"The Outlook for Hill County," BBER Economic Outlook Seminar, Havre, MT, March 14, 2018.

 "The State and National Outlook," BBER Economic Outlook Seminar, Lewistown, MT, March 13, 2018.

"The Outlook for Fergus County," BBER Economic Outlook Seminar, Lewistown, MT, March 13, 2018.

 "The Ravalli County Economy," Marcus Daly Health Center Board Meeting, Hamilton, MT, February 22, 2018.

"The State and National Outlook," BBER Economic Outlook Seminar, Kalispell, MT, February 6, 2018.

"The Outlook for Flathead County," BBER Economic Outlook Seminar, Kalispell, MT, February 6, 2018.

 "The State and National Outlook," BBER Economic Outlook Seminar, Butte, MT, February 1, 2018.

"The Outlook for Southwest Montana," BBER Economic Outlook Seminar, Butte, MT, February 1, 2018.

 "The State and National Outlook," BBER Economic Outlook Seminar, Bozeman, MT, January 31, 2018.

"The Outlook for Gallatin County," BBER Economic Outlook Seminar, Bozeman, MT, January 31, 2018.

 "The State and National Outlook," BBER Economic Outlook Seminar, Billings, MT, January 30, 2018.

"The Outlook for Yellowstone County," BBER Economic Outlook Seminar, Billings, MT, January 30, 2018.

"The State and National Outlook," BBER Economic Outlook Seminar, Missoula, MT, January 26, 2018.

"The Outlook for Missoula and Ravalli Counties," BBER Economic Outlook Seminar, Missoula, MT, January 26, 2018.

"The State and National Outlook," BBER Economic Outlook Seminar, Great Falls, MT, January 24, 2018.

"The Outlook for Cascade County," BBER Economic Outlook Seminar, Great Falls, MT, January 24, 2018.

"The State and National Outlook," BBER Economic Outlook Seminar, Helena, MT, January 23, 2018.

"The Outlook for Lewis and Clark County," BBER Economic Outlook Seminar, Helena, MT, January 23, 2018.

"Slower Economic Growth in Montana: Real or Mirage?," Montana Taxpayers Association, Helena, MT, December 6, 2017.

"AUBER Unit Business Models," Association for University and Business Economic Research Conference, Albuquerque, NM, October 22, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Equipment Dealers, Whitefish, MT, October, 4, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Independent Bankers, Helena, MT, July 29, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Chamber of Commerce Economic Update, Kalispell, MT, July 27, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Chamber of Commerce Economic Update, Missoula, MT, July 27, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Chamber of Commerce Economic Update, Great Falls, MT, July 26, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Chamber of Commerce Economic Update, Helena, MT, July 26, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Chamber of Commerce Economic Update, Butte, MT, July 25, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Chamber of Commerce Economic Update, Bozeman, MT, July 25, 2017.

"Montana's Growth Stall: Real or Artificial?," Montana Chamber of Commerce Economic Update, Billings, MT, July 25, 2017.

"The Montana Outlook," Pacific Northwest Regional Economic Conference, Bend, OR, May 25, 2017.

"Remarks on Poverty in Montana: An Overview," Poverty and Policy Conference, Bozeman, MT, April 7, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Miles City, MT, March 15, 2017.

"The Economic Outlook for Custer County," BBER Economic Outlook Seminar, Miles City, MT, March 15, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Miles City, MT, March 15, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Sidney, MT, March 14, 2017.

"The Economic Outlook for Richland County," BBER Economic Outlook Seminar, Sidney, MT, March 14, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Sidney, MT, March 14, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Kalispell, MT, February 7, 2017.

"The Economic Outlook for Flathead County," BBER Economic Outlook Seminar, Kalispell, MT, February 7, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Kalispell, MT, February 7, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Butte, MT, February 2, 2017.

"The Economic Outlook for Southwest Montana," BBER Economic Outlook Seminar, Butte, MT, February 2, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER

Economic Outlook Seminar, Butte, MT, February 2, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Bozeman, MT, February 1, 2017.

"The Economic Outlook for Gallatin County," BBER Economic Outlook Seminar, Bozeman, MT, February 1, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Bozeman, MT, February 1, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Billings, MT, January 31, 2017.

"The Economic Outlook for Yellowstone County," BBER Economic Outlook Seminar, Billings, MT, January 31, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Billings, MT, January 31, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Missoula, MT, January 27, 2017.

"The Economic Outlook for Missoula and Ravalli Counties," BBER Economic Outlook Seminar, Missoula, MT, January 27, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Missoula, MT, January 27, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Great Falls, MT, January 25, 2017.

"The Economic Outlook for Cascade County," BBER Economic Outlook Seminar, Great Falls, MT, January 25, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Great Falls, MT, January 25, 2017.

"The Outlook for Real Estate and Residential Construction," BBER Economic Outlook Seminar, Helena, MT, January 24, 2017.

"The Economic Outlook for Lewis and Clark County," BBER Economic Outlook Seminar, Helena, MT, January 24, 2017.

"The State and National Outlook: Economic Expansions Don't Live Forever," BBER Economic Outlook Seminar, Helena, MT, January 24, 2017.

"A Tale of Two Years: Montana's Economic Slowdown," Montana Taxpayer Association, Helena, MT, December 7, 2016.

"The Economic Contribution of the Montana Historical Society," Montana Historical Society, Helena, MT, December 6, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Equipment Dealers Association, Whitefish, MT, October 5, 2016.

"Making the Most of Montana's Business and Economic Data," Jobs, Economy and Industry: Montana Business Reporting Seminar, Missoula, MT, September 23, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Missoula Estate Planners, Missoula, MT, September 13, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Telecommunications Association Meeting, Kalispell, MT, August 31, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Chamber of Commerce Economic Update, Missoula, MT, August 11, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Chamber of Commerce Economic Update, Great Falls, MT, August 11, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Chamber of Commerce Economic Update, Butte, MT, August 10, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Chamber of Commerce Economic Update, Helena, MT, August 10, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Chamber of Commerce Economic Update, Bozeman, MT, August 9, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Chamber of Commerce Economic Update, Billings, MT, August 9, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Chamber of Commerce Economic Update, Kalispell, MT, July 28, 2016.

"The State and National Outlook: Coming Off a Very Good Year," Montana Independent Bankers Annual Meeting, Kalispell, MT, July 22, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," Montana Coal Council, Polson, MT, July 19, 2016.

"The Prospects for Bitcoin," Missoula Breakfast Club, Missoula, MT, May 17, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," Montana Republicans Meeting, Bozeman, MT, March 31, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," REMI Webinar, Missoula, MT, May 4, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," Montana Republicans Meeting, Bozeman, MT, March 31, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," Montana Energy Conference, Billings, MT, March 30, 2016.

"The State and National Outlook: Back to Full Employment," Montana CPA Industry Conference, Helena, MT, March 24, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Havre, MT, March 16, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Lewistown, MT, March 15, 2016.

"The State and National Outlook: Back to Full Employment," Missoula Pachyderm Club, Missoula, MT, February 19, 2016.

"Opportunities and Challenges for North Central Montana," Bear Paw Economic Development Annual Meeting, Havre, MT, February 18, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Kalispell, MT, February 12, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," Kalispell Chamber of Commerce, Kalispell, MT, February 11, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Butte, MT, February 4, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Bozeman, MT, February 3, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Billings, MT, February 2, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Missoula, MT, January 29, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Great Falls, MT, January 27, 2016.

"The State and National Outlook: Back to Full Employment," BBER Economic Outlook Seminar, Helena, MT, January 26, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," Montana Energy 2016 Conference, Billings, MT, January 18, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," Montana Chamber of Commerce Business Days at the Capital, Helena, MT, January 13, 2016.

"The Economic Implications of Implementing the Clean Power Plan in Montana," NorthWestern Energy Press Conference, Helena, MT, November 13, 2015.

"Economic Impact of the Western Montana Medical Residency Program," FMRWM Retreat, Big Fork, MT, October 30, 2015.

"Opportunities and Challenges for the Missoula Economy," UM Charitable Giving Campaign Kickoff, Missoula, MT, October 22, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Equipment Dealers Association, Whitefish, MT, October 8, 2015.

"Economic Impact of the Western Montana Medical Residency Program," UM Office of Research and Creative Scholarship, Missoula, MT, September 30, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Chamber of Commerce Economic Update, Missoula, MT, August 13, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Chamber of Commerce Economic Update, Great Falls, MT, August 13, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Chamber of Commerce Economic Update, Butte, MT, August 12, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Chamber of Commerce Economic Update, Helena, MT, August 12, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Chamber of Commerce Economic Update, Bozeman MT, August 11, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Chamber of Commerce Economic Update, Billings, MT, August 11, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Chamber of Commerce Economic Update, Kalispell, MT, July 30, 2015.

"How Will Montana Fare in the Post Commodity Boom Economy?" Montana Independent Bankers Annual Meeting, Big Sky, MT, July 17, 2015.

"How Montanans Feel About Energy Development," Asia Montana Energy Summit, Missoula, MT, April 30, 2015.

"Oil Markets Deliver a Surprise: The Montana Economic Outlook," Pacific Northwest Regional Economic Conference, Bellingham, WA, April 24, 2015.

"The Boom that Hasn't Gone Bust: The Maturation of the Bakken Oil Economy," Pacific Northwest Regional Economic Conference, Bellingham, WA, April 23, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Miles City, MT, March 18, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Sidney, MT, March 17, 2015.

"Property Taxes in Missoula," State of Missoula: Missoula Chamber of Commerce, Missoula, MT, February 17, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Kalispell, MT, February 13, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Butte, MT, February 5, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Bozeman, MT, February 4, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Billings, MT, February 3, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Great Falls, MT, January 28, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Helena, MT, January 27, 2015.

"Oil Markets Deliver a Surprise: The Global, National and State Economic Outlook," BBER Economic Outlook Seminar, Missoula, MT, January 23, 2015.

"Assessing Montana's Growth Prospects," Montana Taxpayers Association Annual Meeting, Helena, MT, December 4, 2014.

"The Economic Impact of the University of Montana," University of Montana - Western, Dillon, MT, November 18, 2014.

"What Gets Measured Gets Managed: Tracking the Montana Innovation Economy," Mid Year Economic Update, Helena, MT, October 29, 2014.

"Faculty Fellows at the BBER – How It Can Happen," School of Business Administration Brown Bag Series, Missoula, MT, October 24, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Montana League of Cities, West Yellowstone, MT, October 9, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Billings, MT, August 5, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," International Association of Workforce Professionals, Helena, MT, October 2, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Stewart Title Company, Missoula, MT, September 11, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Motor Carriers of Montana Annual Meeting, Billings, MT, September 10, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," testimony to the Revenue and Transportation Interim Committee, Helena, MT, September 4, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Billings, MT, August 7, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Great Falls, MT, August 7, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Butte, MT, August 6, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Helena, MT, August 6, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Bozeman, MT, August 5, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Billings, MT, August 5, 2014.

"The Boom Begins to Slow: Updating the Outlook for the U.S. and Montana Economy," Mid Year Economic Update, Kalispell, MT, July 31, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Pacific Northwest Regional Economic Conference, Portland, OR, May 9, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Missoula Society of Human Resource Management, Missoula, MT, April 10, 2014.

"The Boom that Hasn't Gone Bust: The Maturation of the Oil Economy of the Bakken," Montana Energy Expo 2014, Billings, MT, April 2, 2014.

"What If 'Tight Oil' Never Happened?" Montana Energy Expo 2014 Opening Banquet, Billings, MT, April 1, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Havre Economic Outlook Seminar, Havre, MT, March 15, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Havre Economic Outlook Seminar, Havre, MT, March 15, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Lewistown Economic Outlook Seminar, Lewistown, MT, March 11, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Lewistown Economic Outlook Seminar, Lewistown, MT, March 11, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Kalispell Economic Outlook Seminar, Kalispell, MT, February 14, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Kalispell Economic Outlook Seminar, Kalispell, MT, February 14, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Butte Economic Outlook Seminar, Butte, MT, February 6, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Butte Economic Outlook Seminar, Butte, MT, February 6, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Bozeman Economic Outlook Seminar, Bozeman, MT, February 5, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Bozeman Economic Outlook Seminar, Bozeman, MT, February 5, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Billings Economic Outlook Seminar, Billings, MT, February 4, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Billings Economic Outlook Seminar, Billings, MT, February 4, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Missoula Economic Outlook Seminar, Missoula, MT, January 31, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Great Falls Economic Outlook Seminar, Great Falls, MT, January 29, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Great Falls Economic Outlook Seminar, Great Falls, MT, January 29, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Helena Economic Outlook Seminar, Helena, MT, January 28, 2014.

"Health Care Outlook: Changes in Health Care Not Limited to Obamacare," Helena Economic Outlook Seminar, Helena, MT, January 28, 2014.

"The Montana and U.S. Economic Outlook: Has 'Next Year' Finally Arrived?" Montana Tire Dealers Association, Great Falls, MT, January 22, 2014.

"The Economic Impact of the Archie Bray Foundation," Hometown Helena, Helena, MT, December 12, 2013.

"The Boom that Hasn't Gone Bust: Maturation of the Oil Economy of the Bakken," University of Michigan RSQE Forecasting Conference, Ann Arbor, MI, November 22, 2013.

"Measuring Local Economic Diversification," University of Montana School of Business Administration Faculty Brownbag, Missoula, MT, November 1, 2013.

"Missoula Economy Midyear 2013," Missoula Economic Partnership Annual Meeting, Missoula, MT, October 31, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Montana Credit Union Network, Billings, MT, October 24, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Montana Association of Cities and Towns, Helena, MT, October 10, 2013.

"Montana's Implementation of the Affordable Care Act," Western States Health Care Forum, Missoula, MT, October 3, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Mid-Year Economic Update, Missoula, MT, August 8, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Mid-Year Economic Update, Butte, MT, August 8, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Mid-Year Economic Update, Helena, MT, August 7, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Mid-Year Economic Update, Great Falls, MT, August 7, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Mid-Year Economic Update, Bozeman, MT, August 6, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Mid-Year Economic Update, Billings, MT, August 6, 2013.

"The Montana and U.S. Economic Outlook: Recession's Shadow Still Lingers," Mid-Year Economic Update, Kalispell, MT, August 1, 2013.

"The Regional and National Economic Outlook: Recession's Shadow Still Lingers," Montana Independent Bankers, Big Sky, MT, July 12, 2013.

"The Regional and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Association of CPA's, Missoula, MT, June 19, 2013.

"The Regional and National Economic Outlook: Smooth Sailing Towards a Cliff?" Hamilton Kiwanis, Hamilton, MT, June 12, 2013.

"The Montana Economic Outlook: Smooth Sailing Towards a Cliff?" Pacific Northwest Regional Economic Conference, Spokane, WA, May 17, 2013.

"The Regional and National Economic Outlook: Smooth Sailing Towards a Cliff?" Missoula Society of Human Resource Management, Missoula, MT, May 9, 2013.

"Economic Trends in the Bakken," Big Sky Energy Forum, Billings, MT, May 8, 2013.

"The Regional and National Economic Outlook: Smooth Sailing Towards a Cliff?" Mountain Plains States Housing Conference, Bozeman, MT, May 7, 2013.

"The Economic Impact of the Salazar Settlement Distributions to Confederated Salish and Kootenai Tribes Members in Montana," Confederated Salish and Kootenai Tribes Council, Pablo, MT, March 28, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Miles City, MT, March 13, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Sidney, MT, March 12, 2013.

"The Montana Economic Outlook: Smooth Sailing Towards a Cliff?" National Association of Business Economics Policy Conference, Washington, DC, March 4, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Kalispell, MT, February 15, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Butte, MT, February 7, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Bozeman, MT, February 6, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Billings, MT, February 5, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Missoula, MT, February 1, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Great Falls, MT, January 30, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Economic Outlook Seminar, Helena, MT, January 29, 2013.

"The State and National Economic Outlook: Smooth Sailing Towards a Cliff?" Montana Tire Dealers Association Annual Meeting, Missoula, MT, January 24, 2013.

"Montana's Economic Outlook in Perspective," testimony to Joint House and Senate Taxation Committees, Montana Legislature, Helena, MT, January 15, 2013.

"Comments on the Fiscal Cliff," Burros Club, Butte, MT, January 9, 2013.

"Montana's Economic Report Card," Montana Taxpayers Association Annual Meeting, Helena, MT, December 13, 2012.

"Montana's Economic Report Card," First Interstate Bank Board Meeting, Missoula, MT, December 13, 2012.

"An Update on the Montana Economic Outlook," testimony to the Revenue and Transportation Interim Committee, Montana Legislature, Helena, MT, November 19, 2012.

"The Role of the Bureau of Business and Economic Research in Serving the Montana Legislature," Dean's Report, School of Business Administration Advisory Board Meeting, Missoula, MT, November 16, 2012.

"Economic Outlook Fall 2012," Montana Equipment Dealers Annual Meeting, Whitefish, MT, October 4, 2012.

"Economic Outlook Fall 2012," Stockmans Bank Employee Meeting, Miles City, MT, September 14, 2012.

"The 2030 Project: The Impact of Montana's Aging Population on Montana's Fiscal Structure," (with Doug Young and Myles Watts), Wheeler Conference on Graying of Montana, Helena, MT, September 11, 2012.

"The National and Statewide Economic Outlook," Mid-Year Economic Update, Missoula, MT, August 9, 2012.

"The National and Statewide Economic Outlook," Mid-Year Economic Update, Butte, MT, August 9, 2012.

"The National and Statewide Economic Outlook," Mid-Year Economic Update, Helena, MT, August 8, 2012.

"The National and Statewide Economic Outlook," Mid-Year Economic Update, Great Falls, MT, August 8, 2012.

"The National and Statewide Economic Outlook," Mid-Year Economic Update, Bozeman, MT, August 7, 2012.

"The National and Statewide Economic Outlook," Mid-Year Economic Update, Billings, MT, August 7, 2012.

"The National and Statewide Economic Outlook," Mid-Year Economic Update, Kalispell, MT, August 2, 2012.

"The Impact of Otter Creek Coal Development on the Montana Economy," Montana Coal Council Annual Meeting, Polson, MT, July 17, 2012.

"Montana's Economic Prospects: Short and Long-Term," Montana Independent Bankers Association Annual Conference, Kalispell, MT, July 13, 2012.

"The Magic of Analytics" (with Gregg Davis), Montana Trustee Conference, Big Sky, MT, June 11, 2012.

"The Economic Impact of Rocky Mountain Laboratories," RML Employees Meeting, Hamilton, MT, June 7, 2012.

"Montana's Hesitant Economic Recovery," Pacific Northwest Regional Economic Conference, Seattle, WA, May 19, 2012.

"The Economic Impact of Rocky Mountain Laboratories," RML Community Meeting, Hamilton, MT, May 7, 2012.

"Housing, Migration and the Recession: What's Ahead for Missoula?" Leadership

Missoula, Missoula, MT, April 12, 2012.

"The Impact of Otter Creek Coal Development on the Montana Economy," Montana Energy Expo 2012, Billings, MT, April 3, 2012.

"Montana's Energy Industries," Miles Community College Energy Forum, Miles City, MT, March 15, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Havre, MT, March 14, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Lewistown, MT, March 13, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Kalispell, MT, February 10, 2012.

"The Economic Impact of the University of Montana," The Associated Students of the University of Montana, Missoula, MT, February 8, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Butte, MT, February 2, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Bozeman, MT, February 1, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Billings, MT, January 31, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Helena, MT, January 24, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Missoula, MT, January 27, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Great Falls, MT, January 25, 2012.

"Montana's Hesitant Economic Recovery," BBER Economic Outlook Seminar, Helena, MT, January 24, 2012.

"Housing, Migration and the Recession: What's Ahead for Missoula?" Western Montana Chapter National Real Estate Property Managers Association, Missoula, MT, January 19, 2012.

"Montana's Hesitant Economic Recovery," Montana Taxpayers Association Annual Meeting, Helena, MT, December 8, 2011.

"The Economic Contribution of Colstrip Steam Electric Station Units 1-4," Colstrip Community Meeting, Colstrip, MT, November 7, 2011.

"Missoula Mid-Year 2011," Prudential Real Estate Board, Missoula, MT, November 3, 2011.

"Montana's Construction-less Recovery," Montana State University Department of Agricultural Economics and Economics Conference, Bozeman, MT, October 28, 2011.

"Montana's Construction-less Recovery," Montana Hospitality and Lodging Association Fall Meeting, Fairmont, MT, October 24, 2011.

"Montana's Construction-less Recovery," Montana Independent Telecommunications Conference, Helena, MT, October 19, 2011.

"Developing a Self-Funded Research Center," Association for University Business and Economic Research Fall Conference, Indianapolis, IN, October 10, 2011.

"The Economic Impact of The University of Montana," UM Business Drive Volunteers Meeting, Missoula, MT, September 16, 2011.

"Montana's Construction-less Recovery," Montana Department of Workforce Development All Employee Meeting, Helena, MT, September 14, 2011.

"Montana's Construction-less Recovery," Lake County Pachyderm Association, Polson, MT, September 9, 2011.

"Housing Affordability and Montana's Real Estate Markets," Great Falls Association of Realtors Luncheon, Great Falls, MT, August 18, 2011.

"Montana's Construction-less Recovery," Mid-Year Economic Update, Butte, MT, August 10, 2011.

'Montana's Construction-less Recovery," Mid-Year Economic Update, Bozeman, MT, August 10, 2011.

'Montana's Construction-less Recovery," Mid-Year Economic Update, Billings, MT, August 9, 2011.

"Montana's Construction-less Recovery," Mid-Year Economic Update, Helena, MT, August 8, 2011.

"Montana's Construction-less Recovery," Mid-Year Economic Update, Great Falls, MT, August 5, 2011.

"Montana's Construction-less Recovery," Mid-Year Economic Update, Missoula, MT,

August 4, 2011.

"Montana's Construction-less Recovery," Western Region State Farm Insurance Agents Meeting, Missoula, MT, August 3, 2011.

"Montana's Construction-less Recovery," Mid-Year Economic Update, Kalispell, MT, July 28, 2011.

"The University of Montana: Growing Montana's Economy," President's Advisory Board, Missoula, MT, May 3, 2011.

"The University of Montana: Growing Montana's Economy," President's Roundtable, Helena, MT, April 1, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Mile City, MT, March 16, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Sidney, MT, March 15, 2011.

"U.S. and Montana Economic Outlook: Stronger Growth Ahead," Missoula Sunrise Rotary, Missoula, MT, February 23, 2011.

"U.S. and Montana Economic Outlook: Stronger Growth Ahead," Montana Tire Dealers Association Meeting, Billings, MT, February 16, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Kalispell, MT, February 11, 2011.

"U.S. and Montana Economic Outlook: Stronger Growth Ahead," Rocky Mountain Bank, Missoula, MT, February 9, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Butte, MT, February 3, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Bozeman, MT, February 2, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Billings, MT, February 1, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Missoula, MT, January 28, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Great Falls, MT, January 26, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," BBER Economic Outlook Seminar, Helena, MT, January 25, 2011.

"U.S. and Montana Economic Outlook: Stronger Growth Ahead," Briefing to Montana Legislature, Helena, MT, January 24, 2011.

"The Economic Contribution of Colstrip Steam Electric Station Units 1-4," PPL Montana Legislative Reception, Helena, MT, January 11, 2011.

"Paying for the Recession: Bringing Economic Growth Back Into Balance," Missoula Pacyderm Association, Missoula, MT, January 7, 2011.

"The Montana Economic Outlook," Montana Taxpayers Association Annual Meeting, Helena, MT, December 9, 2010.

"The Economic Impact of Montana State University," Bozeman, MT, November 9, 2010.

"The Montana Economic Outlook," Montana Bankruptcy Attorneys Conference, Missoula, MT, October 21, 2010.

"Money Talks: Bureau Management With Shrinking Budgets," Association for University Business and Economic Research Fall Meeting, Charleston, WV, October 18, 2010.

"The Economic Impact of Montana State University," Bozeman, MT, October 12, 2010.

"The Montana Economy: Making Sense of Mixed Signals," Montana Taxpayers Association, Helena, MT, October 5, 2010.

"Recession Throws Montana's Demographic Trends a Curve Ball," Montana Association of Planners, Missoula, MT, September 23, 2010.

"The Outlook for the Montana Economy," Missoula Breakfast Club, Missoula, MT, September 21, 2010.

"The Economic Contribution of the Colstrip Steam Electric Station Units 1-4," Colstrip Owners Board Meeting, Colstrip, MT, September 16, 2010.

"The Outlook for the Montana Economy," International Association of Women Professionals, Missoula, MT, September 10, 2010.

"Montana's Economy: Making Sense of Mixed Signals," Mid-Year Economic Outlook Update, Helena, MT, August 5, 2010.

"Montana's Economy: Making Sense of Mixed Signals," Mid-Year Economic Outlook Update, Helena, MT, August 5, 2010.

"Montana's Economy: Making Sense of Mixed Signals," Mid-Year Economic Outlook

Update, Butte, MT, August 4, 2010.

"Montana's Economy: Making Sense of Mixed Signals," Mid-Year Economic Outlook Update, Bozeman, MT, August 4, 2010.

"Montana's Economy: Making Sense of Mixed Signals," Mid-Year Economic Outlook Update, Billings, MT, August 3, 2010.

"Evaluating Forecasting Accuracy," testimony to joint Revenue and Transportation Committee, Montana Legislature, Helena, MT, August 2, 2010.

"Montana's Economy: Making Sense of Mixed Signals," Mid-Year Economic Outlook Update, Kalispell, MT, July 29, 2010.

"Growing Montana's Economy: The Economic Impact of The University of Montana," Rough Club, Missoula, MT, July 1, 2010.

"Economic Recovery in Montana: The Slow Transition to Growth," Montana Taxpayers Association, Helena, MT, December 3, 2009.

"Economic Recovery in Montana: Re-adjusting to the New Normal," Montana Rental Association, Helena, MT, November 11, 2009.

"Economic Recovery in Montana: Re-adjusting to the New Normal," Ravalli County Pacaderm Group, Stevensville, MT, November 6, 2009.

"Economic Recovery in Montana: Re-adjusting to the New Normal," Montana Association of CPAs, Missoula, MT, November 5, 2009.

"Economic Recovery in Montana: Re-adjusting to the New Normal," Missoula Society for Human Resource Management, Missoula, MT, October 8, 2009.

"Economic Recovery in Montana: Re-adjusting to the New Normal," Montana Labor Relations Council, Butte, MT, September 24, 2009.

"Economic Recovery in Montana: Re-adjusting to the New Normal," Montana Textiles Association, Great Falls, MT, September 18, 2009.

"Economic Recovery in Montana: Adjusting to the New Normal," Montana Chamber Mid-Year Economic Update, Kalispell, MT, July 30, 2009.

"Economic Recovery in Montana: Adjusting to the New Normal," Montana Chamber Mid-Year Economic Update, Billings, MT, August 6, 2009.

"Economic Recovery in Montana: Adjusting to the New Normal," Montana Chamber Mid-Year Economic Update, Bozeman, MT, August 7, 2009.

"Economic Recovery in Montana: Adjusting to the New Normal," Montana Chamber Mid-Year Economic Update, Helena, MT, August 7, 2009.

"Economic Recovery in Montana: Adjusting to the New Normal," Montana Chamber Mid-Year Economic Update, Great Falls, MT, August 12, 2009.

"Economic Recovery in Montana: Adjusting to the New Normal," Montana Chamber Mid-Year Economic Update, Missoula, MT, August 13, 2009.

"Benchmarking Missoula's Economy," Missoula City Council Candidates Forum, Missoula, MT, July 21, 2009.

Newspaper Articles (recent):

"Tax Reforms Needed to Control Costs of Health Care," Billings Gazette, September 15, 2007.

"Tax Breaks Help Drive Up Health Care Costs," Billings Gazette, September 1, 2007.

"The Great Society Meets Fiscal Reality," Billings Gazette, May 8, 2007.

"Health Care Premiums are Killing Jobs," Missoulian, June 19, 2007.

See: http://www.bsu.edu/mcobwin/ibb/COMM/Archive.htm for earlier Indiana newspaper articles.

"The Final Word," Indianapolis Business Journal, August 18, 2007.

Membership in Organizations:

Beta Gamma Sigma, BSU Chapter
National Association of Business Economists
Association for University Business and Economic Research (Secretary-Treasurer)
Regional Economic Models, Inc., (REMI) Users Group
Pacific Northwest Regional Economics Conference (past President)

Boards and Committees Served:

Montana Manufacturers Extension Center (2007-08)
Northwestern Energy and Transmission Advisory Council (ETAC)
Momentive Corp. Community Advisory Panel

Awards:

Muncie Sunrise Rotary 2002 Vocational Service Award