



April 22, 2019

To: Merry Gamper, Project Lead, BLM

Subject: Comments on Problems with the Quantification of Greenhouse Gas Emissions and Failure to Monetize Climate Damages in the Supplemental Environmental Assessment for the May 2015-August 2016 Sold and Issued Leases, DOI-BLM-WY-0000-2019-0007-EA

Submitted by: Institute for Policy Integrity at New York University School of Law, Montana Environmental Information Center, Sierra Club, and The Wilderness Society¹

The following comments focus on problems with the quantification of and the failure to monetize greenhouse gas emissions in the Supplemental Environmental Assessment (EA) that BLM prepared on remand from *WildEarth Guardians v. Zinke*, No. 16-1724, 2019 WL 1273181 (D.D.C. Mar. 19, 2019).

I. BLM Must Correct Problems with the Quantification and Characterization of Greenhouse Gas Emissions

Below, these comments will use BLM's estimates of direct and indirect greenhouse gas emissions to monetize the associated climate damages by applying the social cost of greenhouse gas metrics. BLM's quantitative estimates are used to illustrate that the direct and indirect greenhouse gas emissions quantified by the Supplemental EA are significant, that the climate damages associated with those quantified emissions can be monetized, and that monetization of those climate damages provides useful context in assessing the intensity and significance of the environmental effects of these oil and gas leases, as required by NEPA. Specifically, based on BLM's estimates of emissions, the oil and gas leases under review in the Supplemental EA are responsible for causing over \$45 million per year in climate damages.²

Use of BLM's estimates for illustrative purposes, however, does not constitute an endorsement of BLM's estimates as accurate. To the contrary, BLM's quantification and characterization of the leases' greenhouse gas emissions are problematic, and BLM must correct these problems.

Use Updated Global Warming Potentials and Assess Methane Emissions Separately

BLM suggests that it must use the "100-year GWP timeline" to convert methane emissions into carbon dioxide equivalents "to ensure that consistent comparisons could be made across Federal agency estimates and data."³ BLM does not explain which other "estimates and data" it is worried about being inconsistent with, or why consistency is a more important factor than either accuracy or providing sufficient informational context to inform the public and decisionmakers.

BLM is well aware that the choice of the global warming potential adjustment factor will have a significant effect on its estimates. In a footnote to Table 10, the Supplemental EA shows that selecting the 20-year adjustment factor for methane instead of the 100-year for the Buffalo planning area would

¹ Our organizations may separately and independently submit other comments on other issues raised by the EA.

² (797,495 tons of CO₂e in downstream emissions + 73,424 tons in direct emissions) * \$52 per ton (i.e., the Interagency Working Group's central estimate for the social cost of carbon of year 2020 emissions, adjusted to 2018\$ using the CPI inflation calculator) = \$45,287,788 in climate damages in the year 2020 alone. The social cost of carbon per ton rises for carbon pollution emitted after year 2020.

³ Supplemental EA at 27; *see also id.* at 16 (reporting that a GWP of 28 is used for oil and gas).

nearly triple the calculation of total direct emissions. Yet, the agency does not otherwise assess whether considering all of the leases' methane emissions using a 20-year timeline—a reasonable framework given the lifespan of methane and the intensity of its contributions to climate change in the near term—would change the determination of the significance of the leases' climate effects.

If BLM presents the leases' greenhouse gas emissions in aggregate sums of carbon dioxide-equivalent units, the agency should use the latest adjustment factors from the IPCC's Fifth Assessment Report: namely, 85-87 for methane under a 20-year timeline, and 30-36 for methane under a 100-year timeline.⁴ Considering the 20-year timeline is especially appropriate given that the U.S. District Court for the District of Columbia advised BLM to consider "ranges" when quantifying greenhouse gas emissions, in light of uncertainties.⁵

But given that, as discussed below, the Interagency Working Group on the Social Cost of Greenhouse Gases developed estimates specifically for the social cost of methane that better account for methane's unique contributions to climate damages over its lifespan and given its particular atmospheric chemistry, BLM should also disclose the raw tons of methane emitted by these oil and gas leases, rather than subsuming these totals into carbon dioxide-equivalent aggregates. Quantifying tons of methane separately will allow for more accurate calculation of the project's climate damages.

Clarify How Direct and Fugitive Methane Emissions Were Quantified

BLM reports that its quantifications assumed compliance with regulations under the Clean Air Act,⁶ and that "BLM encourages oil and gas...companies to adopt proven cost-effective technologies and practices that improve operation efficiency and reduce natural gas emissions."⁷ However, given the volatile legal status of BLM's 2016 Waste Prevention Rule and various other regulations from BLM and EPA, BLM should clarify exactly which regulations and standards it assumes that oil and gas operators will comply with under these leases, and how those assumptions affect the quantification of methane emissions.

Similarly, while BLM explains that fugitive methane from gas wells, oil wells, oil storage, and various processing equipment is "a major source of global CH₄ emissions,"⁸ it is not clear whether all fugitive emissions from production, storage, and transportation of oil, gas, and coalbed gas are captured in BLM's estimates of direct emissions. BLM lists "wellhead equipment leaks," "well completion flares," and "tank venting"⁹ as included in the quantification of direct emissions, but it is not clear if these categories fully capture all fugitive methane emissions during production, storage, and transportation of oil, gas, and coalbed gas. BLM needs to clarify whether it is missing any important categories of fugitive emissions.

Conduct Sensitivity Analysis Using Per Well Estimates

BLM claims that, given uncertainty about which kinds of wells will be developed on which land, per-acre emission factors based on historic averages is a preferred and "conservative" way to estimate these leases' direct and indirect emissions.¹⁰ However, BLM offers no evidence to suggest that these estimates

⁴ IPCC Working Group I, Fifth Assessment Report, Climate Change 2013: The Physical Science Basis, Chapter 8: Anthropogenic and Natural Radiative Forcing (2014) at 633, 711-712, 714 (Table 8.7), available at https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf (see the adjustment identified in note B for fossil methane; 85-87 times greater than carbon after 20 years, and 30-36 times greater after 100 years).

⁵ *WildEarth Guardians v. Zinke*, No. 16-1724, 2019 WL 1273181, *15 (D.D.C. Mar. 19, 2019).

⁶ Supplemental EA at 28.

⁷ *Id.* at 35.

⁸ *Id.* at 26.

⁹ *Id.* at 27-28.

¹⁰ *Id.* at 29, 31.

are actually conservative. BLM should provide its best estimates of total emissions using the best available science on per-well emissions factors and reasonable estimates of well development, as a sensitivity analysis, to allow assessment of whether BLM's assumptions in its per-acre approach really are conservative and appropriate. There is sufficient data in the administrative record, from commenters, and from litigation to develop estimates based on per-well factors. Such sensitivity analyses are especially important given that the U.S. District Court for the District of Columbia advised BLM to consider "ranges" when quantifying greenhouse gas emissions, in light of uncertainties,¹¹ and also instructed BLM to re-check the accuracy of its per-well estimates.¹²

Assuming Full Combustion Is Appropriate, but BLM's Characterization of Potential Adjustments Are Inappropriate

BLM assumes that all oil and gas will be combusted, which is an appropriate and conservative assumption for a NEPA analysis. However, BLM then mischaracterizes how conservative the assumption is by suggesting that, in reality, up to 13% of oil and 3% of gas may be consumed by non-combustion uses.¹³ BLM cites "EPA's Energy Star program, in 2017" for these figures,¹⁴ but the only reference provided, EPA's *Natural Gas Star Program (2017 data)*,¹⁵ does not obviously reveal where those numbers came from. Meanwhile, in its recent March 2018 environmental impact statement for the Greater Mooses Tooth 2 Development Project, BLM incorporated a lifecycle greenhouse gas methodology developed by the Bureau of Ocean Energy Management, which relies on figures from the U.S. Energy Information Administration to estimate that only 1.6% of gas and 1.2% of oil are consumed in non-combusted uses.¹⁶ BLM does not explain the discrepancy between these recent estimates and the current suggestion that the rate of un-combusted oil consumption may actually be nearly eleven times higher.

BLM also does not seem to consider in the Supplemental EA another important adjustment that the agency incorporated into its Greater Mooses Tooth 2 EIS: that when oil is refined, the volume increases by 6.7%.¹⁷ The Supplemental EA does not clarify whether its estimates of barrels¹⁸ used to calculate the leases' indirect emissions are estimates pre- or post-refinement. Even if BLM is correct that more than approximately 1% of produced oil is un-combusted, the figures would have to be offset by adjusting for volume gains during refining.

Speculation about Substitution Effects Is Inappropriate; Instead, Model the Substitution Effects

The Supplemental EA misleadingly speculates that, following development of these oil and gas leases, global greenhouse gas emissions actually "could be reduced" as natural gas replaces other dirtier fuels.¹⁹ Although it is true that, depending on relative prices, natural gas can displace coal, that is a misleadingly incomplete slice of the picture. BLM has not, for example, considered how increased production of oil under these leases could lower oil prices, increase demand for oil relative either to less-CO₂-intensive

¹¹ *WildEarth Guardians v. Zinke*, 2019 WL 1273181 at *15.

¹² *Id.* at *14 n.23.

¹³ Supplemental EA at 34.

¹⁴ *Id.*

¹⁵ *Id.* at 54 (providing the url: <https://www.epa.gov/natural-gas-star-program/natural-gas-star-program-accomplishments>).

¹⁶ BLM, *Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth 2 Development Project: Draft Supplemental Environmental Impact Statement* (2018) at Appendix H, pp.4-6, available at https://eplanning.blm.gov/epl-front-office/projects/nepa/65817/127980/155727/Appendix_H-_BOEM_Greenhouse_Gas_Lifecycle_Model_Methodology.pdf.

¹⁷ *Id.* at 4.

¹⁸ Supplemental EA at 31.

¹⁹ *Id.* at 37.

fuels like natural gas or to options for energy conservation and efficiency, and so increase emissions.²⁰ Similarly, while BLM mentions that its estimates of natural gas production on these leases might be overestimates if the future expansion of renewable energy decreases demand for gas,²¹ it is also possible that the increased gas production authorized by these leases will decrease gas prices to the point where the expansion of renewables is delayed or displaced. Finally, while BLM speculates that oil and gas development “may decline in other portions of the United States” in response to these leases, and so overall U.S. emissions from oil and gas “may not necessarily increase” as a result of these leases,²² BLM inconsistently does not consider how the same kind of substitution effect would change its calculations of economic benefits. If these leases displace other oil and gas development, the beneficial economic impacts of those other developments (in the form of oil and gas output, royalties, taxes, labor income, and so forth) would also be displaced, such that the overall economic benefits that BLM calculates and relies upon would not increase on a net national basis.

The Supplemental EA’s wild speculations that, because of market substitution effects, the net result of these leases could be either no increase in emissions or even a decrease in global emissions, lack any analytical foundation and so are misleadingly incomplete and inappropriate. Instead, BLM should conduct a real energy substitution analysis. BLM has recently completed energy substitution analyses in other NEPA reviews, and though there were serious methodological flaws in those recent analyses,²³ BLM is fully capable of correcting those flaws and completing a true energy substitution analysis for these Wyoming oil and gas leases.

II. BLM Must Monetize Climate Damages in Its Supplemental EA

The National Environmental Policy Act (NEPA), the statute under which environmental impact statements are required, directs agencies to fully and accurately analyze the environmental, public health, and social welfare differences between proposed alternatives, and to contextualize that information for decision-makers and the public. NEPA requires a more searching analysis than merely disclosing the amount of pollution. Rather, BLM must examine the “ecological[,]... economic, [and] social” impacts of those emissions, including an assessment of their “significance.”²⁴ By failing to use available tools, such as the social cost of carbon, to analyze the significance of emissions, BLM violated NEPA.

In *WildEarth Guardians v. Zinke*, while the U.S. District Court for the District of Columbia stopped short of requiring BLM to use the social cost of carbon, it issued its holding on very narrow grounds. Specifically, the court declined to side with plaintiffs that “it was arbitrary and capricious for BLM to discuss the economic benefits of oil and gas drilling without quantifying their economic costs” by using the social cost of carbon protocol.²⁵ However, the court did *not* hold that BLM’s acted consistently in choosing to monetize benefits without monetizing costs; rather, it held that BLM’s treatment of economic benefits was so “sparse[.]” and “cursory” that the precedent established in *High Country Conservation Advocates v. Forest Service* could be differentiated.²⁶ Not only was the court’s consideration of this claim incomplete (as explored below), but the inconsistent treatment of costs and benefits is not the only reason why agencies should use the social cost of greenhouse gases to assess

²⁰ See EIA, *Fuel Competition in Power Generation and Elasticities of Substitution* 11-12 (2012) (discussing elasticity between oil and gas as some plant turbines can run on either, as well as oil high own-price elasticity).

²¹ Supplemental EA at 37.

²² *Id.* at 37.

²³ See https://policyintegrity.org/documents/Arctic_Coastal_Plain_DEIS_Comments_2019.3.13-final.pdf.

²⁴ 40 C.F.R. §§ 1508.8(b), 1502.16(a)-(b).

²⁵ 2019 WL 1273181, at *22.

²⁶ *Id.*

climate damages in NEPA reviews. The court never considered whether using the social cost of greenhouse gases was necessary or appropriate to fulfill the obligations and goals of NEPA: to assess a project's actual real-world impacts, to weigh the intensity and significance of a project's contributions to such impacts, and to give meaningful context to the information presented. BLM's Supplemental EA fails on all those counts, whereas applying the social cost of greenhouse gases would fulfill NEPA's obligations and goals.

(The court also deferred to BLM's objections to the range of estimates generated by applying specific estimates of the social cost of greenhouse gases,²⁷ but those objections are about which numbers to pick rather than about whether climate damages can and must be monetized in some fashion. Subsequent sections of these comments explain why BLM's objections and the court's deference were both mistaken.)

Ultimately, the court instructed BLM on remand to "reassess" whether the social cost of greenhouse gas protocol would "contribute to informed decisionmaking" and ensure more accurate analysis as required by NEPA.²⁸ The court believed that "the protocol may one day soon be a necessary component of NEPA analyses"²⁹—and, indeed, that day has already arrived.

Monetizing Climate Damages Fulfills the Obligations and Goals of NEPA

When a proposed action has climate consequences that must be assessed under NEPA, monetizing the climate damages fulfills an agency's legal obligations under NEPA in ways that simple quantification of tons of greenhouse gas emissions cannot. NEPA requires "hard look" consideration of beneficial and adverse effects of each alternative option for major federal government actions. The U.S. Supreme Court has called the disclosure of impacts the "key requirement of NEPA," and held that agencies must "consider and disclose the *actual environmental effects*" of a proposed action in a way that "brings those effects to bear on [the agency's] decisions."³⁰ Courts have repeatedly concluded that an environmental impact statement must disclose relevant climate effects.³¹ NEPA requires "a reasonably thorough discussion of the significant aspects of the probable environmental consequences," to "foster both informed decisionmaking and informed public participation."³² In particular, "[t]he impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impact analysis that NEPA requires," and it is arbitrary to fail to "provide the necessary contextual information about the cumulative and incremental environmental impacts."³³ Furthermore, the analyses included in environmental assessments and impact statements "cannot be misleading."³⁴ An agency must provide

²⁷ *Id.* at *23.

²⁸ *Id.*, n.31.

²⁹ *Id.*

³⁰ *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council*, 462 U.S. 87, 96 (1983) (emphasis added); *see also* 40 C.F.R. § 1508.8(b) (requiring assessment of the "ecological," "economic," "social," and "health" "effects") (emphasis added).

³¹ As the Ninth Circuit has held: "[T]he fact that climate change is largely a global phenomenon that includes actions that are outside of [the agency's] control . . . does not release the agency from the duty of assessing the effects of its actions on global warming within the context of other actions that also affect global warming." *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008); *see also Border Power Plant Working Grp. v. U.S. Dep't of Energy*, 260 F. Supp. 2d 997, 1028-29 (S.D. Cal. 2003) (failure to disclose project's indirect carbon dioxide emissions violates NEPA).

³² *Ctr. for Biological Diversity*, 538 F.3d at 1194 (citations omitted).

³³ *Id.* at 1217.

³⁴ *High Country Conservation Advocates v. U.S. Forest Service*, 52 F. Supp. 3d 1174, 1182 (D. Colo. 2014); *accord Johnston v. Davis*, 698 F.2d 1088, 1094-95 (10th Cir. 1983) (disapproving of "misleading" statements resulting in "an unreasonable comparison of alternatives"); *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 446 (4th Cir. 1996) ("For an EIS to serve these functions" of taking a hard look and allowing the public to play a role in decisionmaking, "it is essential that the EIS not be based on misleading economic assumptions"); *see also Sierra Club v. Sigler*, 695 F.2d 957, 979 (5th Cir. 1983) (holding

sufficient informational context to ensure that decisionmakers and the public will not misunderstand or overlook the magnitude of a proposed action's climate risks compared to the no action alternative. As this section explains, by only quantifying the volume of greenhouse gas emissions, agencies fail to assess and disclose the actual climate consequences of an action and misleadingly present information in ways that will cause decisionmakers and the public to overlook important climate consequences. Using the social cost of greenhouse gas metrics to monetize climate damages fulfills NEPA's legal obligations in ways that quantification alone cannot.

BLM Must Assess Actual Incremental Climate Impacts, Not Just the Volume of Emissions

The tons of greenhouse gases emitted by a proposed action are not the "actual environmental effects" under NEPA. Rather, the actual effects and relevant factors are the incremental climate impacts caused by those emissions, including:³⁵

- property lost or damaged by sea-level rise, coastal storms, flooding, and other extreme weather events, as well as the cost of protecting vulnerable property and the cost of resettlement following property losses;
- changes in energy demand, from temperature-related changes to the demand for cooling and heating;
- lost productivity and other impacts to agriculture, forestry, and fisheries, due to alterations in temperature, precipitation, CO₂ fertilization, and other climate effects;
- human health impacts, including cardiovascular and respiratory mortality from heat-related illnesses, changing disease vectors like malaria and dengue fever, increased diarrhea, and changes in associated pollution;
- changes in fresh water availability;
- ecosystem service impacts;
- impacts to outdoor recreation and other non-market amenities; and
- catastrophic impacts, including potentially rapid sea-level rise, damages at very high temperatures, or unknown events.

The Supplement EA includes brief, generic, qualitative references to some of the broad categories of climate damages that will likely occur globally and in Wyoming.³⁶ To begin, it is unclear why these brief,

that an agency's "skewed cost-benefit analysis" was "deficient under NEPA"); *see generally Bus. Roundtable v. SEC*, 647 F.3d 1144, 1148-49 (D.C. Cir. 2011) (criticizing an agency for "inconsistently and opportunistically fram[ing] the costs and benefits of the rule" and for "fail[ing] adequately to quantify the certain costs or to explain why those costs could not be quantified").

³⁵ These impacts are all included to some degree in the three integrated assessment models (IAMs) used by the IWG (namely, the DICE, FUND, and PAGE models), though some impacts are modeled incompletely, and many other important damage categories are currently omitted from these IAMs. *Compare* Interagency Working Group on the Social Cost of Carbon, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis* at 6-8, 29-33 (2010), <https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf> [hereinafter 2010 TSD]; *with* Peter Howard, *Omitted Damages: What's Missing from the Social Cost of Carbon* (Cost of Carbon Project Report, 2014), http://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf. For other lists of actual climate effects, including air quality mortality, extreme temperature mortality, lost labor productivity, harmful algal blooms, spread of west nile virus, damage to roads and other infrastructure, effects on urban drainage, damage to coastal property, electricity demand and supply effects, water supply and quality effects, inland flooding, lost winter recreation, effects on agriculture and fish, lost ecosystem services from coral reefs, and wildfires, *see* EPA, *Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (2017); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment* (2017); EPA, *Climate Change in the United States: Benefits of Global Action* (2015); Union of Concerned Scientists, *Underwater: Rising Seas, Chronic Floods, and the Implications for U.S. Coastal Real Estate* (2018).

³⁶ Supplemental EA at 15, 34.

qualitative references are based on outdated sources, such as IPCC’s Fourth Assessment Report from 2007³⁷ (an updated Fifth Assessment Report was published in 2014), a “supplemental information report” from 2010³⁸ (whereas the Fourth National Climate Assessment was completed in 2018), and several references with broken URLs.³⁹ But more importantly, none of the Supplemental EA’s qualitative descriptions give any sense of how the leases under review will actually contribute to real-world climate damages and whether those incremental impacts will be significant.

Even in combination with a general, qualitative discussion of climate change, by calculating only the tons of greenhouse gases emitted or a percent comparison to sectoral or national emissions, an agency fails to meaningfully assess the actual incremental impacts to property, human health, productivity, and so forth.⁴⁰ An agency therefore falls short of its legal obligations and statutory objectives by focusing just on volume estimates. Similarly, courts have held that just quantifying the acres of timber to be harvested or the miles of road to be constructed does not constitute a “description of *actual* environmental effects,” even when paired with a qualitative “list of environmental concerns such as air quality, water quality, and endangered species,” when the agency fails to assess “the degree that each factor will be impacted.”⁴¹ Not only has BLM failed to assess the degree to which each category of climate damages will be impacted by the program, but BLM does not even qualitatively list all the environmental concerns. As just one example, the Supplemental EA never mentions how temperature changes induced by greenhouse gas emissions will affect energy demand for heating and cooling or how climate change threatens energy infrastructure—effects that the National Climate Assessment reports are major climate risks for the entire United States⁴² and specifically for the Northern Great Plains region, which includes Wyoming.⁴³ Not only is the Supplemental EA’s qualitative assessment woefully incomplete, but to understand the project’s specific contributions to climate change, any qualitative-

³⁷ *Id.* at 15.

³⁸ *Id.* at 34.

³⁹ Neither <https://www.epa.gov/region8/climatechange/pdf/ClimateChange101FINAL.pdf> (cited at page 34) nor https://www.blm.gov/mt/st/en/prog/energy/oil_and_gas/leasing/leasingEAs.html (cited at page 54), lead to live websites.

⁴⁰ See *High Country*, 52 F. Supp. 3d at 1190 (“Beyond quantifying the amount of emissions relative to state and national emissions and giving general discussion to the impacts of global climate change, [the agencies] did not discuss the impacts caused by these emissions.”); *Mont. Env’tl. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1096–99 (D. Mont. 2017) (rejecting the argument that the agency “reasonably considered the impact of greenhouse gas emissions by quantifying the emissions which would be released if the [coal] mine expansion is approved, and comparing that amount to the net emissions of the United States”).

⁴¹ *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 995 (9th Cir. 2004) (“A calculation of the total number of acres to be harvested in the watershed is . . . not a sufficient description of the actual environmental effects that can be expected from logging those acres.”); see also *Oregon Natural Res. Council v. Bureau of Land Mgmt.*, 470 F.3d 818 (9th Cir. 2006). Similarly, the U.S. Court of Appeals for the D.C. Circuit has found that merely listing “the quantity of . . . heat, chemicals, and radioactivity released” is insufficient under NEPA if the agency “does not reveal the meaning of those impacts in terms of human health or other environmental values.” *NRDC v. U.S. Nuclear Reg. Comm’n*, 685 F.2d 459, 487 (D.C. Cir. 1982), *rev’d sub nom.* on other grounds *Baltimore Gas & Elec. Co.*, 462 U.S. at 106-07 (“agree[ing] with the Court of Appeals that NEPA requires an EIS to disclose the significant health, socioeconomic, and cumulative consequences of the environmental impact of a proposed action,” but finding that the specific “consequences of effluent releases” could be assessed at a subsequent stage in the particular proceeding under review).

⁴² <https://nca2018.globalchange.gov/chapter/4/>.

⁴³ <https://nca2018.globalchange.gov/chapter/22/> (also highlighting, for instance, climate effects to tourism and indigenous peoples—just a few more examples of the many key climate effects that the Supplemental EA never mentions).

only assessment “alone [is] not enough” and will fall short of NEPA’s requirements, especially since more quantitative “data [is] available to BLM.”⁴⁴

By monetizing climate damages using the social cost of greenhouse gas metrics, BLM can satisfy the legal obligations and statutory goals to assess the incremental and actual effects bearing on the public interest. The social cost of greenhouse gas methodology calculates how the emission of an additional unit of greenhouse gases affects atmospheric greenhouse concentrations, how that change in atmospheric concentrations changes temperature, and how that change in temperature incrementally contributes to the above list of economic damages, including property damages, energy demand effects, lost agricultural productivity, human mortality and morbidity, lost ecosystem services and non-market amenities, and so forth.⁴⁵ The social cost of greenhouse gas tool therefore captures the factors that actually affect public welfare and assesses the degree of impact to each factor, in ways that just estimating the volume of emissions cannot.

Climate Damages Depend on Stock and Flow, But Volume Estimates Only Measure Flow

The climate damage generated by each additional ton of greenhouse gas emissions depends on the background concentration of greenhouse gases in the global atmosphere. Once emitted, greenhouse gases can linger in the atmosphere for centuries, building up the concentration of radiative-forcing pollution and affecting the climate in cumulative, non-linear ways.⁴⁶ As physical and economic systems become increasingly stressed by climate change, each marginal additional ton of emissions has a greater, non-linear impact. The climate damages generated by a given amount of greenhouse pollution is therefore a function not just of the pollution’s total volume but also the year of emission, and with every passing year an additional ton of emissions inflicts greater damage.⁴⁷

As a result, focusing just on the volume or rate of emissions, as BLM does here,⁴⁸ is insufficient to reveal the incremental effect on the climate. The change in the rate of emissions (flow) must be assessed given the background concentration of emissions (stock). A percent comparison to national, regional, or sectoral emissions is perhaps even more misleading. For example, proposed action that adds 23 million additional tons per year of carbon dioxide would have contributed to 0.43% of total U.S. carbon dioxide emissions in the year 2012.⁴⁹ In the year 2014, that same proposed action with the same carbon pollution would have contributed to just 0.41% of total U.S. carbon dioxide emissions—a seemingly smaller relative effect, since the total amount of U.S. emissions increased from 2012 to 2014.⁵⁰ However, because of rising background concentrations of global greenhouse gas stock, and because of growing stresses in physical and economic systems, the marginal climate damages per ton of carbon dioxide (as measured by the social cost of carbon) increased from \$33 in 2012 to \$35 in 2014 (in 2007\$).⁵¹ Consequently, those 23 million additional tons would have caused marginal climate damages

⁴⁴ *WildEarth Guardians v. Zinke*, 2019 WL 1273181 at *16 (explaining that because quantitative data was available, a qualitative-only approach was “not enough” and BLM’s insistence that quantification would be “speculative and not helpful” is “not [a] reasonable” justification).

⁴⁵ 2010 TSD, *supra* note 35, at 5.

⁴⁶ Carbon dioxide also has cumulative effects on ocean acidification, in addition to cumulative radiative-forcing effects.

⁴⁷ See 2010 TSD, *supra* note 35, at 33 (explaining that the social cost of greenhouse gas estimates grow over time).

⁴⁸ Supplemental EA at 30-31.

⁴⁹ Total U.S. carbon dioxide emissions in 2012 were 5,366.7 million metric tons (for all greenhouse gases, emissions were 6,529 MMT CO₂ eq). See EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016* at ES-6, tbl. ES-2 (2018).

⁵⁰ Total U.S. carbon dioxide emissions in 2014 were 5,568.8 million metric tons (and for all greenhouse gases, 6,763 MMT CO₂ eq.) *Id.*

⁵¹ Interagency Working Group on the Social Cost of Greenhouse Gases, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis* at 25 tbl. A1 (2016) (calculating the central estimate at a 3% discount rate),

costing \$759 million in the year 2012, but by 2014 that same 23 million tons would have caused \$805 million in climate damages. To summarize: the percent comparison to national emissions misleadingly implied that a proposed action adding 23 million more tons of carbon dioxide would have a relatively less significant effect in 2014 than in 2012, whereas monetizing climate damages would accurately reveal that the emissions in 2014 were much more damaging than the emissions in 2012—almost \$50 million more.

Capturing how marginal climate damages change as the background concentration changes is especially important because NEPA requires assessing both present and future impacts.⁵² Different alternatives can have different greenhouse gas consequences over time. Most simply, different alternatives could have different start dates or other consequential changes in timing. BLM never considers an alternative that would delay leasing. For the reasons explained above, calculating volumes or percentages, especially on an average annual basis, is insufficient to accurately compare the climate damages of proposed alternatives with varying greenhouse gas emissions over time.

By factoring in projections of the increasing global stock of greenhouse gases as well as increasing stresses to physical and economic systems, the social cost of greenhouse gas metrics enable accurate and transparent comparisons of proposed actions with varying greenhouse gas emissions over time.

Monetization Provides the Required Informational Context that Volume Estimates Lack

NEPA requires sufficient informational context. Yet without proper context, numbers like a 0.52% increase in regional emissions from the proposed action⁵³ will be misinterpreted by people as meaningless, as zero. Indeed, in a country of over 300 million people and over 6.5 billion tons of annual greenhouse gas emissions, it is far too easy to make highly significant effects appear relatively trivial.⁵⁴ For example, presenting all weather-related deaths as less than 0.1% of total U.S. deaths makes the risk of death by weather event sound trivial, but in fact that figure represents over 2,000 premature deaths per year⁵⁵—hardly an insignificant figure.⁵⁶ As the U.S. Court of Appeals for the Fifth Circuit recently observed, even a seemingly “very small portion” of a “gargantuan source of [harmful] pollution” may nevertheless “constitute [] a gargantuan source of [harmful] pollution on its own terms.”⁵⁷ In other words, percentages can be misleading and can be manipulated by the choice of the denominator; what matters is the numerator’s actual contribution to total harm.

https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf [hereinafter 2016 TSD].

⁵² NEPA requires agencies to weigh the “relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity,” as well as “any irreversible and irretrievable commitments of resources.” 42 U.S.C. § 4332(2)(C).

⁵³ BLM, Finding of No Significant Impact: Environmental Assessment DOI-BLM-WY-0000-2019-0007-EA at 7 (Apr. 12, 2019).

⁵⁴ As California’s CEQA guidance explains, “A project’s incremental contribution may be cumulatively considerable even if it appears relatively small compared to statewide, national or global emissions.” http://resources.ca.gov/ceqa/docs/2018_CEQA_FINAL_TEXT_122818.pdf.

⁵⁵ Compare Nat’l Ctr. for Health Stat., Ctrs. for Disease Control & Prevention, *Death Attributed to Heat, Cold, and Other Weather Events in the United States, 2006-2010* at 1 (2014) (reporting about 2000 weather-related deaths per year) with Nat’l Ctr. for Health Stat., *Deaths and Mortality*, <https://www.cdc.gov/nchs/fastats/deaths.htm> (reporting about 2.7 million U.S. deaths per year total).

⁵⁶ The public willingness to pay to avoid mortality is typically estimated at around \$9.6 million (in 2016\$). E.g., 83 Fed. Reg. 12,086, 12,098 (Mar. 19, 2018) (U.S. Coast Guard rule using the Department of Transportation’s value of statistical life in a recent analysis of safety regulations). Losing 2,000 lives prematurely to weather-related events is equivalent to a loss of public welfare worth over \$19 billion per year.

⁵⁷ *Southwestern Elec. Power Co. v. EPA*, No. 15-60821, 2019 WL 1577740 at *22 (5th Cir., Apr. 12, 2019).

Economic theory explains why monetization is a much better tool than volume estimates or percent comparisons to provide the necessary contextual information on climate damages. For example, many decisionmakers and interested citizens would wrongly reduce down to zero the climate risks associated with a 0.52% of emissions,⁵⁸ simply due to the leading zero before the decimal in that percentage. As Professor Cass Sunstein has explained—drawing from the work of recent Nobel laureate economist Richard Thaler—a well-documented mental heuristic called “probability neglect” causes people to irrationally reduce small probability risks entirely down to zero.⁵⁹ People have significant “difficulty understanding a host of numerical concepts, especially risks and probabilities.”⁶⁰ Characterizing an annual contribution of nearly a million metric tons of carbon dioxide equivalent from oil and gas activity as just 0.52% of regional emissions misleadingly makes the climate impacts appear vanishingly small. By comparison, by applying the social cost of carbon dioxide (about \$52 per ton for year 2020 emissions in 2018\$⁶¹), decisionmakers and the public can readily comprehend that causing 797,495 tons of CO₂e in downstream emissions and 73,424 tons in direct emissions will generate over \$45 million per year in climate damages.⁶²

Similarly, many people will be unable to distinguish the significance of different emission quantities: for example, the significance of 797,495 tons of downstream emissions versus 73,424 tons in direct emissions.⁶³ As the Environmental Protection Agency’s website explains, “abstract measurements” of so many tons of greenhouse gases can be rather inscrutable for the public, unless “translat[ed] . . . into concrete terms you can understand.”⁶⁴ Abstract volume estimates fail to give people the required informational context due to another well-documented mental heuristic called “scope neglect.” Scope neglect, as explained by Nobel laureate Daniel Kahneman, among others, causes people to ignore the size of a problem when estimating the value of addressing the problem. For example, in one often-cited study, subjects were unable to meaningfully distinguish between the value of saving 2,000 migratory birds from drowning in uncovered oil ponds, as compared to saving 20,000 birds.⁶⁵

Scope neglect means many decisionmakers and members of the public would be unable to meaningfully distinguish between the climate risks of 797,495 versus 73,424 metric tons of CO₂e. While decisionmakers and the public certainly can discern that one number is higher, without any context it may be difficult to weigh the relative magnitude of the climate risks. In contrast, the different climate risks would have been readily discernible through application of the social cost of greenhouse gas metrics.

⁵⁸ FONSI at 7.

⁵⁹ Cass R. Sunstein, *Probability Neglect: Emotions, Worst Cases, and Law*, 112 Yale L. J. 61, 63, 72 (2002).

⁶⁰ Valerie Reyna & Charles Brainerd, *Numeracy, Ratio Bias, and Denominator Neglect in Judgments of Risk and Probability*, 18 Learning & Individual Differences 89 (2007).

⁶¹ \$52 is the Interagency Working Groups’ central estimate for year 2020 emissions, adjusted to 2018\$ using the CPI inflation calculator. See 2016 TSD, *supra* note 51. The social cost of carbon per ton rises for carbon pollution emitted after year 2020.

⁶² This calculation in no way accepts BLM’s quantification as accurate or complete. A higher estimate of downstream emissions, based on different and perhaps more reasonable assumptions and modeling, would produce a higher monetized damage figure. Also note that in a proper cost-benefit analysis, future costs and benefits would be discounted to present value.

⁶³ Supplemental EA at 30-31. Use of these numbers in no way accepts BLM’s calculations as accurate or complete.

⁶⁴ EPA, *Greenhouse Gas Equivalencies Calculator*. Available at <https://web.archive.org/web/20180212182940/https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (last updated Sept. 2017) (“Did you ever wonder what reducing carbon dioxide (CO₂) emissions by 1 million metric tons means in everyday terms? The greenhouse gas equivalencies calculator can help you understand just that, translating abstract measurements into concrete terms you can understand.”).

⁶⁵ Daniel Kahneman et al., *Economic Preferences or Attitude Expressions? An Analysis of Dollar Responses to Public Issues*, 19 J. Risk & Uncertainty 203, 212-213 (1999).

In general, non-monetized effects are often irrationally treated as worthless.⁶⁶ On several occasions, courts have struck down administrative decisions for failing to give weight to non-monetized effects.⁶⁷ Most relevantly, in *Center for Biological Diversity v. NHTSA*, the U.S. Court of Appeals for the Ninth Circuit found it arbitrary and capricious to give zero value “to the most significant benefit of more stringent [fuel economy] standards: reduction in carbon emissions.”⁶⁸ Monetizing climate damages provides the informational context required by NEPA, whereas a simple tally of emissions volume and rote, qualitative, generic description of climate change are misleading and fail to give the public and decisionmakers the required information about the magnitude of discrete climate effects.⁶⁹

Climate Effects Must Be Monetized If Other Costs and Benefits Are Monetized

Though NEPA does not always require a full and formal cost-benefit analysis,⁷⁰ agencies’ approaches to assessing costs and benefits must be balanced and reasonable. Courts have warned agencies, for example, that “[e]ven though NEPA does not require a cost-benefit analysis,” an agency cannot selectively monetize benefits in support of its decision while refusing to monetize the costs of its action.⁷¹

In *High Country Conservation Advocates v. Forest Service*, the U.S. District Court for the District of Colorado found that it was “arbitrary and capricious to quantify the *benefits* of the lease modifications and then explain that a similar analysis of the *costs* was impossible when such an analysis was in fact possible.”⁷² The court explained that, to support a decision on coal mining activity, the agencies had “weighed several specific economic benefits—coal recovered, payroll, associated purchases of supplies and services, and royalties,” but arbitrarily failed to monetized climate costs using the readily available social cost of carbon protocol.⁷³

In *WildEarth v. Zinke*, the U.S. District Court for the District of Columbia declined to apply the ruling of *High Country* to this case, distinguishing it by comparing the “billion dollars” of economic benefits calculated in *High Country* against what the court characterized as a “cursory” discussion of benefits in BLM’s EAs for these leases, such as calculating profits from the November 2015 sale of \$152,364.⁷⁴ To

⁶⁶ Richard Revesz, *Quantifying Regulatory Benefits*, 102 Cal. L. Rev. 1424, 1434-35, 1442 (2014).

⁶⁷ See *id.* at 1428, 1434.

⁶⁸ 538 F.3d at 1199.

⁶⁹ See 42 U.S.C. § 4332(2)(B) (requiring agencies to “identify and develop methods and procedures . . . which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations”).

⁷⁰ 40 C.F.R. § 1502.23 (“[T]he weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis.”); but see *e.g.*, *Sierra Club v. Sigler*, 695 F.2d 957, 978-79 (5th Cir. 1983) (holding that NEPA “mandates at least a broad, informal cost-benefit analysis,” and so agencies must “fully and accurately” and “objectively” assess environmental, economic, and technical costs); *Chelsea Neighborhood Ass’ns v. U.S. Postal Serv.*, 516 F.2d 378, 387 (2d Cir. 1975) (“NEPA, in effect, requires a broadly defined cost-benefit analysis of major federal activities.”); *Calvert Cliffs’ Coordinating Comm. v. U.S. Atomic Energy Comm’n*, 449 F.2d 1109, 1113 (D.C. Cir. 1971) (“NEPA mandates a rather finely tuned and ‘systematic’ balancing analysis” of “environmental costs” against “economic and technical benefits”); *Nat’l Wildlife Fed. v. Marsh*, 568 F. Supp. 985, 1000 (D.D.C. 1983) (“The cost-benefit analysis of NEPA is concerned primarily with environmental costs. . . . A court may examine the cost-benefit analysis only as it bears upon the function of insuring that the agency has examined the environmental consequences of a proposed project.”).

⁷¹ *High Country Conservation Advocates*, 52 F. Supp. 3d at 1191; accord. *MEIC v. Office of Surface Mining*, 274 F. Supp. 3d at 1094-99 (holding it was arbitrary for the agency to quantify benefits in an EIS while failing to use the social cost of carbon to quantify costs, as well as arbitrary to imply there would be no effects from greenhouse gas emissions).

⁷² 52 F. Supp. 3d at 1191.

⁷³ *Id.*

⁷⁴ 2019 WL 1273181, at *22.

start, it is not clear why the paltry size of the lease's economic benefits should excuse BLM from inconsistently treating costs and failing to apply a readily available and easy-to-use tool to monetize the lease's hugely significant climate costs. *High Country's* ruling turned not on the size of the monetized benefits but on the inconsistent treatment of costs and benefits. Furthermore, the court overlooked other portions of the original EAs and the tiered EISs that monetize and rely on larger economic benefits to much greater extent. As the Institute for Policy Integrity detailed in their amicus brief in that case:⁷⁵

[M]ultiple EAs monetize the minimum and expected rental revenue from the leases, down to the dollar. For example, the EA for the May 2015 lease sales recognizes that the value of the leases is at least \$73,702.00, and that rental revenue “would likely be much higher” and could be as much as \$3,399,142.00. AR3426; *see also*, e.g., AR18650–51 (calculating up to \$8,133,952.00 in potential rental revenue from leasing the November 2015 parcels). . . . On top of that rental income, BLM also touts valuable royalties and taxes, as well as more indirect benefits like “employment and purchasing opportunities.” AR3426; *see also* AR18651 (“The State of Wyoming, as well as many counties and communities within, rely on oil and gas development for part, if not the majority, of their economic base.”). For these benefits, various EAs incorporate by reference additional documents and tell readers to “[r]efer to the Final EISs for the Kemmerer, Pinedale, Rawlins, and Green River RMPs [Resource Management Plans] for additional socioeconomic analysis.” AR3426; *see also* AR18651. Wyoming belittles the EAs’ calculations of economic benefits as “one-paragraph discussions” that “merely note the mundane reality that lessees must bid for oil and gas leases.” Mem. Supp. Wyoming, Colorado, and Utah’s Cross Mot. Summ. J. (Wyo. Br.) 23. But in fact the EAs have incorporated by reference dozens of pages on the socioeconomic benefits of leasing. For example, the Kemmerer RMP concluded that, compared to an alternative that would emphasize environmental conservation and limit oil and gas development (Alternative B), BLM’s preferred alternative (Alternative D) would increase oil and gas earnings by about \$12 million per year, increase oil and gas output by about \$171 million per year, increase employment by several hundred jobs per year, increase federal mineral royalties by \$14.4 million per year, increase state severance taxes by \$6.9 million per year, and increase local ad valorem production taxes by \$7.3 million per year. Kemmerer Field Office, BLM, Proposed Res. Mgmt. Plan and Final Envtl. Impact Statement at 4-259–4-263 (2008).⁷⁶ More broadly, the Kemmerer RMP speaks glowingly of the economic value of oil and gas drilling, explaining that “activities on BLM-administered land and mineral estate contribute to the fiscal well-being of local government, as well as to state and federal governments,” and that the mining industry’s substantial contributions to “state and local tax revenues” may explain why “Wyoming has no personal or corporate income tax.” *Id.* at 3-175; *see generally id.* at 3-162–3-178 (describing all economic effects).⁷⁷ By incorporating the RMPs into its EAs, BLM is telling the public and decisionmakers that approving these oil and gas leases will contribute to

⁷⁵ Amicus Brief of Policy Integrity at 10-12, in 16-cv-01724 (D.D.C. filed Oct. 25, 2017), *available at* https://policyintegrity.org/documents/10.25.17_Wildearth_amicus_brief.pdf

⁷⁶ https://eplanning.blm.gov/epl-frontoffice/eplanning/docset_view.do?projectId=63198¤tPagelId=88596&documentId=77655.

⁷⁷ *See also*, e.g., Rawlins Field Office, BLM, Proposed Res. Mgmt. Plan and Final Envtl. Impact Statement at 4-195 (2008), (concluding that, compared to Alternative 3, which would have emphasized environmental protection, the preferred alternative would, from 2004 through 2023, increase total royalties and taxes from oil and gas leases by \$244,162,042).

these impressive estimates of earnings, employment, and state and federal revenues, with benefits monetized down to the dollar.

Thus, the court's attempts to distinguish *High Country* do not hold up; instead, following the original principles developed by *High Country*, BLM's Supplemental EA *must* monetize climate damages, because the original EAs and tiered EISs monetize and rely on the economic benefits of leasing. (The court also attempted to distinguish *High Country* by saying that "unlike" in *High Country*, here BLM "provided reasoned explanations for why it declined to use the social cost of carbon protocol."⁷⁸ The court, unfortunately, was mistaken. In *High Country*, the District of Colorado also considered and dismissed the post hoc attempt to argue that the social cost of carbon protocol was too imprecise or controversial to use because of the range of estimates. The court responded that "even if the agencies had argued that the protocol was controversial because . . . there is a wide range of estimates, . . . [nobody would] suggest the cost is as low as \$0 per unit. Yet by deciding not to quantify the costs at all, the agencies effectively zeroed out the costs in its quantitative analysis."⁷⁹ The same exact reasoning applies in this case to BLM's objections about the supposed "4,000%" range; the climate costs of the leasing program may have been somewhere "between \$18 and \$177 billion per year,"⁸⁰ but they were most decidedly *not* \$0, and it was BLM's responsibility to select the non-zero valuation that, in its professional judgment, it believed was most accurate.)

The court in *WildEarth v. Zinke* also never discussed other important case law. Notably, in *Montana Environmental Information Center v. Office of Surface Mining (MEIC v. OSM)*, the U.S. District Court for the District of Montana followed the lead set by *High Country* and likewise held an environmental assessment to be arbitrary and capricious because it quantified the benefits of action (such as employment payroll, tax revenue, and royalties) while failing to use the social cost of carbon to quantify the costs.⁸¹ The monetized benefits from *MEIC*—\$400,000 in payroll, \$23.8 million in taxes⁸²—are analogous to the scale of benefits monetized in the original EAs and tiered EISs for BLM's oil and gas leases under review in this Supplemental EA.

High Country and *MEIC v. OSM* were simply the latest applications of a broader line of case law in which courts find it arbitrary and capricious to apply inconsistent protocols for analyzing some effects compared to others, especially when the inconsistency obscures some of the most significant effects.⁸³ For example, in *Center for Biological Diversity v. National Highway Traffic Safety Administration*, the U.S. Court of Appeals for the Ninth Circuit ruled that, because the agency had monetized other uncertain costs and benefits of its vehicle fuel efficiency standard—like traffic congestion and noise costs—its "decision not to monetize the benefit of carbon emissions reduction was arbitrary and capricious."⁸⁴ Specifically, it was arbitrary to "assign [] no value to *the most significant benefit* of more stringent [vehicle fuel efficiency] standards: reduction in carbon emissions."⁸⁵ When an agency bases a decision

⁷⁸ 2019 WL 1273181, at *23.

⁷⁹ 52 F. Supp. 3d 1174, 1192 (D. Colo. 2014).

⁸⁰ 2019 WL 1273181, at *23.

⁸¹ 274 F. Supp. 3d at 1094-99 (also holding that it was arbitrary to imply that there would be zero effects from greenhouse gas emissions).

⁸² *Id.* at 1096.

⁸³ Other cases from different courts that have declined to rule against failures to use the social cost of carbon in NEPA analyses are all distinguishable by the scale of the action or by whether other effects were quantified and monetized in the analysis. See *League of Wilderness Defenders v. Connaughton*, No. 3:12-cv-02271-HZ (D. Ore., Dec. 9, 2014); *EarthReports v. FERC*, 15-1127, (D.C. Cir. July 15, 2016); *WildEarth Guardians v. Zinke*, 1:16-CV-00605-RJ, at 23-24, (D. N.M. Feb. 16, 2017).

⁸⁴ 538 F.3d 1172, 1203 (9th Cir. 2008).

⁸⁵ *Id.* at 1199.

on cost-benefit analysis, it is arbitrary to “put a thumb on the scale by undervaluing the benefits and overvaluing the costs.”⁸⁶ Similarly, the U.S. Court of Appeals for the District of Columbia Circuit has chastised agencies for “inconsistently and opportunistically fram[ing] the costs and benefits of the rule [and] fail[ing] adequately to quantify certain costs or to explain why those costs could not be quantified”⁸⁷; and the U.S. Court of Appeals for the Tenth Circuit has remanded an environmental impact statement because “unrealistic” assumptions “misleading[ly]” skewed comparison of the project’s positive and negative effects.⁸⁸

In the Supplemental EA, BLM argues that the economic benefits calculated in the original EAs and tiered EISs were not true benefits that could be weighed against costs in a formal cost-benefit analysis; rather, the various monetized effects on employment, royalties, taxes, and so forth were merely “economic impacts.”⁸⁹ There are several problems with this argument against using the social cost of carbon. First, in *MEIC v. OSM*, the District Court of the District of Montana dismissed this same argument as “a distinction without a difference.”⁹⁰ Second, despite BLM’s attempts to use terminology to distinguish the impacts it wants to monetize from those impacts it would prefer not to monetize, NEPA regulations group all these impacts under the same category of “effects”: economic and social impacts are listed as “effects” alongside ecological and health impacts, and all these effects must be discussed in as much detail as possible in an environmental impact statement.⁹¹ The demand to use the social cost of greenhouse gas metrics is not a request to subtract the leases’ monetized climate costs from the monetized economic benefits in a cost-benefit analysis; rather, it is a demand to use a readily available tool to better contextualize the leases’ climate costs, just as BLM has monetized certain economic impacts to contextualize the leases’ alleged upsides. It is arbitrary to apply inconsistent protocols for analysis of some effects compared to others, and to monetize some effects but not others that are equally monetizable. Third, BLM *has*, in fact, monetized more than just the “economic impacts” of the leases. The Supplemental EA suggests that true benefits would be “measured by the economic value of the proposed oil and gas development and production generally equaling the price of oil and gas minus the cost of producing, processing, and transporting the minerals.”⁹² The tiered EISs did exactly that. For example, in the Kemmerer RMP and FEIS, BLM calculated “output for oil and gas production,” where the “direct economic impact is the market value of output,” based on the market prices per barrel of oil and per thousand cubic feet of gas.⁹³ By tiering to such EISs, BLM incorporated into the original EAs for these leases a reliance on what BLM now acknowledges is a measure of a project’s economic benefits: output, as calculated by the volume of resources extracted multiplied by their market prices. BLM both inconsistently chose to monetize certain economic effects but not climate effects and also relied on monetized economic benefits while refusing to apply the social cost of greenhouse gases. These inconsistent approaches to positive versus negative effects are arbitrary.

⁸⁶ *Id.* at 1198.

⁸⁷ *Bus. Roundtable v. SCC*, 647 F.3d 1144, 1148-49 (D.C. Cir. 2011)

⁸⁸ *Johnston v. Davis*, 698 F.2d 1088, 1094–95 (10th Cir. 1983)

⁸⁹ Supplemental EA at 46.

⁹⁰ 274 F. Supp. 3d at 1097 n.9.

⁹¹ 40 C.F.R. §1508.8.

⁹² Supplemental EA at 46.

⁹³ https://archive.org/stream/proposedresource02unse_0/proposedresource02unse_0_djvu.txt.

III. The Social Cost of Greenhouse Gas Metric Is Appropriate for a Program with Emissions of this Magnitude

The Supplemental EA claims that “currently available information about GHGs and climate change does not permit an assessment of the relationship between specific project-scale GHG emissions and specific effects on climate change,” and that a global model of climate impacts could “not be sensitive to the comparatively small contribution of emissions from the proposed action.”⁹⁴ BLM is wrong.⁹⁵ The social cost of greenhouse gas protocol is exactly such a tool to monetize the incremental climate impacts of specific programs, projects, or plans, and its use is not limited to rulemakings.

Monetization Is Appropriate and Useful in Any Decision with Significant Climate Impacts, Not Just Regulations

Though the federal Interagency Working Group on the Social Cost of Greenhouse Gases originally developed its estimates of the social cost of greenhouse gases to harmonize the metrics used by agencies in their various regulatory impact analyses, there is nothing in the numbers’ development that would limit applications to other decisionmaking contexts. The social cost of greenhouse gases measures the marginal cost of any additional unit of greenhouse gases emitted into the atmosphere. The government action that precipitated that unit of emissions—a regulation, the granting of a permit, or a project approval—is irrelevant to the marginal climate damages caused by the emissions. Whether emitted by a leaking pipeline or the extraction process, whether emitted because of a regulation or a resource management decision, whether emitted in Alaska or Maine, the marginal climate damages per unit of emissions remain the same. Indeed, the social cost of greenhouse gases has been used by many federal and state agencies in environmental impact reviews⁹⁶ and in resource management decisions.⁹⁷

The Social Cost of Greenhouse Gas Metrics Provides a Tool to Assess the Significance of Individual Physical Impacts

The social cost of greenhouse gas methodology is well suited to measure the marginal climate damages of individual projects. These protocols were developed to assess the cost of actions with “marginal” impacts on cumulative global emissions, and the metrics estimate the dollar figure of damages for one extra unit of greenhouse gas emissions. This marginal cost is calculated using integrated assessment models. These models translate emissions into changes in atmospheric greenhouse concentrations, atmospheric concentrations into changes in temperature, and changes in temperature into economic damages. A range of plausible socio-economic and emissions trajectories are used to account for the scope of potential scenarios and circumstances that may actually result in the coming years and

⁹⁴ Supplemental EA at 30.

⁹⁵ *Compare*, Federal Energy Regulatory Comm’n, SMP Remand Order at P 48 (“On further review, we accept that the Social Cost of Carbon methodology does constitute a tool that can be used to estimate incremental physical climate change impacts.”).

⁹⁶ For example, in August 2017, the Bureau of Ocean Energy Management called the social cost of carbon “a useful measure to assess the benefits of CO₂ reductions and inform agency decisions,” and applied the metric in an environmental impact statement to monetize the emissions difference of about 5 million metric tons per year between the proposed oil and gas development project and the no-action baseline, *Draft Environmental Impact Statement—Liberty Development Project in the Beaufort Sea, Alaska* at 3-129, 4-50 (2017). More generally, agencies have used IWG’s social cost of greenhouse gas estimates not only in scores of rulemakings but also in NEPA analyses for resource management decisions. See Peter Howard & Jason Schwartz, *Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon*, 42 Columbia J. Envtl. L. 203, 270-84 (2017) (listing all uses by federal agencies through July 2016).

⁹⁷ States have used the social cost of greenhouse gases in decisions about electricity planning. See Iliana Paul et al., *The Social Cost of Greenhouse Gases and State Policy: A Frequently Asked Questions Guide* (Policy Integrity Report, 2017), http://policyintegrity.org/files/publications/SCC_State_Guidance.pdf.

decades. The marginal cost is attained by first running the models using a baseline emissions trajectory, and then running the same models again with one additional unit of emissions. The difference in damages between the two runs is the marginal cost of one additional unit. The approach assumes that the marginal damages from increased emissions will remain constant for small emissions increases relative to gross global emissions. In other words—and quite to the contrary of BLM’s insistence that a global model could not be “sensitive” to emissions of this magnitude—the monetization tools are in fact perfectly suited to measuring the marginal effects of individual projects or other discrete agency actions.

Some of the incremental impacts on the environment that the social cost of greenhouse gas protocol captures—and which the Supplemental EA fails to meaningfully analyze—include property lost or damaged; impacts to agriculture, forestry, and fisheries; impacts to human health; changes in fresh water availability; ecosystem service impacts; impacts to outdoor recreation and other non-market amenities; and some catastrophic impacts, including potentially rapid sea-level rise, damages at very high temperatures, or unknown events.⁹⁸ A key advantage of using the social cost of greenhouse gas tool is that each physical impact—such as sea-level rise and increasing temperatures—need not be assessed in isolation. Instead, the social cost of greenhouse gas tool conveniently groups together the multitude of climate impacts and, consistent with NEPA regulations,⁹⁹ enables agencies to assess whether all those impacts are cumulatively significant and to then compare those impacts with other impacts or alternatives using a common metric.

The Tons of Greenhouse Gas Emissions at Stake Here Are Clearly Significant

BLM quantifies that greenhouse gas emissions from the proposed leasing actions could reach over 850,000 metric tons per year.¹⁰⁰ But BLM refuses to take the straightforward next step of applying the social cost of greenhouse gas values to those quantified tons. Furthermore, BLM claims that “there are no current criteria or thresholds that determine a level of significance for social cost of carbon monetary values.”¹⁰¹ In making this claim, BLM implies that it cannot rely on its professional judgement to make a reasonable determination of significance, which is inconsistent with how BLM approaches other such determinations and with the practice of other federal agencies in making similar decisions.

⁹⁸ These impacts are all included to some degree in the three integrated assessment models (IAMs) used by the IWG (namely, the DICE, FUND, and PAGE models), though some impacts are modeled incompletely, and many other important damage categories are currently omitted from these IAMs. *Compare* Interagency Working Group on the Social Cost of Carbon, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis* at 6-8, 29-33 (2010), <https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf> [hereinafter 2010 TSD]; with Peter Howard, *Omitted Damages: What’s Missing from the Social Cost of Carbon* (Cost of Carbon Project Report, 2014), http://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf. For other lists of actual climate effects, including air quality mortality, extreme temperature mortality, lost labor productivity, harmful algal blooms, spread of west nile virus, damage to roads and other infrastructure, effects on urban drainage, damage to coastal property, electricity demand and supply effects, water supply and quality effects, inland flooding, lost winter recreation, effects on agriculture and fish, lost ecosystem services from coral reefs, and wildfires, see EPA, *Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (2017); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment* (2017); EPA, *Climate Change in the United States: Benefits of Global Action* (2015); Union of Concerned Scientists, *Underwater: Rising Seas, Chronic Floods, and the Implications for U.S. Coastal Real Estate* (2018).

⁹⁹ 40 C.F.R. § 1508.27(b)(7) (explaining that actions can be significant if related to individually insignificant but cumulatively significant impacts).

¹⁰⁰ Supplemental EA at 30-31. Reference to this number does not endorse BLM’s quantifications as accurate; rather, this section merely demonstrates that even under BLM’s estimates, the quantified tons of emissions are of sufficient magnitude to apply the social cost of greenhouse gas metrics and to weigh the significance.

¹⁰¹ *Id.* at 46.

While there may not be a bright-line test for significance, the emissions BLM estimates for this program are clearly significant and warrant monetization. This is especially true since, once emissions have been quantified, the additional step of monetization through application of the Interagency Working Group's 2016 estimates entails a simple arithmetic calculation.¹⁰² It is difficult to understand how NEPA's mandate that an agency take a "hard look" at the environmental impacts of its actions can be satisfied if BLM fails to analyze the impacts of the greenhouse gas emissions that it quantifies.

In *High Country*, the District Court for the District of Colorado found that it was arbitrary for the Forest Service not to monetize the "1.23 million tons of carbon dioxide equivalent emissions [from methane] the West Elk mine emits annually."¹⁰³ That suggests a threshold for monetization roughly on par with what BLM estimates here. In *MEIC v. OSM*, the District Court for the District of Montana found it was arbitrary for the Office of Surface Mining not to monetize the 23.16 million metric tons, which constituted "approximately 0.35 percent of the total U.S. emissions"¹⁰⁴; here, BLM calculate a similar percentage (0.52%) of regional emissions.¹⁰⁵ In *Center for Biological Diversity*, the Ninth Circuit found that it was arbitrary for the Department of Transportation not to monetize the 35 million metric ton difference in lifetime emissions from increasing the fuel efficiency of motor vehicles:¹⁰⁶ given the estimated lifetime of vehicles sold in the years 2008-2011 (sometimes estimated at about 15 years on average), this could represent as little 2 million metric tons per year. In a recent environmental impact statement from the Bureau of Ocean Energy Management published in August 2017, the agency explained that the social cost of carbon was "a useful measure" to apply to a NEPA analysis of an action anticipated to have a difference in greenhouse gas emissions compared to the no-action baseline of about 25 million metric tons over a 5-year period,¹⁰⁷ or about 5 million metric tons per year. BLM's estimates of emissions from proposed leasing action are comparable to the emissions from other projects and cases where monetization of emissions has been found useful or legally required.

Under any reasonable application of the social cost of greenhouse gas metrics, the upstream and downstream emissions from fossil fuel development from the leases under review will cause tens of millions of dollars in climate damages per year. Tellingly, BLM had no problem concluding in its EAs that it was appropriate to monetize, for example, \$152,364 in lease sale profits.¹⁰⁸ A potential climate cost of tens of millions of dollars per year is also clearly significant, particularly in the context of a document the very purpose of which is to evaluate a proposed action's *environmental* impacts.¹⁰⁹

Finally, while BLM claims that there are no criteria to determine the significance of climate damages once they are monetized,¹¹⁰ BLM routinely evaluates the relative importance of monetized benefits, weighing them against qualitative impacts. For example, in a recent DEIS for oil and gas drilling in the arctic, BLM explained that a "drop in oil prices in late 2014 resulted in a *significant* decline in State

¹⁰² Agencies simply need to multiply their estimate of tons in each year by the IWG's 2016 values for the corresponding year of emissions (adjusted for inflation to current dollars). If the emissions change occurs in the future, agencies would then discount the products back to present value.

¹⁰³ 52 F. Supp. 3d at 1191 (quoting an e-mail comment on the draft statement for the quantification of tons).

¹⁰⁴ *MEIC v. Office of Surface Mining* at 36-37.

¹⁰⁵ FONSI at 7.

¹⁰⁶ 538 F.3d at 1187.

¹⁰⁷ BOEM, *Liberty Development and Production Plan Draft EIS* at 3-129, 4,50 (2017) (89,940,000 minus 64,570,000 is about 25 million).

¹⁰⁸ *WildEarth v. Zinke*, at 48 (citing AR18651).

¹⁰⁹ See California CEQ guidance ("economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment.").

¹¹⁰ Supplemental EA at 46.

government revenues”¹¹¹; the DEIS reported that the portion of capital and operating costs to be paid to Alaskan companies would be “significant”¹¹²; and the DEIS weighs monetized values like income and revenue against qualitative impacts like noise in determining the “overall” and “lasting effects” on subsistence uses and resources.¹¹³ Translating over 850,000 metric tons per year of operational and downstream emissions into over \$45 million per year in climate damages certainly would have contextualized the impact, making it more accessible to the public and decisionmakers, and aiding BLM’s significance determination. It is arbitrary for BLM to ascribe significance to certain monetized values and yet claim it is impossible to determine the significance of monetized climate damages. Moreover, BLM cites no “criteria or thresholds” for how it made a determination on significance in the Supplemental EA based on only volumetric estimates of tons of emissions and comparisons to regional and sectoral emissions inventories; apparently, the agency applied its judgment to quantitative figures, just as BLM should monetize the proposed leasing action’s climate damages and then apply its judgment to weigh the significance of tens of millions of dollars in real-world climate damages.

IV. BLM Should Use the Interagency Working Group’s 2016 Estimates of the Social Cost of Carbon and the Social Cost of Methane

In 2016, the Interagency Working Group on the Social Cost of Greenhouse Gases published updated central estimates for the social cost of greenhouse gases: \$50 per ton of carbon dioxide, \$1440 per ton of methane, and \$18,000 per ton of nitrous oxide (in 2017 dollars for year 2020 emissions).¹¹⁴ Agencies must continue to use estimates of a similar or higher¹¹⁵ value in their analyses and decisionmaking. A recent Executive Order disbanding the IWG does not change the fact that the IWG estimates still reflect the best available data and methodologies.

Most importantly, the fact that there is a range of reasonable estimates of the social cost of greenhouse gases and some uncertainty does not permit BLM “to simply throw up its hands and ascribe any effort at quantification to ‘a crystal ball inquiry.’”¹¹⁶ Rather, BLM must select a reasonable “range” of estimates and then explain any uncertainty.¹¹⁷

IWG’s Methodology Is Rigorous, Transparent, and Based on Best Available Data

Beginning in 2009, the IWG assembled experts from a dozen federal agencies and White House offices to “estimate the monetized damages associated with an incremental increase in carbon emissions in a given year” based on “a defensible set of input assumptions that are grounded in the existing scientific

¹¹¹ Bureau of Land Mgmt., Coastal Plain Oil and Gas Leasing Program Draft EIS at 3-230 (Dec. 2018) (emphasis added), available at <https://www.blm.gov/programs/planning-and-nepa/plans-in-development/alaska/coastal-plain-eis>.

¹¹² *Id.* at 2-233.

¹¹³ *Id.* at 3-169, 3-170, 3-174 (citing Section 3.4.10 for income effects to Kaktovik), 3-175, 3-236 (monetizing tax revenue to the NSB government).

¹¹⁴ U.S. Interagency Working Group on the Social Cost of Greenhouse Gases, “Technical support document: Technical update of the social cost of carbon for regulatory impact analysis under executive order 12866 & Addendum: Application of the methodology to estimate the social cost of methane and the social cost of nitrous oxide” (2016), available at <https://obamawhitehouse.archives.gov/omb/oira/social-cost-of-carbon>.

¹¹⁵ See, e.g., Richard L. Revesz et al., Global Warming: Improve Economic Models of Climate Change, 508 NATURE 173 (2014) (explaining that current estimates omit key damage categories and, therefore, are very likely underestimates).

¹¹⁶ *WildEarth Guardians v. Zinke*, 2019 WL 1273181 at *22.

¹¹⁷ *Id.* The court, unfortunately, was inconsistent and incorrect in suggesting that it must defer to BLM’s insistence that a range of calculated climate impacts of \$18 billion to \$177 billion was too large a range to be helpful. *Id.* *23. Rather, following the court’s own instructions, BLM should not have been permitted to throw up its hands. The cost was at least \$18 billion, and was certainly not \$0. BLM needed to make a reasoned determination about social costs.

and economic literature.”¹¹⁸ IWG’s methods combined three frequently used models built to predict the economic costs of the physical impacts of each additional ton of carbon.¹¹⁹ The models together incorporate such damage categories as: agricultural and forestry impacts, coastal impacts due to sea level rise, impacts from extreme weather events, impacts to vulnerable market sectors, human health impacts including malaria and pollution, outdoor recreation impacts and other non-market amenities, impacts to human settlements and ecosystems, and some catastrophic impacts.¹²⁰ IWG ran these models using a baseline scenario including inputs and assumptions drawn from the peer-reviewed literature, and then ran the models again with an additional unit of carbon emissions to determine the increased economic damages.¹²¹ IWG’s social cost of carbon estimates were first issued in 2010 and have been updated several times to reflect the latest and best scientific and economic data.¹²²

Following the development of estimates for carbon dioxide, the same basic methodology was used in 2016 to develop the social cost of methane and social cost of nitrous oxide—estimates that captures the distinct heating potential of methane and nitrous oxide emissions.¹²³ These additional metrics used the same economic models, the same treatment of uncertainty, and the same methodological assumptions that IWG applied to the social cost of carbon, and these new estimates underwent rigorous peer-review.¹²⁴

IWG’s methodology has been repeatedly endorsed by reviewers. In 2014, the U.S. Government Accountability Office concluded that IWG had followed a “consensus-based” approach, relied on peer-reviewed academic literature, disclosed relevant limitations, and adequately planned to incorporate new information through public comments and updated research.¹²⁵ In 2016 and 2017, the National Academies of Sciences issued two reports that, while recommending future improvements to the methodology, supported the continued use of the existing IWG estimates.¹²⁶ And in 2016, the U.S. Court of Appeals for the Seventh Circuit held that the Department of Energy’s reliance on IWG’s social cost of carbon was reasonable.¹²⁷ It is, therefore, unsurprising that leading economists and climate policy experts have endorsed the Working Group’s values as the best available estimates.¹²⁸

¹¹⁸ IWG, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (2010) (“2010 TSD”). Available at <https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf>.

¹¹⁹ *Id.* at 5. These models are DICE (the Dynamic Integrated Model of Climate and the Economy), FUND (the Climate Framework for Uncertainty, Negotiation, and Distribution), and PAGE (Policy Analysis of the Greenhouse Effect).

¹²⁰ *Id.* at 6-8.

¹²¹ *Id.* at 24-25.

¹²² IWG, *Technical Update of the Social Cost of Carbon* at 5–29 (2016). Available at https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf.

¹²³ See 2016 IWG Addendum at 2.

¹²⁴ *Id.* at 3.

¹²⁵ Gov’t Accountability Office, *Regulatory Impact Analysis: Development of Social Cost of Carbon Estimates* 12-19 (2014). Available at <http://www.gao.gov/assets/670/665016.pdf>.

¹²⁶ Nat’l Acad. Sci., Engineering & Med., *Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide* 3 (2017), <https://www.nap.edu/read/24651/chapter/1>; Nat’l Acad. Sci., Engineering & Med., *Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update* 1–2 (2016); <https://www.nap.edu/read/21898/chapter/1>.

¹²⁷ *Zero Zone*, 832 F.3d at 679.

¹²⁸ See, e.g., Richard Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 Science 655 (2017); Michael Greenstone et al., *Developing a Social Cost of Carbon for U.S. Regulatory Analysis: A Methodology and Interpretation*, 7 Rev. Envtl. Econ. & Pol’y 23, 42 (2013); Richard L. Revesz et al., *Global Warming: Improve Economic Models of Climate Change*, 508 Nature 173 (2014) (co-authored with Nobel Laureate Kenneth Arrow, among others).

BLM previously asserted that the “range” of estimates for the social cost of carbon is too wide to be useful.¹²⁹ Not only was this line of thinking rejected by the Ninth Circuit in *Center for Biological Diversity*—“while . . . there is a range of values, the value of carbon emissions reduction is certainly not zero”¹³⁰—but the range of values recommended by the Interagency Working Group¹³¹ and endorsed by the National Academies of Sciences¹³² is rather manageable. In 2016, the IWG recommended values at discount rates from 2.5% to 5%, calculated as between \$12 and \$62 for year 2020 emissions.¹³³ Numerous federal agencies have had no difficulty either applying this range in their environmental impact statements or else focusing on the central estimate at a 3% discount rate.¹³⁴ Most recently, in August 2017, the Bureau of Ocean Energy Management applied the IWG’s range of estimates calculated at three discount rates (2.5%, 3%, and 5%) to its environmental impact statement for an offshore oil development plan,¹³⁵ and called this range of estimates “a useful measure to assess the benefits of CO₂ reductions and inform agency decisions.”¹³⁶

Uncertainty Supports Higher Social Cost of Greenhouse Gas Estimates, and Is Never a Reason to Abandon the Metric

BLM has complained that the range of social cost of carbon estimates is too large and uncertain to be helpful. In fact, it would be much more misleading to not monetize climate damages at all and so risk treating them as worthless. More generally, uncertainty is *not* a reason to abandon the social cost of greenhouse gas methodologies;¹³⁷ quite the contrary, uncertainty supports higher estimates of the social cost of greenhouse gases, because most uncertainties regarding climate change entail tipping points, catastrophic risks, and unknown unknowns about the damages of climate change. Because the key uncertainties of climate change include the risk of irreversible catastrophes, applying an options value framework to the regulatory context strengthens the case for ambitious regulatory action to reduce greenhouse gas emissions.

There are numerous well-established, rigorous analytical tools available to help agencies characterize and quantitatively assess uncertainty, such as Monte Carlo simulations, and the IWG’s social cost of greenhouse gas protocol incorporates those tools. To further deal with uncertainty, the IWG recommended to agencies a range of four estimates: three central or mean-average estimates at a 2.5%, 3%, and 5% discount rate respectively, and a 95th percentile value at the 3% discount rate. While the IWG’s technical support documents disclosed fuller probabilities distributions, these four estimates

¹²⁹ *WildEarth* at 48-49.

¹³⁰ 538 F.3d at 1200.

¹³¹ See Interagency Working Group on the Social Cost of Greenhouse Gases, *Technical Update* (2016) (hereinafter 2016 TSD).

¹³² See National Academies of Sciences, *Assessment of Approaches to Updating the Social Cost of Carbon* (2016) (hereinafter First NAS Report) (endorsing continued near-term use of the IWG numbers; in 2017, the NAS recommended moving to a declining discount rate, see National Academies of Sciences, *Valuing Climate Damages* (2017) (hereinafter Second NAS Report).

¹³³ 2016 TSD. The values given here are in 2007\$. The IWG also recommended a 95th percentile value of \$123.

¹³⁴ BLM, *Envtl. Assessment—Waste Prevention, Prod. Subject to Royalties, and Res. Conservation* at 52 (2016); BLM, *Final Env'tl. Assessment: Little Willow Creek Protective Oil and Gas Lease*, DOI-BLM-ID-B010-2014-0036-EA, at 82 (2015); Office of Surface Mining, *Final Env'tl. Impact Statement—Four Corners Power Plant and Navajo Mine Energy Project* at 4.2-26 to 4.2-27 (2015) (explaining the social cost of greenhouse gases “provide[s] further context and enhance[s] the discussion of climate change impacts in the NEPA analysis.”); U.S. Army Corps of Engineers, *Draft Env'tl. Impact Statement for the Missouri River Recovery Mgmt. Project* at 3-335 (2016); U.S. Forest Serv., *Rulemaking for Colorado Roadless Areas: Supplemental Final Env'tl. Impact Statement* at 120-123 (Nov. 2016) (using both the social cost of carbon and social cost of methane relating to coal leases); NHTSA EIS, *Available at* http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/FINAL_EIS.pdf at 9-77.

¹³⁵ BOEM, *Liberty Development Project: Draft Environmental Impact Statement*, at 4-247 (2017).

¹³⁶ *Id.* at 3-129.

¹³⁷ *Center for Biological Diversity v. NHTSA*, 538 F.3d 1172, 1200 (9th Cir. 2008) (“[W]hile the record shows that there is a range of values, the value of carbon emissions reductions is certainly not zero.”).

were chosen by agencies to be the focus for decisionmaking. In particular, application of the 95th percentile value was not part of an effort to show the probability distribution around the 3% discount rate; rather, the 95th percentile value serves as a methodological shortcut to approximate the uncertainties around low-probability but high-damage, catastrophic, or irreversible outcomes that are currently omitted or undercounted in the economic models.

The shape of the distribution of climate risks and damages includes a long tail of lower-probability, high-damage, irreversible outcomes due to “tipping points” in planetary systems, inter-sectoral interactions, and other deep uncertainties. Climate damages are not normally distributed around a central estimate, but rather feature a significant right skew toward catastrophic outcomes. In fact, a 2015 survey of economic experts concludes that catastrophic outcomes are increasingly likely to occur.¹³⁸ Because the three integrated assessment models that the IWG’s methodology relied on are unable to systematically account for these potential catastrophic outcomes, a 95th percentile value was selected instead to account for such uncertainty. There are no similarly systematic biases pointing in the other direction which might warrant giving weight to a low-percentile estimate.

Additionally, the 95th percentile value addresses the strong possibility of widespread risk aversion with respect to climate change. The integrated assessment models do not reflect that individuals likely have a higher willingness to pay to reduce low-probability, high-impact damages than they do to reduce the likelihood of higher-probability but lower impact damages with the same expected cost. Beyond individual members of society, governments also have reasons to exercise some degree of risk aversion to irreversible outcomes like climate change.

The National Academies of Sciences did recommend that the IWG document its full treatment of uncertainty in an appendix and disclose low-probability as well as high-probability estimates of the social cost of greenhouse gases.¹³⁹ However, that does not mean it would be appropriate for individual agencies to rely on low-percentile estimates to justify decisions. While disclosing low-percentile estimates as a sensitivity analysis may promote transparency, relying on such an estimate for decisionmaking—in the face of contrary guidance from the best available science and economics on uncertainty and risk—would not be a “credible, objective, realistic, and scientifically balanced” approach to uncertainty, as required by Circular A-4.¹⁴⁰

In short, the 95th percentile estimate attempts to capture risk aversion and uncertainties around lower-probability, high-damage, irreversible outcomes that are currently omitted or undercounted by the models. There is no need to balance out this estimate with a low-percentile value, because the reverse assumptions are not reasonable:

¹³⁸ Policy Integrity, *Expert Consensus on the Economics of Climate Change 2* (2015), available at <http://policyintegrity.org/files/publications/ExpertConsensusReport.pdf> [hereinafter *Expert Consensus*] (“Experts believe that there is greater than a 20% likelihood that this same climate scenario would lead to a ‘catastrophic’ economic impact (defined as a global GDP loss of 25% or more).”). See also Robert Pindyck, *The Social Cost of Carbon Revisited* (National Bureau of Economic Research, No. w22807, 2016).

¹³⁹ Nat’l Acad. Of Sci., *Assessment of Approaches to Updating the Social Cost of Carbon* 49 (2016) (“[T]he IWG could identify a high percentile (e.g., 90th, 95th) and corresponding low percentile (e.g., 10th, 5th) of the SCC frequency distributions on each graph.”).

¹⁴⁰ Circular A-4 at 39.

- There is no reason to believe the public or the government will be systematically risk seeking with respect to climate change.¹⁴¹
- The consequences of overestimating the risk of climate damages (i.e., spending more than we need to on mitigation and adaptation) are not nearly as irreversible as the consequences of underestimating the risk of climate damage (i.e., failing to prevent catastrophic outcomes).
- Though some uncertainties might point in the direction of lower social cost of greenhouse gas values, such as those related to the development of breakthrough adaptation technologies, the models already account for such uncertainties around adaptation; on balance, most uncertainties strongly point toward higher, not lower, social cost of greenhouse gas estimates.¹⁴²
- There is no empirical basis for any “long tail” of potential benefits that would counteract the potential for extreme harm associated with climate change.

Moreover, even the best existing estimates of the social cost of greenhouse gases are likely underestimated because the models currently omit many significant categories of damages—such as depressed economic growth, pests, pathogens, erosion, air pollution, fire, dwindling energy supply, health costs, political conflict, and ocean acidification, as well as tipping points, catastrophic risks, and unknown unknowns—and because of other methodological choices.¹⁴³

Consequently, uncertainty suggests an even higher social cost of greenhouse gases and so is not a reason to abandon the metric, which would misleadingly suggest that climate damages are worthless.

A Recent Executive Order Does Not Change the Requirements to Monetize Climate Damages

In March 2017, President Trump disbanded the IWG and withdrew their technical support documents.¹⁴⁴ Nevertheless, Executive Order 13,783 assumes that federal agencies will continue to “monetiz[e] the value of changes in greenhouse gas emissions” and instructs agencies to ensure such estimates are “consistent with the guidance contained in OMB Circular A-4.”¹⁴⁵ Consequently, while federal agencies no longer benefit from ongoing technical support from the IWG on use of the social cost of greenhouse gases, by no means does the new Executive Order imply that agencies should not monetize important effects in their environmental impact statements. The Executive Order does not prohibit agencies from relying on the same choice of models as the IWG, the same inputs and assumptions as the IWG, the same statistical methodologies as the IWG, or the same ultimate values as derived by the IWG. To the

¹⁴¹ As a 2009 survey revealed, the vast majority of economic experts support the idea that “uncertainty associated with the environmental and economic effects of greenhouse gas emissions increases the value of emission controls, assuming some level of risk-aversion.” See *Expert Consensus*, *supra* note 138, at 3 (citing 2009 survey).

¹⁴² See Richard L. Revesz et al., *Global Warming: Improve Economic Models of Climate Change*, 508 *NATURE* 173 (2014). R. Tol, *The Social Cost of Carbon*, 3 *Annual Rev. Res. Econ.* 419 (2011) (“[U]ndesirable surprises seem more likely than desirable surprises. Although it is relatively easy to imagine a disaster scenario for climate change—for example, involving massive sea level rise or monsoon failure that could even lead to mass migration and violent conflict—it is not at all easy to imagine that climate change will be a huge boost to human welfare.”).

¹⁴³ See Revesz et al., *Global Warming: Improve Economic Models of Climate Change*, *supra* note 142; Peter Howard, *Omitted Damages: What’s Missing from the Social Cost of Carbon* (Cost of Carbon Project Report, 2014); Frances C. Moore & Delavane B. Diaz, *Temperature Impacts on Economic Growth Warrant Stringent Mitigation Policy*, 5 *NATURE CLIMATE CHANGE* 127 (2015) (demonstrating SCC may be biased downward by more than a factor of six by failing to include the climate’s effect on economic growth).

¹⁴⁴ Exec. Order No. 13,783 § 5(b), 82 *Fed. Reg.* 16,093 (Mar. 28, 2017).

¹⁴⁵ *Id.* § 5(c).

contrary, because the Executive Order requires consistency with Circular A-4, as agencies follow the Circular's standards for using the best available data and methodologies, they will necessarily choose similar data, methodologies, and estimates as the IWG, since the IWG's work continues to represent the best available estimates.¹⁴⁶ The Executive Order does not preclude agencies from using the same range of estimates as developed by the IWG, so long as the agency explains that the data and methodology that produced those estimates are consistent with Circular A-4 and, more broadly, with standards for rational decisionmaking.

Similarly, the Executive Order's withdrawal of the Council on Environmental Quality's guidance on greenhouse gases,¹⁴⁷ does not—and legally cannot—remove agencies' statutory requirement to fully disclose the environmental impacts of greenhouse gas emissions. As the Council on Environmental Quality explained in its withdrawal, the "guidance was not a regulation," and "[t]he withdrawal of the guidance does not change any law, regulation, or other legally binding requirement."¹⁴⁸ In other words, when the guidance originally recommended the appropriate use of the social cost of greenhouse gases in environmental impact statements,¹⁴⁹ it was simply explaining that the social cost of greenhouse gases is consistent with longstanding NEPA regulations and case law, all of which are still in effect today.

Notably, some agencies under the Trump administration have continued to use the IWG estimates even following the Executive Order. For example, in August 2017, the Bureau of Ocean Energy Management called the social cost of carbon "a useful measure" and applied it to analyze the consequences of offshore oil and gas drilling.¹⁵⁰ And in July 2017, the Department of Energy used the IWG's estimates for carbon and methane emissions to analyze energy efficiency regulation, describing the social cost of methane as having "undergone multiple stages of peer review."¹⁵¹

Two agencies have developed new "interim" values of the social cost of greenhouse gases following the Executive Order. Relying on faulty economic theory, these "interim" estimates drop the social cost of carbon from \$50 per ton in year 2020 down to as little as \$1 per ton, and drop the social cost of methane from \$1420 per ton in year 2020 down to \$58. These "interim" estimates are inconsistent with accepted science and economics; the IWG's 2016 estimates remain the best available estimates. The IWG's methodology and estimates have been repeatedly endorsed by reviewers as transparent, consensus-based, and firmly grounded in the academic literature. By contrast, the "interim" estimates ignore the interconnected, global nature of our climate-vulnerable economy, and obscure the devastating effects that climate change will have on younger and future generations. BLM should not use the "interim" social cost of greenhouse gas estimates because of their methodological flaws, as described more fully in the attached comments which we have previously submitted to BLM on its misleading use of the unsupported "interim" values.

¹⁴⁶ See Richard L. Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 SCIENCE 6352 (2017) (explaining that, even after Trump's Executive Order, the social cost of greenhouse gas estimate of around \$50 per ton of carbon dioxide is still the best estimate).

¹⁴⁷ Exec. Order 13,783 § 3(c)

¹⁴⁸ 82 Fed. Reg. 16,576, 16,576 (Apr. 5, 2017).

¹⁴⁹ See CEQ, *Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* at 16 (Dec. 2014), available at https://obamawhitehouse.archives.gov/sites/default/files/docs/nepa_revised_draft_ghg_guidance_searchable.pdf ("[A]lthough developed specifically for regulatory impact analyses, the Federal social cost of carbon, which multiple Federal agencies have developed and used to assess the costs and benefits of alternatives in rulemakings, offers a harmonized, interagency metric that can provide decisionmakers and the public with some context for meaningful NEPA review.").

¹⁵⁰ *Draft Environmental Impact Statement—Liberty Development Project in the Beaufort Sea, Alaska* at 3-129.

¹⁵¹ Energy Conservation Program: Energy Conservation Standards for Walk-In Cooler and Freezer Refrigeration Systems, 82 Fed. Reg. 31,808, 31,811, 31,857 (July 10, 2017).

Sincerely,

Denise Grab, Western Regional Director, Institute for Policy Integrity, NYU School of Law*
Jayni Hein, Policy Director, Institute for Policy Integrity, NYU School of Law*
Anne Hedges, Deputy Director, Montana Environmental Information Center
Peter H. Howard, Ph.D., Economic Director, Institute for Policy Integrity, NYU School of Law*
Chase Huntley, Energy & Climate Change Program Director, The Wilderness Society
Rose K. Monahan, Associate Attorney, Sierra Club
Iliana Paul, Policy Analyst, Institute for Policy Integrity, NYU School of Law*
Richard L. Revesz, Director, Institute for Policy Integrity, NYU School of Law*
Jason A. Schwartz, Legal Director, Institute for Policy Integrity, NYU School of Law*

For any questions regarding these comments, please contact:

Jason A. Schwartz, Legal Director, Institute for Policy Integrity
139 MacDougal Street, 3rd Floor, New York, NY 10012
jason.schwartz@nyu.edu

*No part of this document purports to present New York University School of Law's views, if any.

Attachments:

Amicus Brief of the Institute for Policy Integrity in *WildEarth Guardians v. Zinke*, No. 16-1724 (D.D.C. Mar. 19, 2019).

Joint Comments to BLM on the Failure to Appropriately Value the Social Cost of Methane in the Rescission or Revision of Certain Requirements for Waste Prevention and Resource Conservation