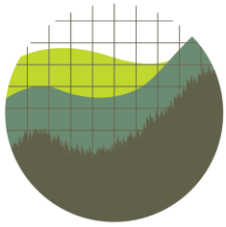

Institute *for*
Policy Integrity
NEW YORK UNIVERSITY SCHOOL OF LAW

December 13, 2021

To: Bureau of Ocean Energy Management

Subject: Comments on the Revised Draft Environmental Impact Statement for the Proposed Cook Inlet Lease Sale 258 (BOEM 2020-063)

The Institute for Policy Integrity at New York University School of Law ("Policy Integrity")[1] respectfully submits these comments on the Bureau of Ocean Energy Management's ("BOEM") Revised Draft Environmental Impact Statement for the Proposed Cook Inlet Lease Sale 258 ("DEIS").[2] Policy Integrity is a nonpartisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy. Policy Integrity has produced scholarship and regularly comments on BOEM analysis of oil and gas leasing.

In the DEIS, BOEM proposes to lease, for purposes of oil and gas development, over one million acres of offshore land in the Cook Inlet area of the Alaska Outer Continental Shelf.[3] To account for the climate impacts of this proposed lease sale, BOEM takes the important step of monetizing greenhouse gas emissions using the social cost of greenhouse gases. BOEM estimates that the proposed action will result in approximately $1.39 billion dollars in climate damages, using the Interagency Working Group's valuations at a 3% discount rate.[4] BOEM does not, however, appear to accord any significance to these enormous costs. The DEIS does not weigh these costs against whatever economic benefits the proposed lease might entail, which the agency does not quantify, and does not otherwise discuss how it considered these costs, or explain how the proposed action is justified in light of them.

BOEM's analysis is deficient in other respects as well. Important costs like health effects from local pollution similarly are not monetized, and the DEIS completely overlooks the substantial option value of delaying leasing at this time. BOEM also continues to rest its projection of the proposal's greenhouse gas emissions on MarketSim, a flawed economic model that for numerous reasons underestimates those emissions.

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[1] This document does not purport to present the views, if any, of New York University School of Law.
[2] BUREAU OF OCEAN ENERGY MGMT., REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR COOK INLET LEASE SALE 258 (BOEM 2020-063) (Oct. 2021) [hereinafter DEIS].
[3] *Id.* at 1.
[4] *Id.* at 51 tbls.4-14 & 4-15.

These comments therefore begin by commending BOEM for applying the social cost of greenhouse gases to estimate the climate damages expected to result from the proposed action, and then offer the following recommendations for how BOEM can improve its analysis:

- BOEM should fully integrate climate impacts into its decisionmaking and not move forward with the lease sale unless it determines that the sale's benefits justify its substantial climate costs.

- BOEM should monetize the impacts of "local" pollutants and, to the extent feasible, other effects such as impacts to wildlife and commercial fishing.

- BOEM should consider the option value of delaying leasing given various uncertainties including the economic benefits of the proposed lease sale and the accuracy of the agency's cost estimates.

- BOEM should reconsider its analytical reliance on MarketSim—which likely overestimates emissions in the no action alternative and relies on inputs that are arbitrary and insufficiently justified. Regardless of the economic model BOEM uses, the agency should apply its substitution analysis to the proposal's economic benefits and not only its environmental harms.

I. BOEM Appropriately Applies the Social Cost of Greenhouse Gases in the Draft Environmental Impact Statement

Although the social cost of greenhouse gases was originally developed for regulatory impact analyses,[5] it is useful in any decisionmaking context that involves greenhouse gas emissions.[6] It is particularly useful to understand the social benefits of reducing or avoiding emissions.[7] In the case of project or program assessments under NEPA, the social cost of greenhouse gases gives agencies an easy-to-understand value in the common metric of money to weigh against other monetized impacts.[8]

Accordingly, although BOEM should have more rigorously and rationally integrated its monetized climate damage totals into its decisionmaking assessment,[9] its application of the social cost of greenhouse gases here is warranted and overdue. BOEM should consider providing

[5] INTERAGENCY WORKING GROUP ON THE SOCIAL COST OF CARBON, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 (Feb. 2010) [hereinafter 2010 TSD].
[6] *See, e.g.*, JAYNI FOLEY HEIN, INST. FOR POL'Y INTEGRITY, A NEW WAY FORWARD ON CLIMATE CHANGE AND ENERGY DEVELOPMENT FOR PUBLIC LANDS AND WATERS (2020), https://perma.cc/W4E5-MA2M; Inst. Pol'y Integrity, Comments on Notice of Intention to Conduct a Review of the Federal Coal Leasing Program (Oct. 5, 2021), https://perma.cc/A2FT-58WN; Inst. Pol'y Integrity, Comments on Programmatic Review of Federal Oil and Gas Leasing Program (Apr. 15, 2021), https://perma.cc/BF8B-DLGM.
[7] MAX SARINSKY ET AL., INST. FOR POL'Y INTEGRITY, BROADENING THE USE OF THE SOCIAL COST OF GREENHOUSE GASES IN FEDERAL POLICY 2–3 (2021), https://perma.cc/GE47-TT2C.
[8] *Id.* at 4–11.
[9] *See* Section II, *infra*.

further analysis using lower discount rates, consistent with the recommendation by the federal Interagency Working Group on the Social Cost of Greenhouse Gases ("Working Group"), and should update its analysis when the Working Group updates its social cost valuations to reflect the latest scientific and economic data.

A. Applying the Social Cost of Greenhouse Gases Allows BOEM to Fulfill Its Obligations Under NEPA

The social cost of greenhouse gases is not only an appropriate tool for assessing climate impacts under NEPA—it also provides the necessary information and context that allow BOEM to fulfill its legal obligations. 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," holding that agencies must "consider and disclose the *actual environmental effects*" of a proposed project in a way that "brings those effects to bear on [the agency's] decisions."[10]

Greenhouse gas emissions do not, on their own, constitute such effects. Rather, the actual effects are the incremental climate impacts caused by those emissions, including property lost or damaged by sea-level rise, coastal storms, flooding, and other extreme weather events, and human health impacts including mortality from heat-related illnesses and changing disease vectors like malaria and dengue fever.[11] When agencies provide only volumetric estimates of emissions, they are failing to meet their obligations under NEPA.[12] By applying the social cost of greenhouse gases, BOEM can consider the "actual environmental impacts" of a proposed action because the social cost metric translates the physical harms from climate change into damage valuations that reflect the actual economic and public-health harms from incrementally more severe climate damages.

B. BOEM Uses Appropriate Values to Assess Climate Impacts, But Should Consider Further Analysis Using Lower Discount Rates

BOEM not only takes the important step of monetizing greenhouse gas emissions, but also uses the best available estimates to value climate damages in the DEIS.[13] The social cost of

[10] Baltimore Gas & Elec. Co. v. Nat. Res. Def. Council, 462 U.S. 87, 96 (1983) (emphasis added).
[11] For a more complete discussion 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* ENV'T PROT. AGENCY, MULTI-MODEL FRAMEWORK FOR QUANTITATIVE SECTORAL IMPACTS ANALYSIS: A TECHNICAL REPORT FOR THE FOURTH NATIONAL CLIMATE ASSESSMENT (2017); U.S. GLOBAL CHANGE RSCH. PROGRAM, CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT (2017); ENV'T PROT. AGENCY, 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).
[12] *See, e.g.*, Inst. Pol'y Integrity, Comments on Failure to Monetize Greenhouse Gas Emissions or Consider Option Value in the Supplemental Environmental Impact Analysis for Greenhouse Gas Emissions Related to Oil and Gas Leasing in Utah at 8–10 (Oct. 27, 2020), https://perma.cc/5CUV-R3KA.
[13] *See* DEIS, *supra* note 2, at 48–51.

greenhouse gases developed by the Working Group are still the best available estimates of the damages caused by one additional unit of carbon dioxide, methane, or nitrous oxide emissions.[14]

The Working Group was originally convened in 2009 and released the first social cost of carbon values in 2010.[15] Between 2010 and 2016, the Working Group reconvened multiple times to refine its methodology and update the social cost values.[16] In 2016, in addition to publishing updated estimates for the social cost of carbon, the Working Group also published estimates for two other common greenhouse gases: methane and nitrous oxide.[17] Although it was disbanded by the Trump administration in 2017, President Biden reconvened the Working Group on his first day in office.[18] In February 2021, the Working Group released interim estimates that are based on its widely used 2016 estimates, only adjusted for inflation to 2020 dollars.[19] BOEM, in turn, further adjusts these estimates in the DEIS to 2022 dollars based on the assumed start date of the proposed action, and extrapolates for years after 2050 (the final year for which the Working Group provides an estimate) using the metric's growth rate during the years 2045–2050.[20] BOEM's use of, and adjustments to, the Working Group's robust social cost of greenhouse gas estimates in the DEIS are appropriate.

BOEM is also correct to apply social cost figures that reflect global climate damages in the DEIS.[21] As the Working Group has recognized, the global valuation of climate damages is appropriate because the U.S. government and its citizens have extraterritorial interests and because a global estimate is a useful proxy for the "spillover" effects of climate change that will affect U.S. interests and assets.[22] Furthermore, there is not yet a reliable methodology for calculating domestic-only climate damages, and existing methodologies are widely acknowledged to substantially underestimate U.S. damages from climate change because they disregard spillover and reciprocity effects.[23]

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[14] *See, e.g.*, ILIANA PAUL & MAX SARINSKY, INST. FOR POL'Y INTEGRITY, PLAYING WITH FIRE: RESPONDING TO CRITICISM OF THE SOCIAL COST OF GREENHOUSE GASES (2021), https://perma.cc/VC7P-2AU5 (citing Richard Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 SCI. 655 (2017)); Michael Greenstone et al., *Developing a Social Cost of Carbon for U.S. Regulatory Analysis: A Methodology and Interpretation*, 7 REV. ENV'T 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 Prize winner Kenneth Arrow).

[15] 2010 TSD, *supra* note 5.

[16] *See* INTERAGENCY WORKING GRP. ON THE SOC. COST OF GREENHOUSE GASES, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON, METHANE, AND NITROUS OXIDE – INTERIM ESTIMATES UNDER EXECUTIVE ORDER 13990 (Feb. 2021) [hereinafter 2021 TSD].

[17] INTERAGENCY WORKING GRP. ON THE SOC. COST OF GREENHOUSE GASES, ADDENDUM TO TECHNICAL SUPPORT DOCUMENT ON SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866: APPLICATION OF THE METHODOLOGY TO ESTIMATE THE SOCIAL COST OF METHANE AND THE SOCIAL COST OF NITROUS OXIDE 2–3 (2016), https://perma.cc/Z2UK-ZRSX.

[18] Exec. Order No. 13,990, 86 Fed. Reg. 7037 (Jan. 20, 2021).

[19] 2021 TSD, *supra* note 16.

[20] DEIS, *supra* note 2, at 50.

[21] *See id.* at 42, 50.

[22] 2021 TSD, *supra* note 16, at 14–16; *see also* JASON A. SCHWARTZ, INST. FOR POL'Y INTEGRITY, STRATEGICALLY ESTIMATING CLIMATE POLLUTION COSTS IN A GLOBAL ENVIRONMENT (2021), https://perma.cc/TCA9-G7PA; PAUL & SARINSKY, *supra* note 14, at 5–6.

[23] SCHWARTZ, *supra* note 22, at 27–28.

BOEM also uses a reasonable range of discount rates in the DEIS,[24] although it should consider including lower discount rates as it refines its analysis. The Working Group developed a range of four estimates, three of which are based on discount rates of 2.5%, 3%, and 5%, and the fourth of which is derived from the 95th percentile of the 3% distribution and is meant to capture higher-than-expected impacts.[25] The 3% discount rate was used for the so-called "central" estimate of the social cost of greenhouse gases and was used to approximate the consumption discount rate,[26] which economists agree is the appropriate perspective from which to discount climate damages.[27] Economists also widely agree that the Working Group appropriately excluded a 7% discount rate based on the opportunity cost of capital.[28]

As the Working Group noted in its most recent technical support document, however, recent evidence supports the usage of lower discount rates for climate impacts. For one, the Working Group recognized that recent evidence indicates that the true consumption discount rate is likely below 3%, perhaps substantially.[29] The Working Group also recognized that the intergenerational nature of the climate problem further counsels for the use of lower discount rates.[30] In light of this extensive evidence, the Working Group acknowledged that its current social cost valuations "likely underestimate societal damages from [greenhouse gas] emissions"[31] and recommended that agencies "conduct[] additional sensitivity analysis using discount rates below 2.5%."[32]

The Working Group is currently evaluating the discount rate (among other issues) as it performs a full assessment of its social cost valuations to reflect the latest scientific and economic research—a task that it has been ordered to complete by January 2022.[33] The fact that the Working Group's recommended values are likely to change in the coming months—potentially with lower discount rates that reveal higher valuations of climate impacts—suggests that the interim values applied by BOEM in the DEIS likely underestimate the true climate impacts of the considered alternatives.

Accordingly, BOEM should explore using a lower range of discount rates, including 1% and 2%. The New York Department of Environmental Conservation developed social cost of greenhouse gases estimates in late 2020 that were otherwise identical to the Working Group's methodology

[24] *See* DEIS, *supra* note 2, at 51 tbls. 4-14 & 4-15.
[25] 2010 TSD, *supra* note 5, at 1.
[26] *Id.* at 17.
[27] PETER HOWARD & DEREK SYLVAN, INST. FOR POL'Y INTEGRITY, EXPERT ELICITATION AND THE SOCIAL COST OF GREENHOUSE GASES 32 (2021), https://perma.cc/MRM9-9B4J.
[28] PETER HOWARD & JASON SCHWARTZ, INST. FOR POL'Y INTEGRITY, ABOUT TIME: RECALIBRATING THE DISCOUNT RATE FOR THE SOCIAL COST OF GREENHOUSE GASES 4–5 (2021), https://perma.cc/NM6K-M7WS.
[29] 2021 TSD, *supra* note 16, at 19–21 ("The average rate of return on inflation adjusted 10-year Treasury Securities over the last 30 years (1991-2020) is 2.0 percent. These rates are not without historic precedent, such that over the last 60 years the inflation adjusted 10-year Treasury Securities is 2.3 percent. Current real rates of returns below 2 percent are expected to persist.").
[30] *Id.* at 21 ("[A] consideration of discount rates below 3 percent, including 2 percent and lower, are [sic] warranted when discounting intergenerational impacts.").
[31] *Id.* at 4.
[32] *Id.* at 21.
[33] Exec. Order No. 13,990 § 5(b)(ii)(B), 86 Fed. Reg. 7037, 7040 (Jan. 25, 2021).

but used discount rates of 1% and 2%,[34] which BOEM could incorporate consistent with the Working Group's current recommendations until the Working Group releases updated social cost values next year.

BOEM should also recognize that the social cost estimates it uses in the DEIS represent lower-bound estimates.[35] Beyond the discounting issues discussed above, the models used by the Working Group to calculate the social cost of greenhouse gases omit many significant adverse consequences of climate change.[36] And while some potentially beneficial effects of climate change are omitted too, there is wide consensus that the excluded harms greatly outweigh the excluded benefits.[37] This further supports BOEM using lower discount rates as points of comparison going forward.

In sum, until the Working Group publishes new estimates, BOEM should continue to use the February 2021 interim estimates and consider including additional analysis applying lower discount rates as well.

C. BOEM Should Use the Interagency Working Group's Updated Estimates When They Become Available

Under the Obama administration, the Working Group sought feedback from the National Academies of Sciences, Engineering, and Medicine ("National Academies"), leading to the National Academies releasing two reports, in 2016 and 2017, detailing how the Working Group could improve its methodology.[38] Because the Working Group was disbanded by the Trump administration, it was not able to conduct regular updates of the social cost values between 2017 and 2020. As noted above, however, President Biden reconvened the Working Group in early 2021 and tasked it with developing long-awaited updates by January 2022.[39] These updated estimates are expected to reflect recommendations made by the National Academies, and

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[34] N.Y. DEP'T OF ENV'T CONSERVATION, ESTABLISHING A VALUE OF CARBON: GUIDELINES FOR USE BY STATE AGENCIES 16–18 (2020). Pursuant to DEC's estimates, at a discount rate of 2%, social cost valuations for year 2020 emissions equal $125 per ton of carbon dioxide, $2,782 per ton of methane, and $44,727 per ton of nitrous oxide. *Id.* at 3; *see also* N.Y. DEP'T OF ENV'T CONSERVATION & RES. FOR THE FUTURE, ESTIMATING THE VALUE OF CARBON: TWO APPROACHES (2020) (explaining considerations and methodology).

[35] *See* Revesz et al., *Global Warming*, *supra* note 14, at 174 ("[B]ecause the models [used to estimate the social cost of carbon] omit some major risks associated with climate change, such as social unrest and disruptions to economic growth, they are probably understating future harms.").

[36] *See* PETER HOWARD, INST. FOR POL'Y INTEGRITY, OMITTED DAMAGES: WHAT'S MISSING FROM THE SOCIAL COST OF CARBON 6 (2014), https://perma.cc/K2SD-8VUU [hereinafter OMITTED DAMAGES]; *see also* PAUL & SARINSKY, *supra* note 14, at 10–12 (discussing how the Working Group's estimates account for positive impacts of climate change). For more on what effects are currently included in the Working Group's estimates, *see* INST. FOR POL'Y INTEGRITY, A LOWER BOUND: WHY THE SOCIAL COST OF CARBON DOES NOT CAPTURE CRITICAL CLIMATE DAMAGES AND WHAT THAT MEANS FOR POLICYMAKERS 5 (2019), https://perma.cc/5VU8-4S5C; *Climate Impacts Reflected in the SCC Estimates*, COST OF CARBON PROJECT, https://costofcarbon.org/scc-climate-impacts (last visited Dec. 10, 2021).

[37] *See* PAUL & SARINSKY, *supra* note 14, at 10–12.

[38] NAT'L ACAD. SCIS., ENG'G & MED., VALUING CLIMATE DAMAGES: UPDATING ESTIMATION OF THE SOCIAL COST OF CARBON DIOXIDE 3 (2017), https://perma.cc/TT87-25PU [hereinafter NAT'L ACAD. VALUING CLIMATE DAMAGES]; NAT'L ACAD. SCIS., ENG'G & MED., ASSESSMENT OF APPROACHES TO UPDATING THE SOCIAL COST OF CARBON: PHASE 1 REPORT ON A NEAR-TERM UPDATE 1–2 (2016), https://perma.cc/TJM6-XE65.

[39] Exec. Order 13,990 § 5(b)(ii)(B).

potentially other methodological revisions to incorporate more recent developments in the science and economics of climate change.[40] Because these new estimates will build upon the Working Group's robust approach and incorporate important input from experts and the public,[41] BOEM should apply these figures in NEPA assessments once they are released.

In sum, though BOEM takes the important step of using the best available estimates to monetize climate impacts in the DEIS, and should continue to do so in any future NEPA assessments involving greenhouse gas emissions, it should go further by incorporating this vital information into its decision of whether (and, if so, in what form) to approve the lease sale. The following section explains how BOEM can improve its decisionmaking process to take climate damages into account.

II. BOEM Should Fully Integrate Climate Impacts into Its Decisionmaking, and Should Not Move Forward with the Lease Sale Unless It Determines that the Sale's Benefits Justify Its Substantial Climate Costs

Though monetizing the potential climate impacts of this leasing decision is a critical step, this alone is insufficient to satisfy the demands of rational decisionmaking. NEPA's "hard look" requirement obligates agencies to "consider and disclose the actual environmental effects" of a proposed project *and then* "bring[] those effects to bear on [the agency's] decisions."[42] This means that agencies must not only present the relative magnitude and severity of effects, which the social cost metric provides. They must also weigh those adverse impacts against the beneficial impacts of the project and consider whether (and, if the agency so determines, explain why) the project is justified given those adverse impacts.

The most rational way for BOEM to contextualize the proposed lease sale's monetized climate impacts and incorporate them into a public interest assessment is to balance those effects against other monetized project impacts in a sort of cost-benefit analysis. The economic benefits of the proposed lease sale are particularly well-suited to monetization and thus can be compared to monetized climate impacts and other adverse environmental effects.

Courts have long recognized that carefully balancing costs and benefits facilitates rational decisionmaking and is appropriate under NEPA.[43] As courts have recognized, "NEPA mandates a rather finely tuned and systematic balancing analysis" of "environmental costs" against

[40] 2021 TSD, *supra* note 16, at 11–13.
[41] The Office of Management and Budget held a public comment period on behalf of the Working Group. *See* Notice of Availability and Request for Comment on "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990," 86 Fed. Reg. 24,669 (May 7, 2021).
[42] *See Baltimore Gas & Elec.*, 462 U.S. at 96.
[43] Calvert Cliffs' Coordinating Comm., Inc. v. U.S. Atomic Energy Comm'n, 449 F.2d 1109, 1113 (D.C. Cir. 1971) (noting that "NEPA mandates a rather finely tuned and systematic balancing analysis" of "environmental costs" against "economic and technical benefits"); Chelsea Neighborhood Ass'ns v. U.S. Postal Serv., 516 F.2d 378, 386 (2d Cir. 1975) ("NEPA, in effect, requires a broadly defined cost-benefit analysis of major federal activities."); Sierra Club v. Sigler, 695 F.2d 957, 978–79 (5th Cir. 1983) (stating 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).

"economic and technical benefits."[44] While NEPA does not require a full and formal cost-benefit analysis, it does "mandate[] at least a broad, informal cost-benefit analysis," and so agencies must "fully and accurately" and "objectively" assess environmental, economic, and technical costs.[45]

Here, BOEM has failed to meet its obligations under NEPA. Despite monetizing the substantial climate damages expected to result from the proposed lease sale, the agency offers no comparison of these costs to the supposed economic benefits of the proposal, and provides no explanation regarding how and to what extent, if at all, these costs factored into BOEM's decision to move forward with the lease sale.

A. BOEM Estimates that the Proposed Lease Sale Will Generate Substantial Costs Due to Climate Damage from Greenhouse Gas Emissions

The climate costs of the proposed lease sale are substantial. Using the 3% central discount rate, BOEM estimates that the proposed lease sale will result in approximately $1.39 billion more in climate damages than the no action alternative.[46] Regarding domestic production and consumption, BOEM estimates that the net emissions projected under the proposed lease sale will result in social costs of $110 million relative to the no action alternative.[47] With respect to emissions from foreign oil consumption, BOEM estimates that the proposed lease sale will result in social costs of $1.28 billion relative to the no action alternative.[48]

For at least two reasons, these incremental climate costs likely underestimate the proposed lease sale's actual costs. First, as noted above, recent evidence suggests that the true consumption discount rate may be substantially below 3%.[49] Use of a lower discount rate would reveal greater climate costs stemming from the proposed lease sale. Second, for reasons later discussed in greater detail, BOEM is likely overestimating the level of substitution (and therefore minimizing the benefits of not leasing) in the no action scenario due to several continuing errors in MarketSim.[50]

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[44] *Calvert Cliffs'*, 449 F.2d at 1113 (internal quotation marks omitted); *see also, e.g.*, *Chelsea Neighborhood Ass'ns*, 516 F.2d at 386 ("NEPA, in effect, requires a broadly defined cost-benefit analysis of major federal activities."); Cape May Greene, Inc. v. Warren, 698 F.2d 179, 188 (3d Cir. 1983) ("In short, the National Environmental Policy Act requires a balancing between environmental costs and economic and technical benefits."); Hughes River Watershed Conservancy v. Glickman, 81 F.3d 437, 446 (4th Cir. 1996) ("NEPA requires agencies to balance a project's economic benefits against its adverse environmental effects.").

[45] *Sierra Club v. Sigler*, 695 F.2d at 978–79 (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); *see also Chelsea Neighborhood Ass'ns*, 516 F.2d at 386 ("NEPA, in effect, requires a broadly defined cost-benefit analysis of major federal activities.").

[46] *See* DEIS, *supra* note 2, at 51 tbls.4-14 & 4-15.

[47] *See id.* at 51 tbl.4-14.

[48] *See id.* at 51 tbl.4-15.

[49] 2021 TSD, *supra* note 16, at 19–21 ("The average rate of return on inflation adjusted 10-year Treasury Securities over the last 30 years (1991-2020) is 2.0 percent. These rates are not without historic precedent, such that over the last 60 years the inflation adjusted 10-year Treasury Securities is 2.3 percent. Current real rates of returns below 2 percent are expected to persist.").

[50] *See* Section IV.A, *infra*.

Notably, climate costs are only a subset of the total incremental costs of the proposed lease sale. As discussed in greater detail in Section III, *infra*, other monetizable impacts such as health effects from local pollution contribute to the net social and environmental costs of the proposed lease sale. BOEM does not explain in the DEIS why these costs were not monetized. Further, BOEM's analysis does not account for the option value of delaying the proposed lease sale, and the cost of foregoing that benefit.[51] Here, option value is particularly strong given the myriad current uncertainties regarding the costs and benefits of the proposed lease sale.

B. BOEM Should Compare the Monetized Climate Impacts (and Other Costs) to the Economic Benefits of the Proposed Lease Sale

BOEM states that it monetized the impacts from greenhouse gas emissions in the proposed action and no action scenarios to provide "a useful measure of the benefits of GHG emissions reductions to inform agency decision-making."[52] However, the DEIS contains no discussion *whatsoever* regarding how the estimated climate costs factor into BOEM's proposed leasing decision, and makes no attempt to explain how the agency's proposed action is consistent with or justified given the associated climate costs.[53] Rational decisionmaking requires more than merely calculating climate impacts for calculation's sake. BOEM must integrate these cost impacts into its decisionmaking in a rational, articulable way that ultimately explains how proceeding with the lease sale is justified in light of these substantial (and likely underestimated) costs.[54]

One rational way for BOEM to properly consider the substantial climate costs of the proposed action would be to monetize the benefits of the proposed lease sale (net of the production costs) and then compare those benefits to the monetized climate damages and other key impacts.[55] Agencies frequently include in their NEPA reviews of resource management decisions both quantitative and monetized analyses of the economic benefits of the decision.[56] In the context of a proposed offshore lease sale, this benefit would be captured by the economic value of oil and gas production.[57] The Economic Analysis Methodology for BOEM's current five-year offshore leasing program explains in detail how the agency calculates the dollar value of the incremental

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[51] BOEM's failure to consider option value is discussed at greater length in Section III.B, *infra*.
[52] DEIS, *supra* note 2, at 49.
[53] *See id.* at 42–53; *see also id.* at 130 (stating in Section 4.16 merely that, under the no action alternative, "[p]otential economic benefits including direct and indirect wage earnings, taxes, and royalties collected by the [State of Alaska] and the federal government would not occur"); *id.* at 29 ("[A]nalysis of the No Action Alternative for all resources is presented in Section 4.16.").
[54] *Baltimore Gas & Elec.*, 462 U.S. at 96 (holding that agencies must "bring[] [the actual environmental effects of a proposed project] to bear on [the agency's] decisions").
[55] As discussed in Section III, *infra*, BOEM should monetize several other key social and environmental costs of the proposal that are currently not monetized in the DEIS.
[56] *See, e.g.*, U.S. BUREAU OF LAND MGMT., MONETA DIVIDE NATURAL GAS AND OIL DEVELOPMENT PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT 4-277 to 4-289 (Feb. 2020); U.S. BUREAU OF LAND MGMT., FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE WRIGHT AREA COAL LEASE APPLICATIONS at ES-60-61, 4-130-50 (July 2010); U.S. FOREST SERV., PAWNEE NATIONAL GRASSLAND OIL AND GAS LEASING FINAL ENVIRONMENTAL IMPACT STATEMENT 317, at 291–98 (Dec. 2014); U.S. FOREST SERV., FEDERAL COAL LEASE MODIFICATIONS COC-1362 & COC-67232, at 190–91 (Aug. 2012).
[57] *See, e.g.*, U.S. DEP'T OF THE INTERIOR, BUREAU OF OCEAN ENERGY MGMT., DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE LIBERTY DEVELOPMENT AND PRODUCTION PLAN IN THE BEAUFORT SEA 4-242 to 4-244 (Aug. 2017).

benefits associated with a lease sale.[58] BOEM could also monetize the private production cost by consulting available information on industry trends, like it did when assessing the costs of its most recent five-year plan.[59]

Yet BOEM declines to monetize the economic benefits of the proposed lease sale, and offers no explanation for this decision. BOEM states that it "seeks to quantify certain impacts related to employment numbers and labor income."[60] But the agency does not monetize these effects.[61] Neither does BOEM monetize federal or state revenues from rents, royalties, taxes, or other streams generated by the proposed lease sale and associated production.[62] Indeed, BOEM explicitly states that its "overall analysis for [the proposed lease sale] does not monetize most of the major costs and benefits and does not include all revenue streams from the proposed lease sale."[63] Nowhere does BOEM explain its decision not to monetize the supposed "major benefits" of the proposed lease sale.

Although the DEIS does not calculate the proposed lease sale's incremental net economic value, it is likely that BOEM could readily generate that information. If BOEM has enough information to assess projected greenhouse gas emissions, it probably has enough information to estimate economic output from fossil fuel development. Volumetric estimates of recoverable oil or gas can be used to calculate the market value—or economic benefit[64]—of extracting oil or gas through simple multiplication using publicly available data on fossil fuel prices.

BOEM's unexplained decision not to calculate the proposed action's benefits leaves the agency without economic projections against which the proposed action's monetized climate costs can be fairly compared. This self-imposed barrier to balancing costs and benefits is itself inconsistent with the agency's NEPA's obligations.[65]

A recent example illustrates how comparing monetized benefits with climate costs can effectuate rational decisionmaking and environmental protection pursuant to NEPA's aims. In a 2018 assessment, the Office of Surface Mining, Reclamation, and Enforcement declined to apply the social cost of greenhouse gases for a proposed coal mine expansion and deemed the project's emissions insignificant upon a cursory examination—even though, as current valuations of the social cost of greenhouse gases would have revealed, the project's annual emissions contribute

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[58] *See* U.S. DEP'T OF THE INTERIOR, BUREAU OF OCEAN ENERGY MGMT., ECONOMIC ANALYSIS METHODOLOGY FOR THE 2017–2022 OUTER CONTINENTAL SHELF OIL AND GAS LEASING PROGRAM 1-3, 1-12 to 1-17 (2016) [hereinafter BOEM ECONOMIC ANALYSIS METHODOLOGY].

[59] *See id.* at 1-12 ("Aggregate costs of equipment, labor, transportation, etc. are then subtracted from aggregate revenues.").

[60] DEIS, *supra* note 2, at 49.

[61] *Id.* at 114–18.

[62] *Id.*

[63] *Id.* at 49.

[64] *See* OFF. OF MGMT. & BUDGET, CIRCULAR A-4: REGULATORY ANALYSIS 21 (2003) [hereinafter CIRCULAR A-4] ("Economists ordinarily consider market prices as the most accurate measure of the marginal value of goods and services to society.").

[65] *See Cape May Greene*, 698 F.2d at 188 ("In short, the National Environmental Policy Act requires a balancing between environmental costs and economic and technical benefits."); *Hughes River Watershed Conservancy*, 81 F.3d at 446 ("NEPA requires agencies to balance a project's economic benefits against its adverse environmental effects.").

roughly $9 billion in climate harm.[66] This figure significantly exceeds the projected economic benefits of the mine expansion of less than $3 billion annually.[67] Monetizing and then comparing key impacts would have made clear that the agency should not have proceeded with this harmful project.

In short, the monetized climate-damage estimates that BOEM presents in the DEIS should serve as a basis for balancing the proposed action's environmental costs against its economic benefits. BOEM should monetize the foreseeable economic benefits, weigh the benefits and costs, and then factor that comparison into its decisionmaking. Importantly, while climate damages are certainly a major consideration, BOEM should also include other monetizable impacts in its analysis, as discussed in the next section.

III. BOEM Should Monetize and Consider Other Important Impacts

A. BOEM Should Monetize the Impacts of "Local" Pollutants and Other Currently Unmonetized Social and Environmental Costs

Though BOEM properly monetizes the climate impacts of greenhouse gas emissions, the agency devotes less analytical attention to the impacts of non-greenhouse gas pollution. As the DEIS recognizes, the proposed action will lead to an increase in local concentrations of nitrogen oxide, carbon monoxide, particulate matter, sulfur oxide, and volatile organic compounds.[68] These local pollutants have measurable and substantial impacts on human health and life. For example, particulate matter and nitrous oxides can cause very serious adverse health effects on nearby populations, including asthma, heart disease, and death.[69] BOEM merely quantifies the projected increase in amount for each local pollutant, estimating, for instance, that the proposed action will result in nearly 1,000 additional short tons of particulate matter and more than 51,000 additional short tons of nitrogen oxide.[70] The impacts caused by these increases, however, can and should be monetized.

Monetizing the impacts of this local pollution would be relatively straightforward, as reliable valuations already exist and are in use by other agencies.[71] BOEM can look to these valuations or other estimates in the literature and then apply them to the volumetric pollution increase

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[66] DEP'T OF THE INTERIOR, OFF. OF SURFACE MINING, RECLAMATION & ENFORCEMENT, BULL MOUNTAINS MINE NO. 1 FEDERAL MINING PLAN MODIFICATION ENVIRONMENTAL ASSESSMENT D-2 (2018). This project was expected to result in the release of approximately 190 million tons of greenhouse gases, *id.* at 56, which equals about 172.36 million metric tons. Using the central social cost of carbon estimate of $51 per metric ton emitted in the year 2020, this amounts to $8.79 billion in climate harm for 2020 emissions. *See* 2021 TSD, *supra* note 16, at 5 tbl.ES-1.

[67] While OSM did not directly report the total value of extracted coal, it did estimate that the mine expansion will result in 86.8 million tons of coal per year that will sell for $32.50 per ton. OSM, *supra* note 66, at 18, G-6. Multiplying 86.8 million by $32.50 equals $2.821 billion—less than one-third of the annual climate damage cost.

[68] DEIS, *supra* note 2, at 37–38.

[69] *See* JEFFREY SHRADER ET AL., INST. FOR POL'Y INTEGRITY, VALUING POLLUTION REDUCTIONS: HOW TO MONETIZE GREENHOUSE GAS AND LOCAL AIR POLLUTANT REDUCTIONS FROM DISTRIBUTED ENERGY RESOURCES 19–21 (2018), https://perma.cc/6BDQ-ZELX; RICHARD L. REVESZ & JACK LIENKE, STRUGGLING FOR AIR: POWER PLANTS AND THE "WAR ON COAL" 10–11 (2016).

[70] DEIS, *supra* note 2, at 38 tbl.4-6.

[71] *See, e.g.*, SHRADER ET AL., *supra* note 69, at 22–24; Env't Prot. Agency, Regulatory Impact Analysis: Revised 2023 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions Standards 7-19 to 7-28 (Aug. 2021).

estimates already provided in the DEIS. In fact, BOEM itself monetized the health impacts of local pollutants in its most recently finalized five-year offshore plan.[72]

Other important environmental and social impacts in the DEIS are similarly not monetized. For example, the DEIS details potentially significant impacts to commercial fishing, including displacement of targeted fish species and space-use conflicts with drilling structures and other operations.[73] Finally, oil spills both large and small have the potential to impact fish, coastal and estuarine habitats, and community subsistence.[74]

Though these and other impacts of fossil fuel extraction may be relatively difficult to calculate, their value is certainly not zero. The Economic Analysis Methodology for BOEM's current five-year offshore leasing program indicates that BOEM has experience monetizing values such as these.[75] Other agencies, moreover, have developed estimates for the ostensibly nebulous impacts often assessed under NEPA, such as noise[76] and energy security.[77] BOEM can look to these approaches to inform its own methodology.

By monetizing key economic, environmental, and social impacts, BOEM would gain further valuable insight into the relative merits of the proposed action and alternatives, and would be better positioned to identify the approach that best promotes public welfare.

B. BOEM Should Consider the Option Value of Not Leasing at This Time

BOEM should also factor into its analysis the option value of not leasing at this time. Option value, or the informational value of delay, has long been considered by agencies, economists, and courts to be a relevant factor for federal leasing and mineral decisions. By delaying action, an agency essentially "buys" itself time and, with it, potentially valuable information that may clarify an action's costs and benefits and help the agency avoid making an erroneous and irreparable decision. As the D.C. Circuit has explained, there is a "tangible present economic benefit to delaying the decision to drill for fossil fuels to preserve the opportunity to see what new technologies develop and what new information comes to light."[78] The court noted that this option value "can be quite substantial, especially for tracts that are only marginally profitable at current prices" and so yield little present economic benefit if leased now.[79] Other courts have held that the government must consider option value when it engages in mineral leasing.[80]

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[72] BOEM ECONOMIC ANALYSIS METHODOLOGY, *supra* note 58, at 1-21 (describing the "air pollution impacts that the OECM examines and monetizes").
[73] DEIS, *supra* note 2, at 120–21.
[74] *Id.* at 60–61, 67, 111–12.
[75] BOEM ECONOMIC ANALYSIS METHODOLOGY, *supra* note 58, at 1-7 to 1-9, 1-17 to 1-25.
[76] *Id.* at 3-42 to 3-43.
[77] *Id.* at 3-15 to 3-27.
[78] Ctr. for Sustainable Econ. v. Jewell, 779 F.3d 588, 610 (D.C. Cir. 2015).
[79] Michael Livermore, *Patience Is an Economic Virtue: Real Options, Natural Resources, and Offshore Oil*, 84 U. COLO. L. REV. 581, 638–39 (2013).
[80] *Ctr. for Sustainable Econ.*, 779 F.3d at 610 (explaining that an agency may "act[] irrationally in failing to [consider] the informational value of delay," and highlighting Interior's "qualitative analysis of the benefits of delaying [offshore] leasing" as satisfying this standard); California v. Watt, 668 F.2d 129, 1319–20 (D.C. Cir. 1981) (remanding an offshore leasing determination because Interior failed to "properly consider[] the economic effect of

Option value is particularly strong here given the myriad current uncertainties regarding the costs and benefits of the proposed lease sale. As detailed above, BOEM has not monetized the supposed economic benefits of proposed action, making it unclear how these benefits stand in relation to the estimated costs of the proposal. Indeed, the costs of the proposal are themselves uncertain. For instance, the social cost of greenhouse gas values will likely be updated in the coming months, potentially revealing higher valuations of climate impacts. The informational value of delay is also illustrated by BOEM's statement in the DEIS that "[o]ne of the reasons BOEM did not previously prepare a quantitative analysis [of greenhouse gas emissions from foreign consumption] was the lack of information on foreign consumption of petroleum products."[81] With the benefit of time, BOEM has now developed a quantitative analytical approach that has revealed $1.28 billion in incremental costs for this proposed lease sale due to climate damages from foreign emissions.[82] What is more, these climate costs from foreign emissions are likely underestimates that, as we discuss below in Section IV, *infra*, may with time become more accurately perceived pending improvements to BOEM's economic model, MarketSim.

Finally, should BOEM defer the proposed lease sale, the agency might in the meantime acquire new information regarding environmental hazards, developmental value, recreational value, or cultural significance. Such information would be difficult to act on if the land has already been leased, creating the possibility that the land's character will be permanently and irreparably altered by resource extraction.[83]

In light of the uncertainty and near-irreversibility associated with the proposed action, BOEM should account for option value at the lease sale stage.

IV. BOEM's Continued Reliance on MarketSim Projections Remains Problematic Given Shortcomings in the Model and Various Unexplained Input Choices

In the DEIS, BOEM applies the MarketSim model to quantify the net greenhouse gas emissions of the proposed leasing, which then informs the agency's assessment of monetized climate impacts. According to BOEM's analysis, the vast majority—over 90 percent—of the oil and gas that will be extracted as a result of the proposed lease sale is simply substituting for other fossil fuels.[84] Yet this estimate appears unreasonably high, as outside analyses have found fossil-fuel substitution and leakage rates closer to 50 percent.[85]

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delaying lease sales," keying in on the fact that the agency "ignored the price rises in crude oil that make delay a factor increasing the value of any recovered resources").

[81] DEIS, *supra* note 2, at 43.

[82] *Id.* at 51 tbl.4-15.

[83] *See* JAYNI HEIN ET AL., INST. FOR POL'Y INTEGRITY, LOOK BEFORE YOU LEASE 17 (2020), https://perma.cc/CV2Y-NN5W.

[84] DEIS, *supra* note 2, at 45 tbl.4-10.

[85] *See, e.g.*, Brian Prest, *Supply-Side Reforms to Oil and Gas Production on Federal Lands: Modeling the Implications for Climate Emissions, Revenues, and Production Shifts* 7 (Res. for the Future Working Paper 20-16, revised Mar. 2021) (using existing elasticity estimates in the literature to estimate total leakage rates for federal oil and gas of 53–74%); Peter Erickson & Michael Lazarus, *Would Constraining U.S. Fossil Fuel Production Affect Global CO_2 Emissions? A Case Study of U.S. Leasing Policy*, 150 CLIMATE CHANGE 29, 34 (2018) (finding that

While BOEM ostensibly corrects for the MarketSim error that the U.S. Court of Appeals for the Ninth Circuit emphasized in striking down the agency's prior reliance on the model—namely, its omission of the impacts on foreign oil demand from domestic oil production[86]—its substitution model continues to suffer from critical flaws that limit its accuracy. Perhaps most implausibly, MarketSim assumes near constant domestic demand for oil and gas for up to 70 years into the future,[87] ignoring considerable evidence that future oil and gas demand is likely to decline considerably as renewables, electric vehicles, and building electrification continue to expand. MarketSim also applies elasticity estimates that rely on data going back to the 1960s, exacerbating the model's overreliance on the past to predict the future. The result is a self-fulfilling model that assumes the world will take little action to combat climate change.

In addition to this critical shortcoming, MarketSim suffers from several additional errors including improper and inconsistent modeling inputs, casting further doubt on the validity of its results. And while BOEM uses MarketSim's results to diminish the agency's assessment of climate costs resulting from the lease sale,[88] BOEM does not apply its substitution estimates in its limited assessment of the project's economic benefits.[89]

A. BOEM's Analysis Likely Overestimates Emissions in the No Action Alternative Because, as Calibrated, MarketSim Does Not Account for Structural Changes in the Energy Sector

A key reason that appears to underlie MarketSim's high substitution results is that the model does not account for structural changes in the global economy that are likely to reduce oil and gas demand and increase substitution to renewables in the coming years and decades. The model over-relies on present and past conditions in both its baseline demand trajectories and elasticity estimates.

First, with regard to its baseline demand trajectories, MarketSim unreasonably assumes near constant demand for domestic oil and gas for up to 70 years into the future.[90] But this assumption is incompatible with domestic and international efforts to mitigate the impacts of climate change, and would lead to unsustainable amounts of warming. In particular, the main condition underlying this assumption—that there will be no "future changes in laws and policies"—is highly unlikely given the realities of climate change.[91] Indeed, BOEM has previously acknowledged that "[a]s countries, including the U.S., address climate change with individual policy targets, this assumption could no longer hold," and that "as new energy sources become

substitution of federal oil production is 39%); Taran Foehn et al., *Climate Policies in a Fossil Fuel Producing Country: Demand Versus Supply Side Policies*, 38 ENERGY J. 77, 90 (2017) (identifying leakage rates for the oil market of 55%).

[86] Ctr. for Biological Diversity v. Bernhardt, 982 F.3d 723 (9th Cir. 2020).

[87] U.S. DEP'T OF THE INTERIOR, BUREAU OF OCEAN ENERGY MGMT., OCS OIL AND NATURAL GAS: POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS AND SOCIAL COST OF CARBON 20 (2016) [hereinafter BOEM POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS].

[88] DEIS, *supra* note 2, at 46–47.

[89] *See, e.g.*, *id.* at 30 (projecting oil and gas output from this lease sale without consideration of substitution effects).

[90] BOEM POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS, *supra* note 87, at 20.

[91] *Id.*

more economically feasible, they could displace existing sources and/or alter the composition of energy supply."[92] The Bureau of Land Management has likewise called this trajectory a "worst-case scenario outcome" that incorporates a "maximum emissions" baseline.[93] Indeed, numerous states in recent years have adopted low- and zero-emission vehicle standards along with net-zero carbon emissions targets—laws that would necessitate a precipitous decline in oil and gas consumption within those states.[94]

BOEM's projection of constant demand over the next 70 years is based on the Energy Information Administration reference case.[95] But the EIA's reference case is intended to reflect trends and is explicitly "not intended to be a most likely prediction of the future,"[96] and has in fact been criticized for understating the long-term growth of renewable energy.[97] As such, these trends should not be used in isolation as point estimates; instead, agencies should conduct sensitivity analysis over reasonable assumptions and scenarios (consistent with how EIA uses the model in its Annual Energy Outlook[98]). For instance, BOEM could provide oil and gas demand projections assuming that nations (including the United States) meet their commitments under the Paris Agreement. Interior could also integrate other NEMS cases[99] into MarketSim's baseline by soliciting opinion from a range of experts on the most likely trajectory, and weight the results of different NEMS cases accordingly.[100] In fact, the National Academies of Sciences has

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[92] *Id.*

[93] U.S. BUREAU OF LAND MGMT., WILLOW MASTER DEVELOPMENT PLAN FINAL ENVIRONMENTAL IMPACT STATEMENT App. S-565 (2020); *accord* U.S. BUREAU OF LAND MGMT., DRAFT EASTERN COLORADO RESOURCE MANAGEMENT PLAN & ENVIRONMENTAL IMPACT STATEMENT B-65 (2019) (explaining that it is "unlikely" that "emission trajectories follow a historical growth curve . . . over the course of the remainder of the century").

[94] *See, e.g.*, Brad Plummer, *Blue States Roll Out Aggressive Climate Strategies. Red States Keep to the Sidelines.*, N.Y. TIMES (June 21, 2019), https://perma.cc/6SYQ-3MSM ("Over the past year. . . California, Colorado, Maine, Nevada, New Mexico, New York and Washington have all passed bills aimed at getting 100 percent of their state's electricity from carbon-free sources like wind, solar or nuclear power by midcentury.").

[95] BOEM POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS, *supra* note 87, at 20.

[96] *EIA's Annual Energy Outlook is a Projection, Not a Prediction*, U.S. ENERGY INFO. ADMIN. (May 17, 2016), https://perma.cc/5UKU-UQYR.

[97] *See, e.g.*, ADVANCED ENERGY ECON. INST., COMPETITIVENESS OF RENEWABLE ENERGY AND ENERGY EFFICIENCY IN U.S. MARKETS 5–6 (2015).

[98] U.S. ENERGY INFO. ADMIN, *supra* note 96 (highlighting "the model's sensitivity to different assumptions").

[99] In addition to its reference case, NEMS features 24 additional cases reflecting a range of assumptions about economic growth, oil prices, resource availability, policy development, and technological progress. U.S. ENERGY INFO. ADMIN, THE NATIONAL ENERGY MODELING SYSTEM: AN OVERVIEW 2018, at 14–15 (2019) (highlighting seven "primary" cases, including reference case, along with 18 additional cases).

[100] The use of expert elicitation is widely accepted in economic forecasting. *See* NAT'L ACAD. VALUING CLIMATE DAMAGES, *supra* note 38, at 57 ("[F]or input variables having a limited empirical or theoretical basis for quantification of projections and their uncertainty, expert elicitation conducted according to best practices provides a useful and necessary approach."). Agencies have previously solicited expert opinion to generate parameters that are uncertain. For instance, EPA surveyed twelve experts in an expert elicitation on the mortality impacts of a decrease in PM2.5 in the United States. It utilized its responses to specify a concentration-response function and explore uncertainty. Henry A. Roman et al., *Expert Judgment Assessment of the Mortality Impact of Changes in Ambient Fine Particulate Matter in the US*, 42 ENV'T SCI. & TECH. 2268 (2008). For an example of the use of expert elicitation to assess future socioeconomic and emission scenarios, *see* Emily Ho et al., *Not All Carbon Dioxide Emission Scenarios Are Equally Likely: A Subjective Expert Assessment*, 155 CLIMATIC CHANGE 545 (2019).

suggested that agencies conduct "expert elicitation of future emission projections" given the uncertainty of long-term energy policies.[101]

Second, MarketSim's elasticities are backward-looking rather than forward-looking and often rely on outdated data, further underestimating ongoing changes in the energy sector. In its November 2021 model update,[102] BOEM relies on demand elasticities from Serletis et al. (2010) and Jones (2014). But as the agency recognizes, both studies rely on data that is decades old[103] and thus reflect a drastically different energy sector than is applicable to this lease sale. Specifically, Serletis et al. (2010) rely on EIA data from 1960 to 2007.[104] Jones (2014) relies on EIA data from 1960 to 2011.[105] These are historical estimates that do not account for structural changes in the energy market, such as the widespread adoption of electric vehicles or renewable energy, and thus are poor predictors of the future. In recent months, for instance, federal agencies have proposed new standards for vehicle fuel-efficiency that these estimates do not capture.

Third, while MarketSim assumes that engines used to produce and consume oil and gas will not become more efficient,[106] this assumption ignores standard best practices for cost-benefit analysis that instruct agencies to make reasonable assumptions about technological growth.[107] As technology continues to improve and become more efficient, engines used to produce and consume oil and gas will have lower energy footprints.

All of these flaws point in the same direction: MarketSim over-relies on past data and, in so doing, disregards the likelihood of adaptation and structural economic change. As a result, MarketSim essentially assumes that fossil-fuel demand will remain high and substitution to renewables low, and thus provides results that overstate emissions—and therefore costs—in the no action alternative.

B. BOEM's Selection of Model Inputs Is Arbitrary and Insufficiently Justified

In addition to its improper reliance on unrealistic parameters that fail to account for structural economic changes, MarketSim also applies various modeling inputs that are insufficiently explained or fail to meet the standards for rational economic analysis.

To begin, BOEM does not sufficiently justify its choice of elasticities. While the agency describes the general criteria it used to select elasticity values,[108] it does not provide a literature

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[101] NAT'L ACAD. VALUING CLIMATE DAMAGES, *supra* note 38, at 69; *see also id.* at 75–77.
[102] The DEIS was published in October 2021, and it is not clear that it applies the November 2021 model updates.
[103] *See* U.S. DEP'T OF THE INTERIOR, BUREAU OF OCEAN ENERGY MGMT., CONSUMER SURPLUS AND ENERGY SUBSTITUTES FOR OCS OIL AND GAS PRODUCTION: THE 2021 REVISED MARKET SIMULATION MODEL 23 (2021) [hereinafter 2021 MARKET SIMULATION MODEL] (citing Apostolos Serletis et al., *Interfuel Substitution in the United States*, 32 ENERGY ECON. 737 (2010), and then citing Clifton Jones, *The Role of Biomass in US Industrial Interfuel Substitution*, 69 ENERGY POL'Y 122 (2014)).
[104] *Id.*
[105] *Id.*
[106] BOEM, POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS, *supra* note 87, at 20.
[107] *See* CIRCULAR A-4, *supra* note 64, at 5 ("[T]echnological advances often affect economies of scale.").
[108] 2021 MARKET SIMULATION MODEL, *supra* note 103, at 17 ("BOEM's assessment of quality for individual elasticity estimates considered, among other factors, (1) whether they are statistically significant, (2) methods by

review, explain why its chosen estimates meet these qualifications over other estimates from the literature, or perform sensitivity analysis using alternative parameter values.[109] The agency applies multiple methodologies to obtain its parameter values—sometimes relying on the Energy Information Administration, other times on published literature, and sometimes on elicitation—yet offers little justification for why it relies on different methodologies at different times.

When BOEM does explain its rationale for particular estimates, that rationale is often deficient. Perhaps most notably, the agency states that it discarded some cross-price elasticity estimates from Serletis et al. (2010) because they "were not statistically significant," and instead "use[d] results from Newell and Pizer (2008)" in place of these values.[110] But a finding of statistical insignificance is not a basis to reject a parameter value. Rather than ignore that finding, the proper approach would be to incorporate an elasticity of zero, or to conduct sensitivity analysis using multiple studies. Furthermore, BOEM improperly assumes a -1.00 demand elasticity value for "Natural Gas – Transport" and "Electricity – Transport" without any citation or analysis.[111] BOEM similarly assumes without explanation or analysis that the supply elasticities for Lower 48 offshore natural gas and Lower 48 offshore oil are the same,[112] despite the fact that supply elasticities between natural gas and oil differ in other categories. BOEM also relies at times on older versions of the Annual Energy Outlook (both the 2015 and 2018 version) without explaining why it does not apply the most recent version.[113]

As in previous iterations of MarketSim, moreover, BOEM overly and improperly relies on the opinion from a single expert in setting supply and demand adjustment rates: Dr. Stephen Brown.[114] While use of expert elicitation is acceptable when estimates are unavailable in the literature, expert elicitations should not rely on a single author. Indeed, a recent study concluded that less than one-third of elicited experts produced statistically accurate assessments, thereby "highlighting the need for validation" from a multitude of experts.[115] Accordingly, after a thorough review of the literature, BOEM should identify multiple experts to survey to develop a range of possible estimates, which can be further characterized by central values and variance.[116] This would allow BOEM to conduct an informed sensitivity analysis over these parameter

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which they were derived, and (3) the richness of the data supporting each estimate (e.g., whether they are based on a multi-year panel or reflect energy market data for a single year).").

[109] *Compare with* CIRCULAR A-4, *supra* note 64, at 3 ("A good analysis is transparent. It should be possible for a qualified third party reading the report to see clearly how you arrived at your estimates and conclusions. For transparency's sake, you should state in your report what assumptions were used, such as the time horizon for the analysis and the discount rates applied to future benefits and costs. It is usually necessary to provide a sensitivity analysis to reveal whether, and to what extent, the results of the analysis are sensitive to plausible changes in the main assumptions and numeric inputs.").

[110] 2021 MARKET SIMULATION MODEL, *supra* note 103, at 19.

[111] *Id.* at 18 tbl.4 & n.5.

[112] *Id.* at 20 tbl.5 & n.6.

[113] *Id.*

[114] *Id.* at 14 tbl.2, 15 tbl.3.

[115] Abigail R Colson & Roger M. Cooke, *Expert Elicitation: Using the Classical Model to Validate Experts' Judgments*, 12 REV. ENV'T ECON. & POL'Y 113 (2018).

[116] For example, EPA surveyed twelve experts in an expert elicitation on the mortality impacts of a decrease in PM2.5 in the United States. It utilized its responses to specify a concentration-response function, and explore uncertainty. Henry A. Roman et al., *supra* note 100.

values. Indeed, BOEM should be conducting more sensitivity analyses over all of its key parameters and assumptions, such as assumptions based on the EIA Energy Outlook's NEMS scenarios.

Finally, while BOEM's methodology includes the greenhouse gas emissions from the tankering of oil imports, it does not appear to include midstream emissions from domestic production, including tankering from Alaska as well as combustion-intensive rail and road transmission.[117] By disregarding emissions from domestic midstream transport—which can be quite high for a lease sale, like this one, occurring in Alaska—BOEM's methodology further minimizes the greenhouse gas emissions of the proposed action relative to the no action alternative.

C. BOEM Arbitrarily Applies Substitution Analysis to Offset the Proposed Action's Environmental Harms But Not Its Economic Benefits

In addition to the above critiques of the methodology for substitution analysis, BOEM also inconsistently applies energy substitution to the proposal's environmental harms without applying the same analysis to the proposal's economic benefits. BOEM should apply substitution analysis consistently to all of the proposal's impacts, and cannot place its thumb on the scale by offsetting only the proposal's environmental harms.

BOEM cannot have it both ways: On the one hand, it offsets the proposal's climate impacts by claiming that most of them would occur anyway as a result of substitute oil and gas production in other areas, while, on the other hand, it attributes various economic benefits to the proposal without any mention of this substitution effect. Of course, if BOEM is indeed accurate that under the no action alternative most of the proposal's oil and gas production would be offset through increased production elsewhere, this would also mean that many of the supposed economic benefits of the proposed action would also occur under the no action alternative due to this increased production. For instance, according to BOEM's calculations, more than 90% of the proposal's oil and gas production would be replaced by substitute fossil-fuel production in the no action alternative.[118] That production would therefore also produce tax revenues, employment income, and (because much fossil fuel development occurs on lands own by the federal or state governments) royalties—meaning that the U.S. economy would still reap many of the proposed action's supposed economic impacts.

Yet BOEM never acknowledges this reality, discussing various economic benefits without acknowledging that most of these economic benefits would, under the logic of BOEM's own substitution analysis, be offset in the no action alternative through increased production elsewhere. In its exploration and development scenario, for instance, BOEM projects that the proposed lease sale will result in up to 192.3 million barrels of oil and 301.9 billion cubic feet of natural gas.[119] But these are gross estimates rather than net estimates, and would be substantially

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[117] BOEM POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS, *supra* note 87, at 11 ("The overall emissions as a result of substitution are totaled using emissions from exploration, development, production (including tankering), processing, storage and distribution, and consumption of the substituted resources. . . . If the energy, such as oil, is substituted by foreign sources, the GHG emissions released from bringing these products to the U.S. are included.").
[118] DEIS, supra note 2, at 45 tbl.4-10.
[119] *Id.* at 30.

lower if BOEM provided net estimates that considered the alleged substitute production being displaced. Likewise, BOEM briefly discusses various economic advantages that will supposedly result from the proposed lease sale, such as employment, wages, and tax and royalty revenues.[120] Yet here too the agency fails to recognize that the proposed lease sale is supposedly replacing considerable production that would offset those impacts.[121] According to BOEM, in other words, this proposed action is responsible for all of its positive economic impacts but few of its environmental harms.

This lopsided analysis violates NEPA. Agencies may not "put a thumb on the scale"[122] by "inconsistently and opportunistically fram[ing] the costs and benefits" of a proposed project.[123] Yet this is precisely what BOEM is doing by using substitution analysis to offset the proposal's environmental costs without also offsetting the proposal's economic benefits. BOEM must apply substitution consistently between the proposed lease sale's costs and benefits.[124] By failing to do so, it adopts an inconsistent methodological approach to the proposal's economic benefits versus climate costs, further skewing their already inconsistent treatment throughout the DEIS.

Conclusion

While BOEM takes an important and appropriate step forward by monetizing greenhouse gas emissions in the DEIS to assess the climate impacts of the proposed action, BOEM should incorporate these findings into its decisionmaking in some discernable way. BOEM could monetize other effects that are easily monetizable and weigh the adverse impacts, including climate damages and option value, against the beneficial effects. BOEM should also revise fundamental errors in the MarketSim model, or apply a different model altogether, in order to ensure a more accurate assessment of the proposal's estimated greenhouse gas emissions.

Sincerely,

Lance Bowman, Attorney
Peter Howard, Ph.D., Economics Director
Max Sarinsky, Senior Attorney

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[120] *Id.* at 116.
[121] Because the proposed action is allegedly replacing a combination of domestic and international production, it is presumably replacing economic benefits that would occur in both the United States and abroad. BOEM's analysis could consider these cross-border transfers.
[122] *Ctr. for Biological Diversity*, 538 F.3d at 1198.
[123] *Bus. Roundtable*, 647 F.3d at 1148–49.
[124] BOEM can do this by applying its modified substitution results to offset the proposal's economic benefits. Alternatively, if BOEM insists on not applying substitution analysis to offset the proposal's economic effects, then for the sake of consistency it should also not apply substitution analysis to offset the proposal's environmental harms.