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Implementing NEPA in the Age of Climate Change

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IMPLEMENTING NEPA IN THE AGE OF CLIMATE CHANGE

Jayni Foley Hein^{*} & Natalie Jacewicz^{**}

The national government has a crucial role to play in combating climate change, yet federal projects continue to constitute a major source of United States greenhouse gas emissions. Under the National Environmental Policy Act, agencies must consider the environmental impacts of major federal actions before they can move forward. But agencies frequently downplay or ignore the climate change impacts of their projects in NEPA analyses, citing a slew of technical difficulties and uncertainties. This Article analyzes a suite of the most common analytical failures on the part of agencies with respect to climate change: failure to account for a project's downstream and upstream greenhouse gas emissions; failure to acknowledge a project's effect on the country's energy mix; and failure to consider a reasonable social cost of carbon. After summarizing current regulatory practice and case law on each topic, this Article finds that despite protestations that accounting for such impacts is infeasible, agencies already possess many of the tools needed to assess such impacts, and indeed, some agencies already use these tools to do so. Furthermore, courts are increasingly holding agencies accountable for a full and fair assessment of climate change effects in NEPA analysis. This Article aims to highlight best practices so that agency offices can learn from one another, fulfill NEPA's mandate, and begin to provide leadership in the fight against climate change.

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INTRODUCTION

The Great Divide, whose mountains slice the western sliver of continent off the Americas like a crust of bread, breaks its path from Alaska to Patagonia¹ at a single point: Wyoming's Red Desert.² Notwithstanding its desolate name, this rupture in the Rockies hosts throngs of wildlife. Made up mostly of unprotected federal lands, the area constitutes the largest undeveloped high-elevation desert in the United States.³

International energy conglomerates have fixed their sights on the region's mineral reserves.⁴ In 2015, the Bureau of Land Management ("BLM") included the Red Desert in a bundle of federal land leases made available to oil and gas companies.⁵ Sacrificing swaths of wilderness to fossil fuels inevitably entails releasing more greenhouse gases ("GHGs") and exacerbating the global climate change crisis. Yet BLM gave only a cursory nod to the GHG emissions that would result from this decision.⁶ Blaming uncertainty around calculating direct and indirect emissions caused by oil and gas projects, BLM claimed it could not quantify GHG effects at specific sites or in aggregate.⁷ The agency decided to lease the land anyway.⁸

The Red Desert's fate exemplifies a broader trend: U.S. agencies routinely make decisions that have significant climate change implications while failing to account for those effects fully—or, in some cases, at all. BLM, for example, held twenty-eight lease sales for oil and gas in 2018 alone.⁹ And even amidst clear market signals that coal is no longer in favor,¹⁰ the federal government remains the nation's

1. *The Continental Divide Trail*, HIKE THE DIVIDE (last visited Jan. 30, 2020), <http://www.hikethedivide.com/the-trail>.

2. See *Red Desert*, NATURE CONSERVANCY (last visited Jan. 30, 2020), <https://www.nature.org/en-us/get-involved/how-to-help/places-we-protect/red-desert/>.

3. *The Red Desert & the Great Divide Basin*, ULTIMATEWYOMING (last visited Jan. 30, 2020), <http://www.ultimatewyoming.com/sectionpages/sec5/extras/reddesert.html>.

4. See *id.* ("[T]he area has long been the focus of multinational oil, gas and mining corporations.")

5. See *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 61–62 (D.D.C. 2019) (discussing standing of the plaintiffs and noting that the Red Desert "contain[s] land falling within one or both of the High Plains and Wind River districts" being leased).

6. See *WildEarth Guardians*, 368 F. Supp. 3d at 56 (discussing the EAs' treatment of climate change "on a conceptual level").

7. See *id.*

8. See *id.* at 51 (referring to the leases authorized by BLM).

9. Press Release, Bureau of Land Mgmt., Using the Least Amount of Acreage in History, Interior Hits Record Oil and Gas Revenues in 2018 at \$1.1 Billion (May 1, 2019), <https://www.blm.gov/press-release/using-least-amount-acreage-history-interior-hits-record-oil-and-gas-revenues-2018-11>.

10. See generally Catherine Morehouse, *2020 Outlook: Coal Faces Headwinds from Aging Plants, Adverse Market Signals and High Remediation Costs*, UTILITY DRIVE (Jan. 14, 2020), <https://www.utilitydive.com/news/2020-outlook-coal-faces-headwinds-from-aging-plants-adverse-market-signal/569732/>.

largest coal producer,¹¹ with roughly 309 million tons of coal produced on federal lands in 2018.¹² These actions have a correspondingly vast effect on GHG emissions. Fossil fuels extracted on federal lands account for 22% of all GHG emissions from the United States annually.¹³

Under the National Environmental Policy Act (“NEPA”), federal agencies must consider the environmental consequences of their projects and disclose their findings to the public before the agencies take action.¹⁴ Because environmental consequences include climate change impacts, agencies must analyze and publish the effects of their projects on greenhouse gas emissions.¹⁵ Yet agencies frequently claim to lack the tools to accurately account for climate change impacts, even while easily quantifying expected benefits to industry.¹⁶ As a consequence, federal projects proceed with massive climate effects that receive little or no examination.¹⁷

The danger of this lack of examination is that cursory and incomplete climate information perpetuates the intractable “death by a thousand cuts” nature of global warming. The sources of greenhouse gas pollution are myriad, multi-jurisdictional, and, at present, entwined with modern necessities like electricity and transportation.¹⁸ And the problem is becoming more serious. Two degrees Celsius of

11. See Phil McKenna, *Cheap Federal Coal Supports Largest U.S. Producers*, INSIDECLIMATENEWS (Mar. 17, 2016), <https://insideclimatenews.org/news/16032016/coal-companies-rely-heavily-public-lands-coal> (stating that for the “top three coal companies in the U.S . . . as much as 88 percent of their total production [comes] from land owned and leased by the federal government.”).

12. U.S. DEP’T OF INTERIOR, NATURAL RESOURCES REVENUE DATA, <https://revenue.data.doi.gov/query-data/?dataType=Production> (last visited on Jan. 29, 2020).

13. See Wilderness Soc’y, *Federal Lands Emissions Accountability Tool*, <https://www.wilderness.org/articles/article/federal-lands-emissions-accountability-tool> (last visited Jan. 30, 2020) (“These emissions are roughly equivalent to 22% of total U.S. average emissions between 2005 and 2015.”); see also U.S. GEOLOGICAL SURVEY, FEDERAL LANDS GREENHOUSE GAS EMISSIONS AND SEQUESTRATION IN THE UNITED STATES: ESTIMATES FOR 2005-14 7 tbl. 1 (2018) (breaking down several of the significant categories of greenhouse gas emissions by fuel type).

14. See generally National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. § 4321; see also 42 U.S.C. § 4321(C)(ii) (requiring agencies to report on “adverse environmental effects”).

15. For just a few examples of cases in which courts demand agencies account for greenhouse gases under NEPA, see *Sierra Club v. Fed. Energy Reg. Comm’n*, 867 F.3d 1357, 1357 (D.C. Cir. 2017); *San Juan Citizens All. v. BLM*, 326 F. Supp. 3d 1227, 1228 (D.N.M. 2018); *West. Org. of Res. Councils v. BLM*, No. CV 16-21-GF-BMM, 2018 WL 1475470, at *9 (D. Mont. Mar. 26, 2018); *Montana Env’tl. Info. Ctr. v. U.S. Office of Surface Mining, Reclamation & Enft*, No. CV 15-106-M-DWM, 2017 WL 5047901, at *3 (D. Mont. Nov. 3, 2017).

16. See *infra* Part IV.B.2 and accompanying notes.

17. See Madeleine Siegel & Alexander Loznak, SURVEY OF GREENHOUSE GAS CONSIDERATIONS IN FEDERAL ENVIRONMENTAL IMPACT STATEMENTS AND ENVIRONMENTAL ASSESSMENTS FOR FOSSIL FUEL-RELATED PROJECTS, 2017-2018 3 (2019) (surveying projects with large greenhouse gas impacts and finding no instance of a finding that the projects’ impacts were “significant,” thus curtailing NEPA analysis, and finding that agencies usually do not analyze cumulative impacts at all).

18. See *Transportation Replaces Power in U.S. as Top Source of CO2 Emissions*, YALEENVIRONMENT360 (Dec. 4, 2017), <https://e360.yale.edu/digest/transportation-replaces-power-in->

global warming used to be considered a threshold for catastrophe, with this increase creating millions of climate refugees fleeing drought and desertification.¹⁹ Today, the Paris Agreement on climate change sets two degrees of warming as the goal.²⁰ The most recent U.N. Intergovernmental Panel on Climate Change report projects roughly five degrees of warming by the beginning of the next century in a scenario in which business continues as usual.²¹

Although this problem has festered under administrations of both political stripes,²² the issue has significantly worsened under the Trump administration.²³ Despite the mounting risks of continuing a “business as usual” approach to fossil fuels, the United States under President Trump has pursued an “energy dominance” strategy that heavily favors fossil fuels and has eliminated several national climate goals.²⁴ The federal agencies that are responsible for project approvals such as coal, oil, and natural gas lease sales, interstate natural gas pipelines, and liquid natural gas (“LNG”) export terminals, among others, are tasked with analyzing and disclosing the climate effects of their projects, which in many cases will increase emissions substantially. But as this Article describes, federal agencies under Trump have often eschewed providing comprehensive greenhouse gas emission information in their

u-s-as-top-source-of-co2-emissions (describing transportation and power as major sources of greenhouse gas emissions in the U.S.).

19. See Bill McKibben, *Global Warming’s Terrifying New Math*, ROLLING STONE (July 19, 2012), <https://www.rollingstone.com/politics/politics-news/global-warmings-terrifying-new-math-188550/> (describing Copenhagen Conference’s goal to keep temperature increases below two degrees Celsius to avoid catastrophe).

20. Conference of the Parties, *Adoption of the Paris Agreement*, U.N. Doc. FCCC/CP/2015/L.9/Rev/1 (Dec. 12, 2015).

21. See Robinson Meyer, *Are We Living Through Climate Change’s Worst-Case Scenario?*, THE ATLANTIC (Jan. 15, 2019), <https://www.theatlantic.com/science/archive/2019/01/rcp-85-the-climate-change-disaster-scenario/579700/> (referring to RCP 8.5 scenario, in which temperatures increase by 4.9 degrees Celsius). *But see* Zeke Hausfather, *Emissions—The ‘Business as Usual’ Story Is Misleading*, NATURE (Jan. 29, 2020), <https://www.nature.com/articles/d41586-020-00177-3#ref-CR2> (stating that the “business as usual” RCP 8.5 scenario is relatively unlikely).

22. See Arnold W. Reitze, Jr., *Dealing with Climate Change Under the National Environmental Policy Act*, 43 WM. & MARY ENV’T. L. & POL’Y REV. 173, 192 (2018) (discussing how “agencies have largely ignored the issue of what role GHG emissions and climate change should play when carrying out their mission responsibilities” for much of NEPA’s history).

23. See *id.* at 185–92 (discussing the various measures the Trump administration has taken weakening federal consideration of GHG emissions).

24. Memorandum from the White House, President Donald J. Trump Is Unleashing American Energy Dominance (May 14, 2019), <https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-unleashing-american-energy-dominance/>; Tyler Clevenger, *7 Ways the Trump Administration Is Harming the Climate*, WORLD RES. INST. (Apr. 21, 2020), <https://www.wri.org/blog/2020/04/7-ways-trump-administration-harming-climate> (discussing withdrawal from the Paris Agreement on Climate Change, the elimination of an efficient lightbulb regulations, and loosening emission standards for cars, among other rollbacks).

project approvals, leaving the public in the dark and masking the agencies' contribution to the climate problem.²⁵

Ideally, these agencies would receive corrective guidance from the White House Council on Environmental Quality (“CEQ”), a committee established by NEPA²⁶ that sets rules determining how agencies perform environmental reviews.²⁷ But in January 2020, the CEQ instead proposed regulations—the Council’s first since the 1980s²⁸—that would significantly decrease the scope and rigor of such analyses,²⁹ inhibiting agencies from accounting for “geographically remote” impacts like climate change, in addition to other changes. These CEQ rules, finalized in July 2020, will likely be struck down in the courts;³⁰ nonetheless, they suggest that, at best, the most climate guidance agencies can expect from CEQ in the near-term is a feeble shrug.³¹

This Article seeks to fill the void by advising agencies how to better account for climate change in NEPA reviews. It does so by highlighting common excuses agencies deploy when shortchanging climate change impact analysis and by offering solutions to these ostensible obstacles.

The challenges cited by agencies with respect to analyzing greenhouse gas emissions typically fall into a few consistent categories. First, agencies commonly fail to calculate how a given action could encourage additional downstream combustion of fossil fuels.³² For example, if the Federal Energy Regulatory Commission (“FERC”) approves the construction of an interstate pipeline, that pipeline may boost consumption of fossil fuels by power plants and other end users and thus drive “downstream emissions.”³³ These emissions are part of the climate impacts of a

25. See Marianne Lavelle, *Trump Moves to Limit Environmental Reviews, Erase Climate Change from NEPA Considerations*, INSIDECLIMATENEWS (Jan. 9, 2020), <https://insideclimatenews.org/news/09012020/trump-nepa-environmental-review-changes-climate-change-infrastructure-pipelines> (discussing the Trump Administration’s efforts to circumscribe NEPA, through regulatory rollback but also through several previous guidance documents).

26. 42 U.S.C. § 4342.

27. 42 U.S.C. § 4344.

28. Jean Chemnick, *New Trump Rule Would Allow Government to Ignore Climate Impacts of Major Projects*, SCIENCE (Jan. 9, 2020), <https://www.sciencemag.org/news/2020/01/new-trump-rule-would-allow-government-ignore-climate-impacts-major-projects>.

29. See *id.* (discussing the rule’s exclusion of indirect environmental impacts of projects); see also Alejandro E. Camacho & Robert L. Glicksman, *Trump Is Trying to Cripple the Environment and Democracy*, THE HILL (Jan. 18, 2020), <https://thehill.com/opinion/energy-environment/478904-trump-is-trying-to-cripple-the-environment-and-democracy> (discussing the arbitrary page limits of the proposed rule).

30. For further discussion, see *infra* Part I.B.

31. See Chemnick, *New Trump Rule*, *supra* note 28.

32. See Michael Burger & Jessica Wentz, *Downstream and Upstream Greenhouse Gas Emissions: The Proper Scope of NEPA Review*, 41 HARV. ENV’T. L. REV. 109, 133–42 (2017).

33. See JAYNI HEIN ET AL., INST. FOR POLICY INTEGRITY, PIPELINE APPROVALS AND GREENHOUSE GAS EMISSIONS 4 (2019) (“[P]ipeline infrastructure creates the economic conditions for

federal project and should therefore be included in any NEPA review of the project. Nonetheless, agencies commonly claim they cannot or should not quantify such emissions.³⁴

At the other end of the supply chain, a project may make gas transportation more efficient and enable more gas production, leading to greater “upstream emissions.”³⁵ Again, agencies frequently dodge accounting for these emissions, either by denying that their projects will have any effect on such emissions or by suggesting that any impact will be too speculative to report.³⁶

A third hurdle in accurately quantifying GHG emissions is modeling energy substitution.³⁷ Agencies have irrationally assumed that if a particular fossil fuel project is not completed, another project will provide the same type of energy from elsewhere at identical cost, resulting in identical GHG emissions.³⁸ Thus, agencies routinely assert that the project will not increase emissions without evidentiary support. But this “perfect substitution” assumption is contrary to basic principles of supply and demand, and federal courts have rejected agency analysis on this basis.³⁹

Finally, even if agencies do attempt to quantify a project’s carbon emissions, they often peg the cost of such emissions at the wrong value.⁴⁰ Agencies chronically undervalue the cost to society of pumping more carbon into the atmosphere and frequently treat the cost as zero by failing to use available tools like the Interagency Working Group’s social cost of greenhouse gases metric.⁴¹ The result is a skewed analysis that makes the economic benefits of projects look much greater than the costs.

Because of these common shortcomings in their climate analyses, agencies face an ever-growing number of lawsuits for their failure to satisfy NEPA obligations with respect to greenhouse gas emissions.⁴² This leaves courts to muddle through what level of analysis is feasible and reasonable for the agencies to perform. The

additional natural gas production and consumption, which produce both upstream and downstream greenhouse gas emissions, contributing to climate change.”).

34. See *infra* Part II.

35. See HEIN ET AL., *supra* note 33, at 4.

36. See *infra* Part III.

37. See HEIN ET AL., *supra* note 33, at 14.

38. See *infra* Part IV.

39. See HEIN ET AL., *supra* note 33, at 14.

40. See *infra* Part V.

41. KEVIN RENNERT & CORA KINGDON, RES. FOR THE FUTURE, SOCIAL COST OF CARBON 101 4 (2019), <https://www.rff.org/publications/explainers/social-cost-carbon-101/>.

42. Barry Kellman, Comment, *NEPA Review of Climate Change*, 46 ENV’T. L. REP. NEWS & ANALYSIS 10378, 10378 (2016) (referencing the lack of clarity from multiple appellate and district courts analyzing NEPA and climate change applicability).

result is a hodgepodge of rulings across the country pronouncing different requirements for different agencies.⁴³

This Article proposes that the quest to account for the climate effects of federal projects need not be so complicated. For every challenge that agencies characterize as insurmountable—upstream emissions, downstream emissions, energy substitution modeling, or pricing the cost of carbon pollution—tools endorsed by experts in law and economics exist.⁴⁴ In fact, in each case, some agencies are already using these tools to calculate carbon emissions, even while other agencies stumble over virtually identical challenges. While CEQ provides general guidance to agencies on best practices for NEPA analysis, it does not appear to monitor the specific tools each agency uses, nor endorse specific tools.⁴⁵ This paper fills that gap by highlighting best practices that all agencies can and should use to arrive at more accurate and useful climate analyses. The message to agencies is what adventure protagonists hear from their mentors in the third act of their journey: “You’ve had the power inside you all along.”

As a secondary function, this Article can serve as inspiration to state agencies that have established their own NEPA counterparts.⁴⁶ Even if federal agencies insist on turning a blind eye to climate change, state agencies may use their own statutory authority to evaluate state projects’ climate effects.

Finally, this Article provides judges guidance for navigating the complex world of NEPA analyses. It falls to judges to hold agencies accountable for fulfilling their statutory obligation to consider climate impacts meaningfully and communicate them clearly. This article can help evaluate agencies’ claims that, “It can’t be done!” More often than not, agencies can do the proper analysis, and other agencies have done it in the past, rendering many deficiencies arbitrary and capricious.⁴⁷

This Article proceeds in five parts. Part I explains the statutory function and framework of NEPA. The following four parts tackle each of the four common challenges to quantifying the cost of GHG emissions. Each section explains the particular challenge, offers examples of agency failure to overcome the challenge, outlines court trends to date, and finally proposes feasible solutions. Part II pertains to downstream emissions, Part III to upstream emissions, Part IV to energy substitution, and Part V to the social cost of greenhouse gases.

43. See *infra* Part IV.C (discussing mixed court guidance on using the social cost of carbon).

44. See, e.g., HEIN ET AL., *supra* note 33, at 38 (discussing social cost of carbon endorsements). The Article provides other examples throughout.

45. See Chemnick, *New Trump Rule*, *supra* note 28 (describing new CEQ guidance).

46. See COUNCIL ON ENV’T. QUALITY, *States and Local Jurisdictions with NEPA-like Environmental Planning Requirements*, <https://ceq.doe.gov/laws-regulations/states.html> (last visited Jan. 30, 2020) (listing states with NEPA-like requirements).

47. When agencies fail to “consider an important aspect of the problem” in deciding a regulation, that decision is arbitrary and capricious. *Motor Vehicle Mfrs. Assoc. v. State Farm Mutual Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

Correctly evaluating GHG emissions in NEPA analyses may seem to be a thorny and theoretical issue, but the consequences of such emissions are concrete. In 2019, the D.C. District Court found that BLM failed to appropriately consider climate change effects in leasing almost 400 parcels of land, including the Red Desert.⁴⁸ The ruling provided the groundwork for other lawsuits that suspended the extension of oil and gas infrastructure into the basin.⁴⁹

Poor climate analysis has high stakes for agencies, developers, and most of all, the public. By shining a light on what is possible—and required—in terms of climate change disclosure, this Article aims to help decisionmakers make better decisions that account for actual climate effects, and ideally take steps to lessen their contribution to the grave threat of climate change.

I. THE FRAMEWORK AND FUNCTION OF NEPA

Signed into law on New Year's Day in 1970, the National Environmental Policy Act (“NEPA”) led the charge in a cavalcade of environmental statutes enacted during the rest of the decade.⁵⁰ Because of NEPA's pivotal legal importance⁵¹ and its restraining effect on environmental plundering,⁵² many have dubbed the statute the “Magna Carta of environmental law.”⁵³ This Part traces how the statute functions and recent regulations that might change NEPA's operation.

A. NEPA's Broad Reach

NEPA's text reflects not only Congress's broad conception of environmental hazards but also lawmakers' lofty ambitions for the statute. The law's

48. See *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 78 (D.D.C. 2019). Notably, the court decided not to vacate the leases. *WildEarth Guardians*, 368 F. Supp. 3d at 84.

49. Press Release, Ctr. for Biological Diversity, *Lawsuit Spurs Trump Administration to Suspend 130 Oil, Gas Leases in Utah* (Nov. 12, 2019), <https://biologicaldiversity.org/w/news/press-releases/lawsuit-spurs-trump-administration-suspend-130-oil-gas-leases-utah-2019-11-12/>.

50. Richard J. Lazarus, *The Greening of American and the Graying of United States Environmental Law: Reflections on Environmental Law's First Three Decades in the United States*, 20 VA. ENV'T. L.J. 75, 77 (2001); *National Environmental Policy Act (NEPA)*, NEPA.GOV, <https://ceq.doe.gov/> (last visited Nov. 20, 2019) (calling NEPA “the first major environmental law in the United States”).

51. Janet McCabe & Cynthia Giles, *Trump Proposal to Weaken Project Reviews Threatens the 'Magna Carta of Environmental Law'*, THE CONVERSATION (May 15, 2018), <http://theconversation.com/trump-proposal-to-weaken-project-reviews-threatens-the-magna-carta-of-environmental-law-93258> (stating that “[NEPA] represents a turning point in thinking about environmental protection”).

52. Amanda Jahshan, *NEPA: The Magna Carta of Environmental Law*, NAT. RES. DEF. COUNCIL (Jul. 26, 2013), <https://www.nrdc.org/experts/amanda-jahshan/nepa-magna-carta-environmental-law> (“Much like the Magna Carta protected people from the dangers of monarchical rule, NEPA protects people by providing transparency in federal projects.”).

53. *NEPA*, NEPA.GOV, *supra* note 50 (saying NEPA “is often called the ‘Magna Carta’ of Federal environmental laws.”).

stated purposes include “prevent[ing] or eliminat[ing] damage to the environment and biosphere and stimulat[ing] the health and welfare of man.”⁵⁴ NEPA also lists more specific statutory goals as line-items, commanding the federal government to act as “trustee of the environment for succeeding generations,” to “assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings,” and to “attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.”⁵⁵

The primary operational provision of the Act, section 102, requires all federal agencies to create a detailed statement about “every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment.”⁵⁶ This statement must include: 1) the proposed action’s environmental impact; 2) unavoidable adverse effects of the proposed action; 3) alternatives to the proposed action; 4) the relationship between local short-term environmental uses and long-term productivity; and 5) any irreversible resource commitment the proposed action entails.⁵⁷ Over the years, this detailed report has come to be known as an “environmental impact statement” (“EIS”).⁵⁸

Because NEPA states that only “major Federal actions significantly affecting” the environment require environmental impact statements, agencies must make the threshold determination of whether a particular action triggers this NEPA obligation.⁵⁹ If the agency is unsure as to whether an EIS is required, it must complete an “environmental assessment” (“EA”).⁶⁰ Shorter and less resource-intensive than an EIS, an EA examines the “context” and “intensity” of a proposed action.⁶¹ If the agency determines the action will not significantly affect the environment, the agency then issues a “Finding of No Significant Impact”

54. 42 U.S.C. § 4321.

55. And these demands constitute only half of the list of goals! See 42 U.S.C. § 4331.

56. 42 U.S.C. § 4332(C).

57. *Id.*

58. See, e.g., *City of New York v. I.C.C.*, 4 F.3d 181, 182 (2d Cir. 1993) (referring to activities that “require a full environmental impact statement (“EIS”)”); 40 C.F.R. § 1501.4 (referring to “environmental impact statement”); *National Environmental Policy Act Review Process*, ENV’T. PROT. AGENCY (last updated Jan. 24, 2017), <https://www.epa.gov/nepa/national-environmental-policy-act-review-process> (summarizing the “EIS” process).

59. *Wildearth Guardians v. Zinke*, 368 F. Supp. 3d 41, 53 (D.D.C. 2019); 40 C.F.R. § 1501.4.

60. See 40 C.F.R. § 1501.4 (explaining that an agency must make its decision to regulate based on an environmental assessment if the proposed action does not categorically require or avoid environmental impact statements).

61. 40 C.F.R. § 1508.27.

(“FONSI”).⁶² Thus no EIS need be prepared.⁶³ Otherwise, the EA triggers an EIS. A typical EIS involves considerable resources. EISs can take several years to produce,⁶⁴ and a 2014 study placed average cost per EIS at \$2.9 million.⁶⁵ Given these numbers, it is perhaps unsurprising that agency EAs tend to result in findings of no significant impact much more frequently than they trigger EISs. Less than 1% of NEPA decisions involve an EIS.⁶⁶

When conducting an EIS, regulations require agencies to consider three types of consequences that might result from the proposed action: 1) direct effects; 2) indirect effects; and 3) cumulative effects.⁶⁷ Agencies must also consider these environmental impacts in EAs, although regulations allow “brief discussions” of the impacts, rather than the extended descriptions typical of EISs.⁶⁸ Direct effects are “caused by the action and occur at the same time and place.”⁶⁹ Indirect effects are also caused by the action but “are later in time or farther removed in distance, [yet] are still reasonably foreseeable.”⁷⁰ Regulations outline what might constitute indirect effects, including “growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems.”⁷¹ Finally, cumulative effects are those that result “from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person” takes the actions.⁷²

Agencies must also set the proper scope for their EIS analyses. The regulations provide that in evaluating the impact of a proposed action, agencies must consider “connected actions,” “cumulative actions,” and “similar actions.”⁷³ Actions are connected if they automatically trigger other actions that may require EIS analyses; if they “cannot or will not proceed unless other actions are taken previously or simultaneously;” or if they “are independent parts of a larger action and depend

62. 40 C.F.R. § 1508.13.

63. *Id.*

64. NAT’L ASS’N ENVTL. PROF’LS, ANNUAL NEPA REPORT 2015 13 (Karen Johnson ed., 2016) (“The 183 final EISs in our sample had an average preparation time . . . of 1841 ± 1347 days (5.0 ± 3.7 years)”).

65. U.S. GEN. ACCOUNTING OFFICE, GAO-14-369, NATIONAL ENVIRONMENTAL POLICY ACT: LITTLE INFORMATION EXISTS ON NEPA ANALYSES 12 (2014).

66. *Id.* at 7.

67. 40 C.F.R. § 1508.25.

68. *See* 40 C.F.R. § 1508.9(b).

69. 40 C.F.R. § 1508.8.

70. *Id.*

71. *Id.*

72. 40 C.F.R. § 1508.7.

73. 40 C.F.R. § 1508.25.

on the larger action for their justification.”⁷⁴ Cumulative actions are those which have cumulatively significant impacts when considered with other proposed actions.⁷⁵ And similar actions are those that share features, such as timing or geography, with other reasonably foreseeable or proposed agency actions, such that their environmental consequences ought to be evaluated together.⁷⁶

The requirement to consider certain actions together may overlap with the requirement to consider a project’s myriad effects.⁷⁷ For example, a proposed coal mining plan will produce greenhouse gas emissions from mining, transporting, and burning coal.⁷⁸ The environmental effects of coal transport should be discussed as effects of a “connected action” if the transport requires a separate federal approval, but they should also be discussed as indirect effects of the proposed coal mining plan.⁷⁹ This overlap of effect and action considerations enables NEPA to weave an expansive net that more comprehensively captures the environmental impacts of agency actions.

The suite of regulations governing federal agency NEPA obligations is promulgated by the White House Council on Environmental Quality (“CEQ”).⁸⁰ Established in section 202 of NEPA, CEQ sits in the Executive Office of the President.⁸¹ NEPA directs that members must have the training and experience “to analyze and interpret environmental trends and information of all kinds.”⁸² The Council has sundry responsibilities with respect to advising the President on environmental issues, but one of its chief obligations is to regulate and review agency NEPA decisions.⁸³

The Council does not approve or disapprove specific agency NEPA decisions;⁸⁴ nonetheless, if an agency departs from CEQ-approved procedures, the agency is vulnerable to lawsuits. Some courts have described CEQ regulations as

74. *Id.*

75. *Id.*

76. *Id.*

77. Burger & Wentz, *supra* note 32, at 129.

78. *Id.*

79. *Id.*

80. *Heartwood, Inc. v. U.S. Forest Serv.*, 230 F.3d 947, 949 (7th Cir. 2000) (“The Council on Environmental Quality (“CEQ”) administers NEPA and promulgates regulations related to NEPA that are binding on federal agencies.”).

81. 42 U.S.C. § 4342.

82. *Id.*

83. *See id.* (tasking CEQ with “apprais[ing] programs and activities of the Federal Government in the light of the policy set forth in title I of this Act”).

84. *See id.* (making no reference to the power to review agency decisions); *see also* CONG. RESEARCH SERV., RL33152 THE NATIONAL ENVIRONMENTAL POLICY ACT: BACKGROUND AND IMPLEMENTATION 1 (2011) (“CEQ was not authorized to enforce those regulations.”).

binding on agencies,⁸⁵ and the Supreme Court, as discussed in more detail below, has described CEQ's regulations as "entitled to substantial deference" in determining what is required by NEPA.⁸⁶ Thus, the regulations promulgated by CEQ have considerable sway over agency behavior. CEQ also drafts guidance that helps agencies understand their NEPA obligations and carry out best practices.⁸⁷ Courts have interpreted CEQ's guidance as advisory, rather than binding.⁸⁸

The Supreme Court has announced an arbitrary and capricious standard to review an agency's decision not to prepare an EIS.⁸⁹ And courts may force agencies to redo or supplement their analyses based on a similar arbitrary and capricious standard of review.⁹⁰ In the words of the Ninth Circuit, NEPA's goals "can be achieved only if the prescribed procedures are faithfully followed; grudging, pro forma compliance will not do."⁹¹ Accordingly, courts review NEPA analyses to ensure that agencies have taken a "hard look" at environmental impacts before reaching a decision.⁹²

85. *E.g.*, *Mid State Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 549 (8th Cir. 2003) (describing CEQ regulations as "binding on the agenc[y]"); *Nat. Res. Def. Council v. U.S. Dept. of Interior*, 397 F. Supp. 3d 430, 453-54 (S.D.N.Y. 2019) (describing CEQ as "promulgating rules applicable to and binding on all Federal agencies"). *But see* *Taxpayers of Michigan Against Casinos (TOMAC) v. Norton*, 433 F.3d 852, 861 (D.C. Cir. 2006) (noting that "the binding effect of CEQ regulations is far from clear").

86. *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 372 (1989); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 355-56 (1989); *Andrus v. Sierra Club*, 442 U.S. 347, 358 (1979). In some cases, a court may refer to CEQ guidelines both as "binding" and as "entitled to substantial deference." *E.g.*, *Nat. Res. Def. Council v. U.S. Dept. of Interior*, 397 F. Supp. 3d 430, 453-54 (S.D.N.Y. 2019). *But see* *TOMAC*, 433 F.3d at 861; *City of Alexandria v. Slater*, 198 F.3d 862, 866 n.3 (D.D.C. 1999) (saying CEQ is only empowered to issue binding regulations under executive order, not NEPA itself).

87. *See* *Front Page, NEPA.GOV*, <https://ceq.doe.gov/> (last visited Apr. 2, 2020) ("CEQ oversees NEPA implementation, principally through issuing guidance and interpreting regulations that implement NEPA's procedural requirements.").

88. *See e.g.*, *Andrus*, 442 U.S. at 356-7 (contrasting the binding nature of CEQ's regulations before and after President Carter's executive order changed the regulations from guidance to binding rules); *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 70 n.27 (D.D.C. 2019) (calling CEQ's guidance "not binding"); *San Juan Citizens All. v. U.S. Bureau of Land Mgmt.*, 326 F. Supp. 3d 1227, 1243 n.5 (D.N.M. 2018) (noting that CEQ guidance is nonbinding); *see also* CONG. RESEARCH SERV., *supra* note 84, at 10 (referring to CEQ's "informal" guidance as distinct from its regulations).

89. *Marsh*, 490 U.S. at 377 n.23.

90. *See* *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976) (citing *Nat. Res. Def. Council v. Morton*, 458 F.2d 827, 838 (D.C. Cir. 1972)) (describing how courts must ensure that agencies take a "hard look" at the environmental effects of a proposed action); *Lathan v. Brinegar*, 506 F.2d 677, 693 (9th Cir. 1974) (discussing the need to review procedure for serious flaws that prevent agencies from meeting NEPA's goals); Jason J. Czarnezki, *Revisiting the Tense Relationship Between the U.S. Supreme Court, Administrative Procedure, and the National Environmental Policy Act*, 25 STAN. ENV'T. L.J. 3, 13 (2006) (referring to APA as governing NEPA review).

91. *Lathan*, 506 F.2d at 693.

92. *See* *Robertson v. Methow Valley Citizen Council*, 490 U.S. 332, 350 (1989).

Agencies must scrutinize not only the environmental effects of the proposed action but also the environmental effects of “all reasonable alternatives . . . so that reviewers may evaluate their comparative merits.”⁹³ One of the alternatives must be a “no action” alternative.⁹⁴ The regulations identify the alternatives analysis process as “the heart of the environmental impact statement,”⁹⁵ and the Second Circuit has described this requirement as “the linchpin of the entire impact statement.”⁹⁶

Multiple cases have affirmed that climate change considerations are within NEPA’s ambit.⁹⁷ Agencies that fail to disclose and consider the significant greenhouse gas effects of their proposed projects and alternatives risk the chance that judges will find their analyses inadequate.⁹⁸

B. Actions from CEQ on Climate Change

As climate change has become a more pressing issue, CEQ has released guidance on the subject. The contours and limits of this guidance are discussed below.

Despite the muscular text of NEPA, courts have interpreted the statute as one of procedural rather than substantive force. The Supreme Court first declared NEPA a procedure-forcing law in 1978, in *Vermont Yankee Nuclear Power Corporation v. Natural Resources Defense Council*.⁹⁹ The Court asserted that, “NEPA does set forth significant substantive goals for the Nation, but its mandate to the agencies is essentially procedural.”¹⁰⁰ The Court noted that NEPA’s function was “to insure a fully informed and well-considered decision,” not to reach the same conclusion that the Court would have reached given the information at hand.¹⁰¹

Because of the clear and growing importance of climate change, in 2016, CEQ released guidance to instruct agencies on how to account for climate change

93. 40 C.F.R. § 1502.14.

94. *Id.*

95. *Id.*

96. *Monroe Cty. Conservation Council v. Volpe*, 472 F.2d 693, 697–98 (2d Cir. 1972).

97. *See infra* Part II.C.

98. *E.g.*, *Ctr. For Biological Diversity v. NHTSA*, 508 F.3d 508, 550 (9th Cir. 2007) (finding greenhouse gas emissions were cumulative impacts that should have been considered by agency in setting CAFE standards); *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 67–68 (D.D.C. 2019) (requiring accounting for greenhouse gases); *Border Power Plant Working Grp. v. DOE*, 260 F. Supp. 2d 997, 1028 (S.D. Cal. 2003) (finding EA was inadequate because agency failed to consider the effects of carbon dioxide emissions).

99. 435 U.S. 519, 548–49 (1978).

100. *Vermont Yankee*, 435 U.S. at 558.

101. *Id.* The Court affirmed this position in *Strycker’s Bay Neighborhood Council, Inc. v. Karlen*, 444 U.S. 223, 227 (1980).

consistently in the NEPA process.¹⁰² The guidance explained that agencies should consider a) the potential effects of a proposed action on climate change and b) the potential effects of climate change on the proposed action.¹⁰³ Agencies should quantify direct and indirect GHG emissions, and where such quantification proved impossible, agencies should include a qualitative analysis of these effects.¹⁰⁴ EIS analyses should allow agencies to consider “the short- and long-term effects and benefits in the alternatives and mitigation analysis.”¹⁰⁵ Although NEPA does not expressly require monetizing costs and benefits of projects, the CEQ guidance said that in cases in which agencies choose to perform economic analyses, valuations must take “into account best practices for cost-benefit analysis with strong theoretical underpinnings.”¹⁰⁶ CEQ highlighted the social cost of carbon as “a harmonized, interagency metric that can give decision makers and the public useful information.”¹⁰⁷ In sum, CEQ set a high but achievable bar for agencies that recognized the danger of climate change, its relevance to NEPA analyses, and the ways these analyses should incorporate climate considerations.

In 2017, shortly after President Trump’s election, CEQ withdrew its 2016 guidelines.¹⁰⁸ In June 2019, CEQ published a draft of weaker replacement guidance.¹⁰⁹ The new guidance allows a qualitative analysis of GHG emissions when “an agency determines that the tools, methods, or data inputs necessary to quantify a proposed action’s GHG emissions are not reasonably available, or [quantification] otherwise would not be practicable.”¹¹⁰ Agencies may also opt out of quantification when “information necessary for quantification is unavailable, not of high quality, or the complexity of identifying emissions would make quantification overly speculative.”¹¹¹

This noncommittal language opens the door to avoiding consideration of greenhouse gases if the effects are uncertain or speculative, and represents a departure from CEQ’s longstanding presumption in favor of gathering information, barring extraordinary circumstances in which obtaining information is exorbitantly

102. Memorandum from Council on Env’tl. Quality, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews 2 (2016).

103. *Id.* at 4.

104. *Id.*

105. *Id.* at 5.

106. *Id.* at 33 n.86.

107. *Id.*

108. Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions, 84 Fed. Reg. 30,097, 30,097 (June 26, 2019).

109. *See id.* at 30,098.

110. *Id.*

111. *Id.*

costly or no known means of collecting the information exists.¹¹² Moreover, CEQ claims that the social cost of carbon was “not intended for socio-economic analysis under NEPA or decision-making on individual actions, including project-level decisions,” thus discouraging its use.¹¹³

The Trump administration has also segmented projects to downplay climate impacts in NEPA analyses.¹¹³ Agencies routinely understate the climate impacts of projects by dividing proposed actions into more diminutive components, rather than considering all actions collectively.¹¹⁴ Defining a project narrowly offers a way to evade consideration of broader environmental impacts.

CEQ proposed new regulations in January 2020.¹¹⁵ The new regulations contain sweeping changes, some of which seem designed, at least in part, to limit climate change considerations.

First, the regulations eliminate the requirement to consider direct, indirect, and cumulative effects.¹¹⁶ Instead, CEQ claims, “effects should not be considered significant if they are remote in time, geographically remote, or the result of a lengthy causal chain.”¹¹⁷ This restriction could bar consideration of the global and future effects of climate change.¹¹⁸

Second, CEQ proposes that instead of considering “all reasonable alternatives,” agencies should consider only alternatives “which must meet the goals of the applicant, where applicable.”¹¹⁹ Agencies could easily narrowly define project goals—the goal to extract coal from a particular site, for example—and thus ignore environmentally beneficial alternatives.

Third, CEQ suggests that other analyses, like regulatory impact analyses (“RIAs”), can substitute for NEPA assessments.¹²⁰ So-called RIAs have a cost-based focus, not a science-centered one; agencies produce RIAs under the authority of an executive order that focuses on the need to assess not only environmental costs but also the cost to private industry, recognizing that “the private sector and private

112. See 40 C.F.R. § 1502.22 for current language. Courts continue to implement a hard look standard and do not merely accept an agency’s determination that quantitative data is overly speculative. See, e.g., *Citizens for a Healthy Cmty. v. U.S. Bureau of Land Mgmt.*, 377 F. Supp. 3d 1223, 1237 (D. Colo. 2019).

113. 84 Fed. Reg. at 30,099.

114. *Id.*

115. Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 1684 (Jan. 10, 2020).

116. *Id.* at 1707–08.

117. *Id.* at 1708.

118. See *supra* Part I.A.

119. 85 Fed. Reg. at 1701.

120. *Id.* at 1705.

markets are the best engine for economic growth.”¹²¹ Although RIAs could theoretically include comprehensive quantification and monetization of climate change effects, agencies could skirt in-depth conversations about environmental effects by using RIAs that emphasize savings to the regulated industry.

Finally, having eviscerated NEPA analysis, CEQ has attempted to prevent agencies from reviving more demanding procedures. The proposal includes a “provision [that] will prevent agencies from designing additional procedures that will result in increased costs or delays,” and requires that agencies “shall not impose additional procedures or requirements” for NEPA analyses.¹²² Thus, even agencies industrious and resourceful enough to investigate climate change effects may be blocked from doing so.

The proposal, now finalized,¹²³ is virtually certain to generate challenges in court, where the changes will likely be struck down as inconsistent with NEPA. Excluding temporally or geographically removed environmental effects is difficult to square with NEPA’s statutory imperative to produce a detailed statement on the “environmental impact of [a] proposed action,” “any adverse environmental effects,” and “the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity.”¹²⁴ The stated purpose of NEPA makes clear that the statute is concerned with fulfilling commitments not only to “all Americans,” but also to “succeeding generations,”¹²⁵ a focus that makes it difficult to narrowly construe the statutory requirement to consider “alternatives to the proposed action”¹²⁶ as only those that serve a particular agency’s whim. And Congress’s expending the better part of a provision explaining what must be included

121. Exec. Order No. 12,866, 58 Fed. Reg. 190 (Jan. 4, 1993); *See also* OFFICE OF INFO. & REGULATORY AFFAIRS, AGENCY CHECKLIST: REGULATORY IMPACT ANALYSIS 1, https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/inforeg/inforeg/regpol/RIA_Checklist.pdf (last visited Apr. 2, 2020) (attributing regulatory impact statements to Executive Order 12,866).

122. 85 Fed. Reg. at 1693.

123. Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 43,304 (July 16, 2020). Although the language has changed slightly, the proposed changes have by and large made their way into the final rule. For remote effects and significance, *see id.* at 43,375 (“Effects should *generally* not be considered significant if they are remote in time, geographically remote, or the product of a lengthy causal chain.”) (emphasis added to highlight new qualifier that was not in proposal). To see confining reasonable alternatives to those which “meet the goals of the applicant,” *see id.* at 43,376. To see the finalized changes with respect to substituting other analyses for NEPA analyses, *see id.* at 43,373, although the agency’s discussion no longer specifically references RIAs as possible substitutes. CEQ also finalizes the bar on agency ability to develop additional NEPA procedures at page 43,373.

124. 42 U.S.C. § 4332(C).

125. *Id.* § 4331(b)(1).

126. *Id.* § 4332(C).

in a “detailed statement” casts doubt on the legality of substituting other reports—like RIAs—for NEPA analyses.¹²⁷

Thus, agencies would be wise to prepare for a world in which climate change plays a central role in NEPA analyses. Unfortunately, because of CEQ’s regressive posture, agencies are less likely to consider the climate impacts of their actions adequately, more likely to reach suboptimal decisions, and more likely to find themselves in protracted NEPA litigation.

This Part explained the goals and function of NEPA. The next four parts explain how to fulfill the statute’s promise by describing current approaches and highlighting best practices to adequately account for climate change.

II. ACCOUNTING FOR DOWNSTREAM EMISSIONS

Downstream emissions provide a useful starting point for considering common shortcomings in NEPA climate analysis. These emissions have been the subject of considerable litigation, and after years of agency resistance, courts have coalesced around a position that such emissions must be considered in NEPA analyses. Agencies should take two lessons about downstream emissions: 1) Despite claims of infeasibility, agencies in fact possess the tools needed to calculate these emissions; and 2) Inadequate consideration of greenhouse gases may ultimately lead to slower progress on projects because of successful court challenges.

This Part begins by defining downstream emissions and explaining why NEPA regulations suggest such emissions must be accounted for in multiple contexts. The article then discusses the traditional regulatory approach to downstream emissions and judicial reactions. Finally, the Part ends by suggesting how agencies should analyze downstream emissions in NEPA analyses.

A. What Are Downstream Emissions?

Downstream emissions, as the name suggests, are those emissions that occur later in the supply chain than the project under NEPA consideration.¹²⁸ In the fossil fuel context, downstream emissions are typically those emitted after fuel transportation and include emissions caused by power plant operations and by the combustion of fuel.¹²⁹

As discussed in Part I, NEPA’s text requires accounting for “the environmental impact” of a project, as well as “any adverse environmental effects

127. *Id.*

128. “Downstream emissions” and “upstream emissions” are not terms coined for this article but are part of the parlance around emissions from projects. *See generally* Burger & Wentz, *supra* note 32.

129. *See e.g.*, *Sierra Club v. Fed. Energy Regulatory Comm’n*, 867 F.3d 1357, 1363 (D.C. Cir. 2017) (describing the “downstream end of Sabal Trail” linking to a power plant); *see also* BHP CO., SCOPE 3 EMISSIONS CALCULATION METHODOLOGY 2018 3 (2018) (defining downstream emissions as those related to “sold goods or devices”).

which cannot be avoided” if the project goes forward.¹³⁰ CEQ regulations have implemented this mandate by requiring agencies to consider both direct and indirect effects from projects.¹³¹ Indirect emissions—those caused by a project but removed in time or place¹³²—can be further divided into downstream and upstream effects.

Whether environmental impacts are direct, indirect downstream, or indirect upstream effects depends on the effects’ relation to the project under consideration. Consider emissions involved in fuel transportation—through a pipeline gas leak, for example. These emissions would qualify as direct emissions if the project under consideration were construction of the pipeline itself. But these emissions would be “downstream emissions” if the project considered were a gas extraction project supplying gas to the pipeline. Finally, these emissions would constitute “upstream emissions” if the analyzed project were a power plant supplied by the pipeline.

Several CEQ regulations suggest that downstream emissions are relevant to NEPA analyses in a number of different contexts. Depending on the specifics of a given project, an agency should consider downstream emissions as “indirect effects” or direct effects of “connected actions.”¹³³

Downstream emissions qualify as indirect effects because they are “removed in distance” from the project that causes them but nonetheless “are still reasonably foreseeable,” meeting CEQ’s definition of “indirect effects.”¹³⁴ For example, coal is burned at a different location from the coal mine where it is extracted or the railroad on which it is transported. But virtually all coal extracted is ultimately burned.¹³⁵ Thus, the greenhouse gases emitted from combusting coal are removed in time and place from extraction or transport projects but are foreseeable effects of both. Accordingly, agencies could describe downstream emissions as indirect effects in NEPA analyses.

In some cases, it may also be appropriate to describe downstream emissions as the direct effects of connected actions.¹³⁶ As discussed in Part I, actions are

130. 42 U.S.C. § 4332(C).

131. 40 C.F.R. § 1508.8.

132. *Id.* § 1508.8(b).

133. 40 C.F.R. § 1508.25. *See also* Burger & Wentz, *supra* note 32, at 168, 173 (describing means of accounting for upstream emissions).

134. 40 C.F.R. § 1508.8(b). These definitions come from the longstanding regulations the Trump administration has proposed to replace. Under the proposed regulations, indirect effects need not be considered and cannot be considered significant. 85 Fed. Reg. 1684, 1729 (Jan. 10, 2020) (“Effects should not be considered significant if they are remote in time, geographically remote, or the result of a lengthy causal chain.”). We focus on the preexisting regulations, because the proposed regulations are unlikely to survive legal challenge.

135. *See Coal Explained*, U.S. ENERGY INFO. ADMIN. (last updated May 9, 2019), <https://www.eia.gov/energyexplained/coal/use-of-coal.php> (discussing the primary uses of coal, and that burning is involved in those uses).

136. Burger & Wentz, *supra* note 32, at 169.

connected if one action automatically triggers the other, if one action cannot proceed unless the other occurs first, or if the actions are independent parts of a larger action.¹³⁷ In some cases, these descriptions may apply to various phases of the fossil fuel industry, particularly those situations in which agencies are evaluating permits for different parts of the fossil fuel chain at the same time.¹³⁸ If one agency is determining whether to lease land for natural gas extraction, for example, and no pipelines run to the area under consideration, then approving the lease may trigger the construction of a pipeline, because eventually the fuel produced must be transported. Similarly, building the pipeline only makes sense if the land is leased for natural gas extraction. This interdependence connects the two actions to each other. A NEPA analysis, therefore, should not look at either project in isolation but should consider the two projects' environmental effects together.

Regulatory requirements to consider multiple effects and actions in NEPA analyses make clear that agencies have a responsibility to account for downstream emissions. Perhaps for this reason, agencies do not use legal arguments, but feasibility claims, to evade disclosing these effects. The next section discusses agencies' inconsistent and unsatisfactory approach to downstream emissions.

B. Regulatory Approach to Downstream Emissions

Agencies are inconsistent when accounting for downstream emissions. Surveys of environmental impact statements over the past decade have revealed uneven treatment of downstream emissions from one agency to the next.¹³⁹ For example, one survey of EISs produced between 2009 and 2011 found that the Bureau of Land Management ("BLM") seldom calculated downstream emissions from combustion associated with mining projects,¹⁴⁰ while the Forest Service seldom quantified emissions at all,¹⁴¹ and the U.S. Army Corps of Engineers conducted full life-cycle analyses of projects' indirect emissions.¹⁴²

137. 40 C.F.R. § 1508.25(a)(1).

138. Burger & Wentz, *supra* note 32, at 171.

139. See generally AIMEE DELACH ET AL., DEFS. OF WILDLIFE, REASONABLY FORESEEABLE FUTURES: CLIMATE CHANGE ADAPTATION AND THE NATIONAL ENVIRONMENTAL POLICY ACT (2013); JESSICA WENTZ ET AL., SABIN CTR. FOR CLIMATE CHANGE LAW, SURVEY OF CLIMATE CHANGE CONSIDERATIONS IN FEDERAL ENVIRONMENTAL IMPACT STATEMENTS, 2012–2014 (2016); PATRICK WOOLSEY, SABIN CTR. FOR CLIMATE CHANGE LAW, CONSIDERATION OF CLIMATE CHANGE IN FEDERAL EISS, 2009–2011 (2012).

140. WOOLSEY, *supra* note 138, at 9.

141. *Id.* at 10.

142. *Id.* at 13. This difference in agency analysis is probably not due to a lack of resources of one agency relative to another. For example, the Forest Service issued guidance about how to account for climate change in NEPA analysis in 2009 and referenced efforts to update its model, but then said that it was "not necessary to calculate GHG emissions for most projects." FOREST SERV., CLIMATE CHANGE CONSIDERATIONS IN PROJECT LEVEL NEPA ANALYSIS 5 (2009), <https://www.fs.fed.us/emc/nepa/clim>

Even within the same agency—indeed, within the same field office—treatment of climate change effects may vary from one impact statement to the next. Consider the BLM Tres Rios Field Office in Colorado. In a 2018 EA evaluating the environmental impacts associated with approving a permit to drill a natural gas well, the Office quantified anticipated upstream and downstream GHG emissions.¹⁴³ Despite this quantification, the EA did not attempt to translate these emissions into climate effects, explaining that “[n]o analysis tools exist to describe the project’s incremental contributions to the global phenomenon of climate change.”¹⁴⁴ By contrast, the same field office produced a 2019 EA approving a coal mine expansion that not only quantified downstream GHG emissions¹⁴⁵ but referred to a Technical Resources Report, which contains an extended qualitative discussion of climate change effects nationally and on Colorado in particular.¹⁴⁶

Notwithstanding this unexplained variation in methodology among NEPA analyses, an examination of NEPA reports reveals some common fallacies. This section discusses each in turn.

1. Uncertainty and the Fallacy of Future Self-Restraint

Agencies commonly cite uncertainty to avoid accounting for downstream emissions. Lamenting the number of variables that pop up in the supply chain between production and combustion, an agency may claim it cannot meaningfully estimate a project’s downstream emissions.¹⁴⁷

One variety of the uncertainty excuse is the claim that agencies cannot be sure how much of the fossil fuel associated with a given project will ultimately be combusted. The argument runs as follows: Permit applicants might not mine or drill leases to full capacity, and those minerals that are extracted might not be burned.¹⁴⁸ We dub this excuse the “future self-restraint” fallacy. Essentially, agencies claim that

ate_change/includes/cc_nepa_guidance.pdf. The agency did not mention personnel or resource shortages as its justification for this position.

143. U.S. BUREAU OF LAND MGMT., HARPER 01-18 #2 NATURAL GAS WELL 15 (2018).

144. *Id.*

145. U.S. BUREAU OF LAND MGMT., DUNN RANCH AREA LEASE-BY-APPLICATION AND MINE PLAN MODIFICATION, at 3-10 to 3-11 (2019).

146. OFFICE OF SURFACE MINING RECLAMATION AND ENF’T, GCCE KING II MINE DUNN RANCH AREA LBA AND MINING PLAN MODIFICATION PROJECT TECHNICAL RESOURCES REPORT 12–16, 46–47 (2019).

147. See WOOLSEY, *supra* note 138, at 9–10. See, e.g., BUREAU OF OCEAN ENERGY MGMT., U.S. DEP’T OF THE INTERIOR, CENTRAL PLANNING AREA LEASE SALE 247: Draft Supplemental Impact Statement 4–6 (2017).

148. See, e.g., *Citizens for a Healthy Cmty. v. U.S. Bureau of Land Mgmt.*, 377 F. Supp. 3d 1223, 1237 (D. Colo. 2019); *Wilderness Workshop v. Bureau of Land Mgmt.*, 342 F. Supp. 3d 1145, 1155–56 (D. Colo. 2018); *High Country Advocates v. U.S. Forest Serv.*, 52 F. Supp. 3d 1174, 1196–97 (D. Colo. 2014).

permit applicants, for some unspecified reason, might exercise self-restraint in the future and leave some mineral resources in the ground. But this assumption is difficult to justify because permittees are likely to fully extract mineral resources for the same reason restaurant patrons are likely to finish an ice cream sundae: they paid for it, and it's theirs for the taking. Absent a concrete reason to expect that a lease will not be used to its full potential, it is irrational to assume permittees will leave money on the table by leaving minerals in the ground.¹⁴⁹

Strikingly, in other contexts, agencies treat full fossil fuel yield as an axiomatic truth. While invoking the future self-restraint fallacy to avoid calculating GHG emissions, agencies frequently assume 100 percent fossil fuel yield when calculating a project's anticipated profits.¹⁵⁰ This "all upside" fallacy—relying on assumptions about a project's benefits while rejecting the same assumptions as too uncertain in the context of a project's costs—crops up in multiple contexts and is discussed further in Part IV.

The Red Desert, discussed in the Introduction, provides an example of the "future self-restraint" fallacy at work. In 2015 and 2016, BLM issued 282 oil and gas leases covering 303,000 acres of federal land in Wyoming.¹⁵¹ As part of this process, the Bureau created several EAs discussing the environmental impacts of leasing.¹⁵² The EAs admitted that opening the lands to oil and gas drilling would have downstream climate impacts through the burning of the extracted fossil fuels, but skirted quantifying those impacts or finding them significant.¹⁵³ For example, one EA acknowledged that each of the parcel's wells contained roughly 0.00059 metric tons of carbon dioxide but then cited uncertainty about the extent to which these wells would ultimately be drilled as reason that it was "not possible to predict at this stage what level of emissions would occur."¹⁵⁴ In other words, the agencies argued, the permittees might exercise future self-restraint and not fully drill their wells.

This lack of quantification affected other parts of the EA. For instance, the agency could equivocate about the difference between the Bureau's proposal to lease all of the parcels immediately and the alternative of deferring leasing some of the

149. To bolster this intuitive position, consider that fossil fuel companies' stock prices are driven by the companies' proven mineral reserves. Peter R. Orszag, *Markets Are Putting a Price on Carbon Risks*, BLOOMBERG (Dec. 4, 2019), <https://www.bloomberg.com/opinion/articles/2019-12-04/carbon-risks-reflected-in-stock-prices>. If companies utilized only a fraction of their reserves, this would almost certainly lower their stock prices.

150. *See id.*

151. *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41, 55 (D.D.C. 2019).

152. *WildEarth Guardians*, 368 F. Supp. 3d at 55–56.

153. *See id.* (summarizing the EAs' treatment of climate change and noting that a FONSI was issued at each stage).

154. BLM, AUGUST 2015 LEASE PARCELS: WIND RIVER / BIGHORN BASIN DISTRICT, DOI-BLM-WY-R000-2015-0001-EA 4–31 (2015) [hereinafter WIND RIVER EA].

parcels.¹⁵⁵ Because “the level of development [was] unknown” under either scenario, the difference in greenhouse gas emissions could not be quantified, the agency argued.¹⁵⁶ The Bureau dispensed with the entire comparative discussion in two sentences.¹⁵⁷

Ostensible uncertainty about the extent of drilling also allowed the agency to shrug off its duty to perform a cumulative impact analysis. Nodding to the thousands of active, producible, or serviceable wells around the proposed leasing region, the Bureau claimed an inability to determine the net impact of these multitudinous sites.¹⁵⁸ Because the assessment of greenhouse gases was “in its formative phase,” the Bureau explained, it was impossible to know the project’s “incremental effects on climate change globally or in the area of these site-specific actions.”¹⁵⁹

Throughout the EA’s abbreviated discussions of climate change, the Bureau repeatedly emphasized uncertainty, but it always seemed to interpret that uncertainty as an invitation to press forward with its lease sales rather than to proceed with caution.¹⁶⁰ In fact, at one point, the agency catalogued the many sources of uncertainty in its considerations, including price swings, resource limitations, regulatory changes, and the volume of gases vented from processing facilities.¹⁶¹ But never did the agency consider this uncertainty as sufficient reason to either engage in a more detailed EIS or to restrain leasing. Instead, the agency found no significant environmental impact in each EA and decided to move forward with the lease sales.¹⁶²

2. The “Our Hands Are Tied” Fallacy

A second tack an agency may use to evade accounting for greenhouse gases is the claim that other authorities play a role in the permitting process, and thus the lead NEPA agency lacks authority over the decision resulting in GHG emissions. For example, an agency in charge of approving whether land is leased for coal mines might argue that it has no authority over the way in which that coal is extracted, transported, and combusted. Thus, the argument runs: the agency approving the

155. *See id.* at 4–38 (describing modified and deferred alternative).

156. *Id.* at 4–39.

157. *Id.*

158. *See id.* at 4–47 (citing 847 wells in the Lander Field Office and 2,598 wells in the Cody and Worland Field Offices).

159. *Id.*

160. *See id.* at 4–31, 4–39, 4–47 (citing uncertainty, but never interpreting that uncertainty as reason not to proceed with leasing).

161. *Id.* at 4–48.

162. *See WildEarth Guardians, v. Zinke*, 368 F. Supp. 3d 41, 55 (D.D.C. 2019) (stating that each EA resulted in a FONSI).

lease need not consider downstream emissions over which it has no jurisdictional control. This claim springs from Supreme Court precedent that agencies need not consider environmental effects in NEPA analyses if the agencies have no power to prevent those emissions.¹⁶³ The Federal Energy Regulatory Commission has brandished the excuse for years in what amounts to an argument that the agency's "hands are tied."¹⁶⁴ But agencies often do have authority over the decision.¹⁶⁵ Courts' skepticism of this excuse is discussed in the following section on case law.

3. The "Frivolous Fraction" Fallacy

Finally, even if an agency does account for downstream greenhouse gas emissions, the agency may dodge finding a project's impacts to be "significant," often by comparing the project's emissions to national or global GHG emissions. The result, inevitably, is that each project's emissions are dwarfed by comparison to a vast denominator; the very fact that climate change poses such a huge threat allows agencies to move forward with projects worsening climate change. This Article refers to this argument as the "frivolous fraction" fallacy.

BLM's Wyoming leases again provide a useful illustration. In addition to avoiding quantification of downstream emissions, the Bureau further trivialized the greenhouse gas implications of the lease sales by comparing the project's downstream emissions with national or global emissions.¹⁶⁶ Because global greenhouse gas emissions pose such an enormous problem, the Bureau suggested, "the amount released as a result of potential production from the proposed lease tracts would not have a measurable effect."¹⁶⁷

The traditional neglect of downstream emissions, however, may be changing. Seven of the nine EISs for fossil fuel related projects completed between 2017 and 2018 quantified downstream greenhouse gas emissions.¹⁶⁸ But over the same period, most agencies failed to examine cumulative effects of other ongoing projects in NEPA analyses.¹⁶⁹ And all of those EAs resulted in findings that no significant

163. *Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752, 770 (2004).

164. *See, e.g., WildEarth Guardians v. Office of Surface Mining, Reclamation & Enft*, 104 F. Supp. 3d 1208, 1230 (D. Colo. 2015); *Dine Citizens Against Ruining Our Env't v. Office of Surface Mining, Reclamation & Enft*, 82 F. Supp. 3d 1201, 1217 (D. Colo. 2015). The D.C. Circuit dispensed with this excuse in *Sierra Club v. Fed. Energy Regulatory Comm'n.* 867 F.3d 1357, 1374 (D.C. Cir. 2017). *But see* *Tenn. Gas Pipeline Co.*, 169 FERC ¶ 61,230, 62,841 (2019) (McNamee, Comm'r, concurring) (rejecting the D.C. Circuit's reasoning in a FERC Concurrence).

165. *See infra* Part II.C.

166. WIND RIVER EA, *supra* note 153, at 4-31.

167. *Id.*

168. SIEGEL & LOZNAK, *supra* note 17, at 17.

169. *Id.* at 10.

impacts to the environment would occur, thus avoiding full EISs.¹⁷⁰ Despite the independent findings of insignificance, these EA projects, if considered together, would pump between 654 to 683 million metric tons of carbon dioxide into the atmosphere, equivalent to the annual emissions of at least 139 million cars.¹⁷¹

Improvements in accounting for downstream emissions likely spring from court decisions, which have increasingly demanded that agencies account for downstream emissions in NEPA analyses. The next section will examine the state of case law on the subject.

C. Case Precedent

Courts have repeatedly found that downstream emissions are foreseeable indirect effects of leases for fossil fuel production and approval of pipelines or railroads. Thus, these indirect effects must be accounted for and quantified where possible.¹⁷²

Courts have chipped away at agencies' uncertainty excuses in a few ways. First, they have found fuel production to be the proximate cause of fuel consumption.¹⁷³ In *San Juan Citizens Alliance v. Bureau of Land Management*, a 2018 case challenging an EA related to leasing several parcels for oil and gas, the Bureau claimed that downstream emissions from all uses of the oil and gas, including combustion, were not proximately caused "indirect effects" and could thus be ignored.¹⁷⁴ The court rejected this argument, noting that several courts had determined that consumption-related downstream emissions were indirect effects and that these effects should be accounted for in NEPA analyses as early as feasible.¹⁷⁵

170. *Id.* at 3.

171. *Id.* at 3. For car equivalency, see *Greenhouse Gas Equivalencies Calculator*, ENV'T. PROT. AGENCY (last updated Dec. 2019), <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (equating 654 million metric tons of carbon dioxide to 138,853,503 cars).

172. *E.g.*, *Sierra Club v. Fed. Energy Regulatory Comm'n*, 867 F.3d 1357, 1371 (D.C. Cir. 2017); *San Juan Citizens All. v. BLM*, 326 F. Supp. 3d 1227, 1244 (D.N.M. 2018); *West. Org. of Res. Councils v. BLM*, No. CV 16-21-GF-BMM, 2018 WL 1475470, at *13 (D. Mont. Mar. 26, 2018); *Montana Env't. Info. Ctr. v. U.S. Office of Surface Mining, Reclamation & Enft*, No. CV 15-106-M-DWM, 2017 WL 5047901, at *3 (D. Mont. Nov. 3, 2017).

173. *See, e.g.*, *San Juan Citizens All. v. BLM*, 326 F. Supp. 3d 1227, 1242–43 (D.N.M. 2018); *Sierra Club v. Fed. Energy Regulatory Comm'n*, 867 F.3d 1357, 1374 (D.C. Cir. 2017); *Montana Env't. Info. Ctr. v. U.S. Office of Surface Mining*, No. CV 15-106-M-DWM, 2017 WL 5047901, at *3, 10 (D. Mont. Nov. 3, 2017); *WildEarth Guardians v. U.S. Office of Surface Mining, Reclamation & Enft*, 104 F. Supp. 3d 1208, 1229–30 (D. Colo. 2015); *Dine Citizens Against Ruining Our Env't v. U.S. Office of Surface Mining Reclamation & Enforcement*, 82 F. Supp. 3d 1201, 1213 (D. Colo. 2015).

174. *San Juan Citizens All.*, 326 F. Supp. 3d at 1242 ("By 'downstream,' Plaintiffs are referring to all emissions produced through and including the end-use combustion of the oil and gas produced by wells developed on the subject leases.").

175. *Id.* at 1242–43.

Notably, in this case, a generalized discussion of the perils of climate change without a more specific accounting of the effects of the project at issue did not pass muster.¹⁷⁶ In several courts' eyes, the existence of a known end-user, like a specific power plant, further undermines future self-restraint arguments about downstream emissions.¹⁷⁷ In such cases, "there is virtually no uncertainty regarding when, where, and how" the fuel extracted will be combusted.¹⁷⁸

Second, agencies may not rely on anticipated fuel use to estimate project benefits but decline to use those anticipated amounts to quantify downstream emissions. In the 2019 case *Citizens for a Healthy Community v. Bureau of Land Management*, the District Court of Colorado found that if an agency relies on certain assumptions to estimate a project's benefits, it must also consider costs related to those assumptions.¹⁷⁹ The Bureau relied on production estimates to summarize the benefits of a master development plan for natural gas wells but claimed those estimates were too speculative to rely on for the purposes of emissions quantification.¹⁸⁰ The court found that the Bureau acted in an arbitrary and capricious fashion in producing this explanation.¹⁸¹ This reasoning reflected the court's opinion the preceding year in *Wilderness Workshop v. Bureau of Land Management*, in which the Bureau arbitrarily cited fossil fuel extraction predictions to tout a project's benefits but claimed these projections were speculative when considering downstream emissions.¹⁸²

Courts are more receptive to claims about uncertainty in the context of cumulative impacts, which include fossil fuel impacts beyond those of the project at hand. In *Citizens for a Healthy Community*, the District of Colorado demanded quantification of downstream emissions as indirect effects but upheld the Bureau's generalized discussion of cumulative impacts.¹⁸³ In the Bureau's cumulative impacts discussion, the agency described GHG effects generally and provided quantities of statewide emissions.¹⁸⁴ The court credited the agency's explanation that it lacked "standardized protocols or specific levels of significance by which to quantify climate

176. *Id.* at 1248–49.

177. *E.g.*, *Birckhead v. Fed. Energy Regulatory Comm'n*, 925 F.3d 510, 518–19 (D.C. Cir. 2019); *Sierra Club v. Fed. Energy Reg. Comm'n*, 867 F.3d 1357, 1371–72 (D.C. Cir. 2017); *WildEarth Guardians*, 104 F. Supp. 3d at 30; *Dine Citizens*, 82 F. Supp. 3d at 1212–13.

178. *Dine Citizens*, 82 F. Supp. 3d at 1213.

179. *Citizens for a Healthy Cmty. v. Bureau of Land Mgmt.*, 377 F. Supp. 3d 1223, 1237–39 (D. Colo. 2019); *see also* *High Country Conservation Advocates v. U.S. Forest Serv.*, 52 F. Supp. 1174, 1189–91 (D. Colo. 2014) (finding agencies' decision to quantify benefits but not costs of GHGs arbitrary and capricious).

180. *Citizens for a Healthy Cmty.*, 377 F. Supp. 3d at 1237.

181. *Id.*

182. 342 F. Supp. 3d 1145, 1155–56 (D. Colo. 2018).

183. 377 F. Supp. 3d at 1238–39.

184. *Id.*

impacts.”¹⁸⁵ In *Wilderness Workshop*, the court similarly found the cumulative impacts discussion of climate change was sufficient, holding that more specific analyses were better reserved for specific well-siting decisions that would be made in the future.¹⁸⁶ If petitioners could point to tools agencies could use, agencies might lose this defense.

Third, courts have taken a narrow view of when agencies can avoid considering downstream greenhouse gas emissions based on the agency’s ostensible lack of control over such emissions—the “our hands are tied” fallacy. In 2015, the Office of Surface Mining, Reclamation, and Enforcement argued to the District Court of Colorado that it had no obligation to consider downstream emissions from burning coal as part of the decision to approve state mining plans.¹⁸⁷ After all, the agency argued, it only possessed the power to approve or deny the plan; any restrictions to make the plan more environmentally friendly must begin with the State of Colorado.¹⁸⁸ The court rejected this argument, finding that although the agency could not itself implement such regulations, the agency nonetheless had discretion to approve or reject the plan.¹⁸⁹ Because downstream coal burning was a foreseeable indirect effect of approval, the agency must consider those downstream emissions as part of its decision.¹⁹⁰ The District of Colorado rejected a similar argument by the same agency with respect to its failure to consider downstream coal combustion for another mining expansion project.¹⁹¹

In 2017, in a case commonly referred to as *Sabal Trail* after the name of the pipeline at its center,¹⁹² the D.C. Circuit adopted the same reasoning and determined that FERC, which approves the construction of interstate pipelines, must consider downstream gas combustion as indirect effects in NEPA analyses.¹⁹³ The Commission argued it lacked statutory discretion to consider such emissions in deciding whether to approve pipelines.¹⁹⁴ But the court found that because the Commission was required by statute to assess “the public convenience and necessity” of a pipeline, the agency could deny a pipeline based on environmental harm, and therefore the agency’s hands were not tied.¹⁹⁵ The Court also rejected the

185. *Id.* at 1239.

186. 342 F. Supp. 3d at 1158.

187. *WildEarth Guardians v. Office of Surface Mining, Reclamation & Enft*, 104 F. Supp. 3d 1208, 1230 (D. Colo. 2015).

188. *WildEarth Guardians*, 104 F. Supp. at 1230.

189. *Id.*

190. *Id.*

191. *Dine Citizens Against Ruining Our Env’t v. Office of Surface Mining, Reclamation & Enft*, 82 F. Supp. 3d 1201, 1217 (D. Colo. 2015).

192. *Sierra Club v. Fed. Energy Regulatory Comm’n*, 867 F.3d 1357 (D.C. Cir. 2017).

193. *Sierra Club*, 867 F.3d at 1374.

194. *See id.* at 1372.

195. *Id.* at 1373.

Commission's "future self-restraint" argument. Although FERC claimed uncertainty as to the exact quantity of greenhouse gases that would ultimately be released from power plants, the court noted that the EIS included a useful proxy: an estimate of how much gas would be transported through the pipeline per day.¹⁹⁶ In a subsequent case, the D.C. Circuit declined to make quantification of downstream emissions a requirement of all NEPA analyses, clarifying that assessments should be analyzed on a case-by-case basis.¹⁹⁷ But the court did provide some general guidance: if agencies ignored downstream emissions based on an ostensible lack of information but failed to take reasonable steps to acquire the information—like asking the company seeking a permit for projected fuel numbers, for example—then the court suggested it would side with challengers.¹⁹⁸

WildEarth Guardians v. Zinke, concerning the Wyoming lease sales in the Red Desert, pulled these trends together. In March 2019, the D. C. District Court considered environmental groups' claims against BLM for failure to adequately account for climate change in its Wyoming lease sales for oil and gas extraction.¹⁹⁹ As discussed above, the EAs associated with these sales discussed climate change at a high level, failed to quantify downstream greenhouse gas emissions, and emphasized uncertainty as to the extent to which gas would be extracted at the wells' full capacity.²⁰⁰

The D.C. District Court found that the downstream use of oil and gas was the "project's entire purpose" and that downstream emissions should thus be considered foreseeable indirect effects of the leases.²⁰¹ The court rejected the Bureau's claim that it lacked authority to act on information about environmental harms caused by these downstream emissions.²⁰² Moreover, the court demanded that these downstream emissions either be quantified or that the agency explain in detail why such quantification was not reasonably possible.²⁰³ The court also found the generalized discussion of cumulative impacts unsatisfactory.²⁰⁴ The agency could not conclusively state that the project's impacts on climate change would be dwarfed by the global scale of the problem.²⁰⁵ Instead, the agency had to quantify the emissions

196. *Id.* at 1373–74.

197. *Birckhead v. Fed. Energy Regulatory Comm'n*, 925 F.3d 510, 519 (D.C. Cir. 2019).

198. *Birckhead*, 925 F.3d at 520.

199. *WildEarth Guardians v. Zinke*, 368 F. Supp. 3d 41 (D.D.C. 2019).

200. *Id.* at 56–57.

201. *Id.* at 73.

202. *Id.* at 74.

203. *Id.* at 75.

204. *Id.* at 77.

205. *Id.*

of its past, present, and future actions and consider them in regional and national contexts.²⁰⁶

The ruling had significant impacts on the Bureau. To correct the shortcomings in its NEPA analyses, and possibly prevent additional adverse court rulings, the Bureau suspended not only the Wyoming leases at issue in *WildEarth Guardians v. Zinke* but Colorado and Utah leases as well, where the agency's NEPA analysis suffered from similar flaws.²⁰⁷ The suspended area amounts to roughly one million acres.²⁰⁸

In sum, over the last ten years, courts have raised the bar for agencies to account for downstream emissions. Agencies that fail to properly account for such emissions will face repercussions.

But not all agency leaders are adjusting to the courts' position. Writing a concurrence in November 2017 to an order that approved an interstate natural gas pipeline, FERC Commissioner McNamee insisted that FERC was unable to consider greenhouse gas emissions under NEPA and explained that he "respectfully disagree[s] with the [D.C. Circuit] court's finding that the Commission can . . . deny a pipeline based on environmental effects."²⁰⁹ This position placed the Commissioner in open defiance of the D.C. Circuit's opinion in *Sabal Trail*.

The next section discusses approaches that agencies can take to better account for downstream emissions. Agencies should incorporate downstream emissions accurately to better inform their own decisions, provide the public with meaningful information, and gird themselves against legal challenges.

D. Solutions for Governmental Agencies

Agencies should summon the same ingenuity and thoroughness that they rally in calculating the upsides of projects when calculating those projects' downstream emissions. If agencies use numeric estimates to determine the benefits of a project by estimating the amount of fuel to be extracted, transported, processed, and burned, then these same numbers can and should be used to estimate the project's downstream emissions. Quantifying benefits but not costs is arbitrary and capricious when costs are just as readily quantifiable.²¹⁰

206. *Id.*

207. Nicholas Kusnetz, *U.S. Suspends More Oil and Gas Leases Over What Could Be a Widespread Problem*, INSIDE CLIMATE NEWS (Nov. 17, 2019), <https://insideclimatenews.org/news/17112019/oil-gas-leases-suspended-climate-impact-federal-nepa-assessment-blm-utah-colorado-wyoming>.

208. *Id.*

209. *Tenn. Gas Pipeline Co.*, 169 FERC ¶ 61,230, 62,850 (Dec. 19, 2019) (McNamee, Comm'r, concurring).

210. *E.g.*, *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1198 (9th Cir. 2008) (finding it impermissible for an agency to "put a thumb on the scale by undervaluing the benefits and overvaluing the costs of more stringent standards"); *see also* *Sierra Club v. Sigler*, 695 F.2d 957, 979 (5th Cir. 1983) (holding that an agency "cannot tip the scales . . . by promoting [the action's]

That some agencies are already quantifying downstream emissions points to the feasibility of this approach. For example, in 2017, the BLM Tres Rios Field Office and the Office of Surface Mining Reclamation and Enforcement completed an EA including upstream and downstream emissions associated with a coal mine expansion.²¹¹ Although the actual coal that would be produced and transported would depend on coal markets, the agencies assumed maximum allowable coal recovery as a conservative approach that would consider environmental impacts in a worst-case scenario.²¹² And in two 2018 EAs considering the effects of approving permits to drill natural gas wells, BLM quantified downstream greenhouse gas emissions as reasonably foreseeable indirect effects.²¹³ The agency based emission estimates on common practices reported by oil and gas operators and project-specific information provided by the permit applicant.²¹⁴ Where the Bureau lacked specific information, the agency made reasonable assumptions: the Bureau assumed that “completed wells are all brought online during the construction year” and that “100% of the produced minerals are eventually combusted.”²¹⁵ The Bureau also relied on EPA’s combustion emissions factors²¹⁶ to determine the gases released.²¹⁷ Such practices should be shared within and across agencies.

BLM’s approach in the above EAs provides some general principles that agencies should adopt to account for downstream emissions. If agencies lack the information necessary to make emissions estimates, then agencies should seek that information out from parties that might have it, including the parties seeking permits. Failure to make a thorough investigation reflects a lack of preparation and

possible benefits while ignoring [its] costs”); *Pub. Citizen, Inc. v. Mineta*, 340 F.3d 39, 56–58 (2d Cir. 2003) (holding that a rule “that does not explain why the costs saved were worth the benefits sacrificed” is arbitrary and capricious”).

211. *See generally* BLM, ENVIRONMENTAL ASSESSMENT, (DOI-BLM-CO-S010-2011-0074-EA), FEDERAL COAL LEASE (COC-62920) MODIFICATION AND FEDERAL MINE PERMIT (CO-0106A) REVISION AND RENEWAL 12 (Oct. 12, 2017), <https://bit.ly/2ufWNSL> (“2017 KING II MINE EA”).

212. *See id.* at 76 (assuming maximum allowable coal recovery). The Environmental Protection Agency makes similar maximum emissions assumptions in other contexts. *See, e.g.*, ENV’T. PROT. AGENCY, NEW SOURCE REVIEW WORKSHOP MANUAL app. C, at c.1 (1990), <https://www.epa.gov/sites/production/files/2015-07/documents/1990wman.pdf>; *see also* HEIN ET AL., *supra* note 33, at 24.

213. BUREAU OF LAND MGMT., ENVIRONMENTAL ASSESSMENT FOR HARPER 01-18 #2 NATURAL GAS WELL 15 tbl.3 (2018); BUREAU OF LAND MGMT., ENVIRONMENTAL ASSESSMENT FOR TABOR #1 NATURAL GAS WELL RE-ENTRY 8–9 (2018).

214. *See* BUREAU OF LAND MGMT., ENVIRONMENTAL ASSESSMENT FOR TABOR #1 NATURAL GAS WELL RE-ENTRY 8 (2018).

215. *Id.*

216. *Id.*; ENV’T. PROT. AGENCY, EMISSION FACTORS FOR GREENHOUSE GAS INVENTORIES, https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf (last updated Apr. 4, 2014).

217. *See* BUREAU OF LAND MGMT., ENVIRONMENTAL ASSESSMENT FOR TABOR #1 NATURAL GAS WELL RE-ENTRY 8 (2018).

could lead to failure in the courts.²¹⁸ If parties cannot provide information specific to the project, then agencies may still be able to rely on generally applicable assumptions from other representative practitioners or projects in the industry.

In cases of uncertainty, agencies should define the upper bound of emissions as those based on the combustion of the project's maximum amount of fuel. If agencies wish to include a lower bound as well, they should assume that a project will meet at least the amount already committed to by regulated parties. For example, if a shipper commits to paying for a given volume of gas from a proposed pipeline, then agencies can assume that at least that amount of gas will be produced, transported, and burned as part of the project.²¹⁹

Agencies should also seek out information from preexisting emission inventories. BLM has evaluated permits for natural gas wells in Colorado by relying on Colorado's Comprehensive Air Resource Protection Protocol ("CARPP") and the Colorado Air Resource Management Modeling Study ("CARMMS").²²⁰ The former provides guidelines to assessing activities that may adversely affect air quality in Colorado and requires oil and gas permit seekers to submit comprehensive inventories of "direct and indirect emissions associated" with proposed projects.²²¹ CARPP includes greenhouse gas emissions in the required inventory. CARMMS, meanwhile, provides "cumulative analyses for multiple projected oil and gas development scenarios in Colorado".²²² Such inventories and modeling tools provide agencies with valuable information and methodology for calculating emissions.

Even if states lack inventories, federal agencies should examine the extent to which they can utilize the EPA State Inventory Tool,²²³ like the National Oceanic and Atmospheric Administration did in an EIS considering drilling exploration in the Arctic.²²⁴ To the extent possible, federal agencies and states should work together

218. See *Nat'l Audubon Soc'y v. Dep't of Navy*, 422 F.3d 174, 185 (4th Cir. 2005) (stating that the "hard look" requirement "encompasses a *thorough investigation* into the environmental impacts of an agency's action") (emphasis added); see also *Am. Wild Horse Pres. Campaign v. Perdue*, 873 F.3d 914, 931 (D.C. Cir. 2017) (finding that an agency's EA did not "accurately identifi[y] the relevant environmental concern" — and instead took a "head-in-the-sand approach" which the court stated "is the antithesis of NEPA's requirement that an agency's environmental analysis candidly confront the relevant environmental concerns").

219. HEIN ET AL., *supra* note 33, at 25.

220. BLM, ENVIRONMENTAL ASSESSMENT: CRESTONE PEAK REGNIER FARMS APDS, DOI-BLM-CO-F020-2019-0016 EA 12 (2019).

221. COLO. BUREAU OF LAND MGMT., COMPREHENSIVE AIR RESOURCE PROTECTION PROTOCOL (CARPP) 4–7 (2015).

222. BLM, ENVIRONMENTAL ASSESSMENT: CRESTONE PEAK REGNIER FARMS APDS, DOI-BLM-CO-F020-2019-0016 EA 12 (2019).

223. *State Inventory and Projection Tool*, ENV'T. PROT. AGENCY, <https://www.epa.gov/state-localenergy/state-inventory-and-projection-tool> (last updated Nov. 26, 2019).

224. NAT'L OCEANIC AND ATMOSPHERIC ADMIN., EFFECTS OF OIL & GAS ACTIVITIES IN THE ARCTIC OCEAN FINAL ENVIRONMENTAL IMPACT STATEMENT 3-22-3-23 (2016).

to develop informational inventories and modeling tools for greenhouse gas emissions. These tools can borrow techniques from other sources. For example, the United Nations has released developed methodologies and produced data to aid countries in calculating greenhouse gas inventories.²²⁵ The United States has used these methods in calculating its own nationwide greenhouse gas inventory.²²⁶

Although agencies need not wait for CEQ to implement best practices, CEQ plays an important role in promulgating guidance for agencies and standardizing agency approaches. After CEQ released final guidance requiring agencies to consider greenhouse gas emissions in 2016, the Bureau of Ocean Energy Management (“BOEM”) cooperated with other federal agencies to “prepare a report quantifying both upstream and downstream emissions related to . . . oil and gas production and consumption.”²²⁷ BOEM specifically cited CEQ’s guidance as guiding its “full lifecycle” approach.²²⁸ While the report still contained some flaws in assessing net greenhouse gas emissions as a result of energy substitution errors, discussed in Part IV, it was nonetheless a step in the right direction for NEPA’s twin aims of informed agency decision-making and public participation. Such reports both standardize an agency’s own decisions and can improve the NEPA analyses of sister agencies.

Agencies have many tools at their disposal to meet courts’ growing demands with respect to accounting for downstream emissions in NEPA analyses. The next Part will discuss an area in which the courts’ mandates are less clear.

III. ACCOUNTING FOR UPSTREAM EMISSIONS

Courts have not examined upstream emissions from greenhouse gases to the same extent that they have examined downstream emissions. As a result, there is less judicial consensus that such emissions must be covered in NEPA analyses.²²⁹ But to meet the twin goals of NEPA—to fully consider governmental decisions and to accurately inform the public of environmental consequences—agencies must consider upstream emissions in their analyses.

225. ENV’T. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2007 ES-1 (2009) (reporting on greenhouse gas emission trends completed to comply with the U.S.’s obligations under the United Nations Framework Convention on Climate Change).

226. *Id.*

227. BUREAU OF OCEAN ENERGY MGMT., GULF OF MEXICO OCS OIL AND GAS LEASE SALE: 2017, CENTRAL PLANNING AREA LEASE SALE 247, FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT 4–11 (2016).

228. *Id.*; accord BUREAU OF OCEAN ENERGY MGMT., *FORWARD TO OCS OIL AND NATURAL GAS: POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS AND SOCIAL COST OF CARBON* (2016), <https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/Leasing/Five-Year-Program/2017-2022/OCS-Report-BOEM-2016-065---OCS-Oil-and-Natural-Gas---Potential-Lifecycle-GHG-Emissions-and-Social-Cost-of-Carbon.pdf>.

229. *See infra* Part III.C.

A. *What Are Upstream Emissions?*

Upstream emissions, as the name suggests, are those emissions that occur earlier in the supply chain relative to the project under consideration.²³⁰ In the fossil fuel context, upstream emissions are typically those created by the extraction of fuel required for a project, and sometimes by the processing and transportation of fuel as well.²³¹ For example, establishing a coal mine affects the climate in various ways. The coal company may strip away carbon-consuming forest to make way for mining equipment.²³² Methane leaks into the air when machines carve up the rock that held the gas captive.²³³ And equipment—the trucks that haul coal on site, for instance—emit their own greenhouse gases.²³⁴ Such emissions are “direct effects” if the project under consideration is a lease for coal mining, but they are upstream effects for transportation projects, like building a railroad to haul coal.

As with downstream emissions, under NEPA, agencies must account for these upstream emissions in more than one regulatory context: as “indirect effects” or as direct effects of “connected actions.”²³⁵

B. *Regulatory Approach to Upstream Emissions*

The federal government has generally fallen short of its duty to account for upstream emissions. As with downstream emissions, agencies often claim that upstream emissions are too speculative to consider.

The Mountain Valley Pipeline, a proposed 303-mile natural gas line that would snake through Virginia,²³⁶ West Virginia,²³⁷ the Jefferson National Forest,²³⁸

230. *Upstream Emissions*, EUROPEAN COMM’N, https://knowledge4policy.ec.europa.eu/glossary-item/upstream-emissions_en (last visited Nov. 22, 2019).

231. *Id.*

232. See Elizabeth McGowan, *Reclaiming Appalachia: A Push to Bring Back Native Forests to Coal Country*, YALE ENVIRONMENT 360 (Dec. 14, 2017), <https://e360.yale.edu/features/reclaiming-appalachia-a-push-to-bring-back-native-forests-to-coal-country> (describing the deforestation that occurred to make way for mining).

233. JAYNI FOLEY HEIN & PETER HOWARD, ILLUMINATING THE HIDDEN COSTS OF COAL, INST. FOR POL’Y INTEGRITY A3 (2015).

234. *Id.*

235. 40 C.F.R. § 1508.25. See also Burger & Wentz, *supra* note 32, at 168, 173 (describing means of accounting for upstream emissions).

236.

Mountain Valley Pipeline, MOUNTAIN VALLEY PIPELINE, <https://www.mountainvalleypipeline.info> (last visited Dec. 4, 2019).

237. *Id.*

238. FED. ENERGY REGULATORY COMM’N, MOUNTAIN VALLEY PROJECT AND EQUITRANS EXPANSION PROJECT FINAL ENVIRONMENTAL IMPACT STATEMENT, FERC/FEIS-0272F ES-9 (2017).

and the Appalachian Trail,²³⁹ offers a useful example of a myopic EIS produced during the Obama administration.

Although the 2016 EIS discusses and quantifies greenhouse gas emissions from the project, including those associated with construction,²⁴⁰ operation of compressors,²⁴¹ and downstream combustion,²⁴² the agency does not quantify the upstream emissions that might be associated with induced greater natural gas production. In fact, the agency barely acknowledges qualitatively that the pipeline might drive greater upstream production of fossil fuels.²⁴³ In its discussion of cumulative impacts from climate change, the EIS first describes the crisis in a general way through a stark, multi-page summary, listing environmental woes ranging from extreme heat events to decreased water availability.²⁴⁴ But the closest the EIS comes to discussing upstream emissions is to suggest that the project might displace some coal use, thereby counteracting some of the project's greenhouse emissions, because coal produces more carbon dioxide than natural gas.²⁴⁵ The Fourth Circuit eventually found the EIS insufficient on different grounds,²⁴⁶ putting the project on hold.²⁴⁷ Nonetheless, the EIS demonstrates considerable room for improvement in the consideration of upstream effects.

Administrations of both parties may have a history of paying upstream greenhouse gas emissions short shrift, but recent court decisions could augur a growing judicial expectation that such emissions be considered in NEPA analyses. The next section discusses the judicial perspective on upstream emissions.

C. Case Precedent

Few courts have analyzed agencies' failure to address upstream greenhouse gas emissions thus far. Courts have sided with agencies, but the bases for their holdings do not necessarily absolve agencies of their general responsibility to consider upstream emissions. Moreover, other precedent embraces logic that could extend to upstream emission cases.

239. *Id.*

240. *Id.* at 4-502, 4-503 tbl.4.11.1-5.

241. *Id.* at 4-507 to 4.508 tbl.4.11.1-7.

242. *Id.* at 4-620 tbl.4.13.2-2.

243. *See id.* at 4-620 (limiting upstream effects discussion to a somewhat rosy prediction that the project could displace coal and decrease emissions).

244. *Id.* at 4-617, 4-618, 4-619.

245. *Id.* at 4-620.

246. *Mountain Valley Pipeline and the Jefferson National Forest*, U.S. DEP'T OF AGRIC., <https://www.fs.usda.gov/detail/gwj/home/?cid=stelprd3827827> (last visited Dec. 4, 2019).

247. *Sierra Club, Inc. v. U.S. Forest Serv.*, 897 F.3d 582, 596 (4th Cir. 2018) (discussing vacating Forest Service's failure to comply with NEPA by adopting a sedimentation analysis in the EIS that it had previously critiqued).

The earliest case considering upstream greenhouse gas emissions for natural gas pipelines was *Sierra Club v. Clinton*, a 2010 case in which the District Court of Minnesota considered a challenge to the construction of two crude oil pipelines, one domestic and one crossing the border from the United States into Canada.²⁴⁸ The international pipeline required approval from the State Department, which prepared an EIS for the project and issued a permit for the construction and operation of the pipeline.²⁴⁹ Petitioners challenged the EIS for failing to consider, as indirect effects, the upstream emissions the international pipeline might cause, including increased natural gas extraction in Canada driven by cheaper transport to the United States.²⁵⁰

The court, however, did not find that the causal connection between the pipeline's construction and any increased extraction was clear enough to require consideration under NEPA.²⁵¹ The pipeline, the Court noted, was not the only means of transporting oil from the tar sands and therefore reasoned that the oil would be extracted regardless of whether the pipeline was built.²⁵² Furthermore, the Court deferred to analysis of the energy market that listed several reasons that Canadian oil production would be ramped up, but omitted references to increased pipeline capacity.²⁵³ Finally, the Court noted that oil sands development fell under Canadian jurisdiction.²⁵⁴

Although the decision in *Clinton* cuts against requiring the consideration of upstream emissions, the case's reasoning is colored by the facts of the project in issue. The court's concerns might be addressed by entering a report into the record reflecting the link between increased transport and induced production. Such a report today would have more empirical examples to cite than was the case in 2010. For example, the construction of the pipeline at issue in *Clinton* enabled the further expansion of production, doubling the capacity numbers assumed by the court.²⁵⁵

More recently, in 2019, the D.C. Circuit declined to require consideration of upstream emissions of greenhouse gases but did so on narrow grounds. In *Birckhead v. Federal Energy Regulatory Commission*, petitioners challenged FERC's approval of a natural gas pipeline without considering natural gas production induced

248. 746 F. Supp. 2d 1025, 1028–29 (D. Minn. 2010).

249. *Clinton*, 746 F. Supp. 2d at 1029.

250. *Id.* at 1043.

251. *Id.* at 1044–45.

252. *Id.* at 1045.

253. *Id.*

254. *Id.* at 1045–46.

255. *See id.* at 1045 (citing the capacity to transport 450,00 barrels-per-day); *Alberta Clipper's Five-Year Saga Ends with a Presidential Permit*, OIL SANDS MAG., <https://www.oilsandsmagazine.com/news/2017/10/16/alberta-clippers-five-year-saga-ends-with-a-presidential-permit> (last visited Dec. 4, 2019) (discussing how capacity was increased to 800,00 bpd despite being built to handle half that amount).

by the pipeline's construction as indirect effects.²⁵⁶ Although the court seemed skeptical that the agency would be able to meaningfully consider such emissions without knowing the sites of induced production,²⁵⁷ the court suggested that the petitioners might have prevailed if they had urged the Commission to seek further information about upstream emissions from the company constructing the pipeline.²⁵⁸ Because of petitioners' failure to make a claim on this ground, the Court was "left with no basis for concluding that the Commission acted arbitrarily or capriciously or otherwise violated NEPA in declining to consider [upstream emissions]."²⁵⁹

Although agencies prevailed in the cases discussed above, other cases suggest courts may demand more of agencies. The Ninth Circuit has called for consideration of upstream emissions in the greenhouse gas context. In 2011, the Court required the Surface Transportation Board to revise an EIS and approval for a coal railroad because the EIS failed to consider the impacts, including methane emissions, from upstream coal mines.²⁶⁰ At the time of the EIS, the coal mines did not yet exist, and the agency deemed them "too speculative to be considered reasonably foreseeable future actions."²⁶¹ But the Court disagreed, noting that the Board had cited the coal mine development as a reason to justify the proposal to build the railroad.²⁶² Thus, the Board should have considered the impacts from coal, including methane leaks,²⁶³ as a cumulative effect to be considered along with the other effects of the railroad.²⁶⁴

A D.C. Circuit case discussed in Part II, *Sabal Trail*,²⁶⁵ also relies on logic that ought to apply to upstream greenhouse gas emissions. That case determined that FERC must consider downstream greenhouse gas emissions as indirect effects and quantify them if possible.²⁶⁶ The court rejected FERC's claim that quantification was impractical merely because the quantification depended on uncertain variables including the "operating decisions of individual plants and the demand for electricity

256. 925 F.3d 510, 516–17 (D.C. Cir. 2019).

257. *See id.* at 517 (discussing how petitioners have no information about the location or number of wells where production would be induced).

258. *Id.*

259. *Id.* at 518.

260. *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1082 (9th Cir. 2011).

261. *N. Plains Res. Council*, 668 F.3d at 1082.

262. *Id.*

263. *Id.* at 1077 (introducing this section of concerns as failure to adequately consider cumulative effects, including methane).

264. *Id.* at 1081.

265. *See supra* Part II.

266. 867 F.3d 1357, 1374 (D.C. Cir. 2017).

in the region.”²⁶⁷ The court insisted that NEPA required “reasonable forecasting” and called upon the agency to “make educated assumptions about an uncertain future.”²⁶⁸ For the same reason that the court found downstream emissions reasonably foreseeable indirect effects, courts may find upstream emissions reasonably foreseeable indirect effects.

One distinction between downstream emissions and upstream emissions may make courts more inclined to require agencies to consider the former than to consider the latter: downstream emissions cases tend to have built-in emissions estimates for courts to invoke. That is, as discussed in Part II, EISs frequently include estimates of the amount of fuel a project will produce in order to illustrate a project’s energy upside. Judges can point to these estimates as proxies for downstream emissions.²⁶⁹ Upstream emissions cases may lack a similarly useful number.

However, *Birckhead* can provide guidance.²⁷⁰ Recall that the D.C. Circuit suggested that environmental petitioners might have prevailed if they had challenged FERC’s failure to solicit estimates of induced upstream production from the permit-seeking company.²⁷¹ The implication is that if petitioners challenge agencies’ failure to solicit relevant information, they might prevail. Both to reach more informed decisions and gird themselves against legal challenges, agencies should make efforts to collect information relevant to upstream emissions.

The cases above focus on EIS analyses, but precedent can also guide agencies’ approaches to EAs. Uncertainty about the amount of upstream emissions should not support a FONSI. Rather, EAs should only result in FONSI if the agencies can affirmatively conclude that environmental impacts will not be significant. CEQ regulations require agencies to procure information absent “exorbitant” costs, and where costs are exorbitant, agencies must still discuss the uncertainty in detail in an EIS.²⁷² Multiple court cases have upheld this principle.²⁷³

267. *Id.* at 1374.

268. *Id.*

269. *See, e.g., id.* (discussing the EIS’s failure to explain why the number estimating fuel transported could not be used as a downstream emissions estimate).

270. *Birckhead v. FERC*, 925 F.3d 510 (D.C. Cir. 2019).

271. *See id.* at 518.

272. 40 C.F.R. § 1502.22.

273. *See, e.g., Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005) (“Preparation of an EIS is mandated where uncertainty may be resolved by further collection of data, or where the collection of such data may prevent speculation on potential . . . effects.”) (internal citations omitted); *Montana Env’t. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1091 (D. Mont. 2017) (vacating a mining plan EA on several grounds and stating, “an agency should not attempt to travel the easy path and hastily label the impact of the [action] as too speculative and not worthy of agency review”) (internal citations omitted); *Scientists’ Inst. for Pub. Info., Inc. v. U.S. Atomic Energy Comm’n*, 481 F.2d 1079, 1092 (D.C. Cir. 1973) (noting that the courts must “reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as ‘crystal ball inquiry’”).

Thus, rather than issuing a FONSI when there is uncertainty, agencies should develop an EIS, and through that process gather relevant information on emissions in order to determine whether the environmental effects are significant. Again, cursory EAs may invite legal challenges.

D. Solutions for Governmental Agencies

As the cases above illustrate, agencies avoid considering upstream emissions by claiming such emissions are too speculative to estimate. But even as some agencies claim inability to calculate these emissions, other agencies have begun using tools to do just that.

First, *Birckhead* shows that agencies should ask for as much information as possible from companies seeking permits for projects. Companies likely have projections about the amount of fuel production and transportation that will occur if the project proceeds, as such estimates underlie the economic rationale and financing for the project.²⁷⁴ Moreover, any questions as to the validity or completeness of such information can and should be explored through the NEPA process, including by soliciting public comment. Securing high-quality information on direct and indirect emissions helps agencies more accurately assess those emissions, and in turn, enables agencies to determine whether environmental effects are significant, whether alternative options should be selected, and whether mitigation measures should be implemented. If agencies fail to consider this information and provide it to the public, the federal government will fail NEPA's twin purposes of promoting informed decisionmaking and sharing information with the public.²⁷⁵ Moreover, if agencies fail to seek out this information to inform NEPA analyses, petitioners may sue with success.

As with downstream emissions, if agencies cannot obtain project-specific information, agencies should use reasonable assumptions to account for upstream emissions. Thus, agencies should produce studies and reports that can inform and standardize assumptions. Some agencies have already done so. In 2012, the U.S. Energy Information Administration published a study determining the effect increased natural gas exports would have on domestic natural gas production and found a sixty-to-seventy percent increase in production as the likely result.²⁷⁶ And in 2014, the Department of Energy published a study of the lifecycle of greenhouse gas emissions associated with liquefied natural gas exports to foreign markets as

274. See, e.g., Melissa Denchak, *What Is the Keystone Pipeline?*, NAT. RES. DEF. COUNCIL (Apr. 7, 2017), <https://www.nrdc.org/stories/what-keystone-pipeline> (sharing projections that the Keystone XL pipeline would transport 830,000 barrels of tar sands oil per day).

275. COUNCIL ON ENV'T. QUALITY, MAJOR CASES INTERPRETING THE NATIONAL ENVIRONMENTAL POLICY ACT 14 (last visited Apr. 2, 2020), https://ceq.doe.gov/docs/laws-regulations/Major_NEPA_Cases.pdf (describing NEPA's "twin aims").

276. Burger & Wentz, *supra* note 32, at 125.

compared to emissions associated with domestic delivery and consumption.²⁷⁷ As discussed in the context of downstream emissions, the Bureau of Ocean Energy Management also produced a greenhouse gas emissions lifecycle report in 2016 that could inform upstream emissions estimates.²⁷⁸

Some agencies have estimated upstream emissions for specific projects. In a 2014 liquefied natural gas export decision, the Department of Energy assessed the greenhouse gas emissions associated with induced upstream natural gas production.²⁷⁹ The Department determined that for every increase of one trillion cubic feet of gas production, an 6.8 million metric tons of greenhouse gases would be released per year.²⁸⁰ We advise that, as with downstream emissions, agencies should base estimates on maximum use of a given project's fuel capacity and calculate how that new supply of fuel will affect demand and ultimately drive upstream emissions. Again, if agencies wish to make a lower bound estimate as well, agencies should use no number lower than the amount of fuel promised in existing contracts.

Agencies already use similar strategies to account for other kinds of uncertainty. For example, FERC allows applicants to rely on generic, default studies to prove a market need for projects.²⁸¹ Whether using information from regulated parties or making reasonable assumptions about upstream emissions, agencies should not only discuss these emissions qualitatively but also quantitatively wherever possible.

In sum, to comply with NEPA's legal requirements, agencies should consider upstream emissions in their analyses. Courts have not yet arrived at a consensus demanding quantification of upstream greenhouse gas emissions, but reasoning in cases mandating downstream quantification extends to upstream emissions as well. Thus, agencies may be vulnerable in court if they fail to quantify such emissions. Furthermore, agencies have the tools necessary to meaningfully improve their consideration of upstream emissions. Cries of speculation or impracticability will ring hollow as information about greenhouse gas impacts continues to grow each year.

277. *Id.* at 126.

278. BUREAU OF OCEAN ENERGY MGMT., U.S. DEP'T OF THE INTERIOR, *Forward to OCS OIL AND NATURAL GAS: POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS AND SOCIAL COST OF CARBON* (2016), https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/Leasing/Five-Year-Program/2012-2017/BOEMOceanInfo/ocs_oil_and_natural_gas.pdf.

279. Burger & Wentz, *supra* note 32, at 125–26.

280. *Id.* at 126.

281. 1999 Policy Statement, 88 FERC ¶ 61,227, 61748 (Sept. 15, 1999) (moving away from a requirement that applicants show actual contracts and permitting use of market studies, including “generally available studies by EIA or GRI, for example, showing projections of market growth”); *see also* HEIN ET AL., *supra* note 33, at 22.

IV. ENERGY SUBSTITUTION ANALYSIS: THE MYTH OF INCONSEQUENTIAL FOSSIL FUEL PROJECTS

In order to arrive at a reasonably accurate estimate of expected greenhouse gas emissions associated with project proposals, agencies must not only use accurate data on emissions but must consider the state of the energy market, whereby some energy resources act as substitutes for one another, with consequences for resulting emissions.²⁸² This is commonly known as energy substitution analysis.²⁸³ Conducted properly, energy substitution analysis enables agencies to arrive at an accurate understanding of expected emissions, both upstream and downstream.²⁸⁴ However, agencies have often made flawed assumptions about the effect of their projects on the energy market and resulting emissions.

These flawed assumptions fall into two main categories. First, agencies have claimed that their project approvals will have no effect on greenhouse gas emissions because absent the project, another source of supply would be developed elsewhere at identical cost, resulting in identical emissions.²⁸⁵ This is known as the fallacy of “perfect substitution:” the effect of which is to make fossil fuel projects appear inconsequential from a climate change standpoint.²⁸⁶ Agencies that make such assertions frequently ignore basic principles of supply and demand and make irrational assumptions about the energy market and long-term demand for fossil fuels in a rapidly warming world. A variant of this argument is that in the “no action”

282. See U.S. ENERGY INFO. ADMIN., FUEL COMPETITION IN POWER GENERATION AND ELASTICITIES OF SUBSTITUTION 1, 3 (2012), <https://www.eia.gov/analysis/studies/fuelelasticities/pdf/eia-fuelelasticities.pdf> (describing “fossil fuel substitution” during 2005-2010 and how “[a] continued decline in natural gas prices during 2011 and the early part of 2012 has further encouraged power plant operators to use combined-cycle units to fulfill baseload power demand, displacing some coal generation”); James Ko & Carol Dahl, *Interfuel Substitution in US Electricity Generation*, 33 APPLIED ECON. 1833, 1833–1843 (2001); see also *WildEarth Guardians v. U.S. Bureau of Land Mgmt.*, 870 F.3d 1222, 1235 (10th Cir. 2017) (“[W]hen coal carries a higher price, for whatever reason that may be, the nation burns less coal in favor of other sources. A force that drives up the cost of coal could thus drive down coal consumption.”).

283. *WildEarth Guardians*, 870 F.3d at 1233–38; see also PETER HOWARD, INST. FOR POL’Y INTEGRITY, THE BUREAU OF LAND MANAGEMENT’S MODELING CHOICE FOR THE FEDERAL COAL PROGRAMMATIC REVIEW 3 (2016), https://policyintegrity.org/files/publications/BLM_Model_Choice.pdf [hereinafter HOWARD, MODELING CHOICE].

284. See HOWARD, MODELING CHOICE, *supra* note 282, at 3; see also *WildEarth Guardians*, 870 F.3d at 1236 (describing BLM’s flawed perfect substitution analysis and stating, “[p]rioritizing the carbon emissions and global warming analysis in the RODs suggests that this question was critical to the decision to open the leases for bidding”).

285. See, e.g., *WildEarth Guardians*, 870 F.3d at 1234 (describing BLM’s “perfect substitution assumption” and finding it arbitrary and capricious).

286. *Id.* at 1236 (stating that “the BLM’s carbon emissions analysis seems to be liberal (i.e., underestimates the effect on climate change”).

alternative, about ninety-five percent of the same resource would be produced at identical cost, resulting in nearly identical emissions.²⁸⁷

Second, while agencies frequently assume perfect or near-perfect substitution for greenhouse gas emissions, they often ignore substitution effects altogether when reporting the expected economic benefits from a project, such as royalties and tax revenue. A project's climate harms are essentially erased by waving the magic wand of perfect substitution, while projected revenue and other economic benefits are treated as entirely dependent on the project being approved.²⁸⁸ We call this the fallacy of "all upside," whereby the project appears to have significant economic benefits, yet little or no climate consequences. This error is multiplied due to the failure of agencies to use an existing tool like the Interagency Working Group's social cost of greenhouse gases to monetize climate costs, as discussed in Part V. Such misrepresentation strikes at the heart of NEPA, as the statute's primary goal is to inform the public and decisionmakers about the likely effects of governmental approvals, yet it distorts the project's identified costs and benefits.

Invoking either fallacy can render agency analysis arbitrary and capricious, inviting judicial reproach. Most, but not all, federal courts to have considered these issues have required agencies to make assumptions supported by basic principles of supply and demand and to use the best available data on the energy market.²⁸⁹ However, some courts have deferred to agencies despite analytical flaws, especially where technical or complex modeling decisions are at issue.²⁹⁰ After describing these two primary pitfalls and how courts have responded to them, we describe how agencies can, and have in the past, used accurate assumptions and models to conduct proper substitution analysis. By conducting energy substitution analysis in the right way, the public and decisionmakers can gain a clearer picture of the net costs or benefits of projects, and climate change consequences are illuminated, as opposed to swept under the rug.

A. What is Energy Substitution Analysis?

In the modern energy market, energy resources like coal, oil, natural gas, nuclear, wind, and solar act as substitutes for one another, especially with respect to

287. *See, e.g.*, BLM, COASTAL PLAIN OIL AND GAS LEASING PROGRAM: FINAL ENVIRONMENTAL IMPACT STATEMENT 3-8 (2019), https://eplanning.blm.gov/public_projects/nepa/102555/20003762/250004418/Volume_1_ExecSummary_Ch1-3_References_Glossary.pdf [hereinafter ARCTIC FINAL EIS].

288. *See infra* Part IV.B.2 (discussing how BLM made these errors in its Final EIS for oil and gas production in the Arctic National Wildlife Refuge EIS, and in the Draft EIS for the Willow Master Plan).

289. *See infra* Part IV.C (describing relevant litigation).

290. *See infra* Part IV.C.

electricity generation.²⁹¹ As prices for certain resources rise and fall, substitute sources become more attractive on the market.²⁹² Further, the consumption of different resources for energy produces different amounts of greenhouse gases and other air pollutants.²⁹³ Generally speaking, decreases in the supply of a resource tend to increase price; and increases in prices will lead to decreases in demand for that resource, with consequences for resulting emissions.²⁹⁴

When agencies conduct NEPA analysis, they must describe the environmental consequences of the action alternative compared to the “no action” alternative.²⁹⁵ In describing resulting emissions for each alternative, agencies often consider energy substitution, whereby production of a given resource or approval of an energy infrastructure project, such as a pipeline, will affect resource prices, consumption, and resulting emissions.²⁹⁶ In order to conduct energy substitution analysis, agencies must account for basic principles of supply and demand. Flooding the market with a large amount of coal, oil, or natural gas lowers the market price of that resource, resulting in increased demand for the resource and increased consumption.²⁹⁷ This, in turn, has implications for greenhouse gas emissions: producing more carbon-intensive resources like coal and oil will displace some cleaner resources like renewables and natural gas, and reduce energy conservation, thereby increasing net greenhouse gas emissions.²⁹⁸ Conversely, producing more renewable energy would be expected to lower net greenhouse gas emissions after accounting for energy substitution.²⁹⁹

291. U.S. ENERGY INFO. ADMIN., FUEL COMPETITION IN POWER GENERATION AND ELASTICITIES OF SUBSTITUTION 1–4 (2012).

292. See, e.g., *U.S. Renewable Electricity Generation Has Doubled Since 2008*, U.S. ENERGY INFO. ADMIN., (Mar. 19, 2019), <https://www.eia.gov/todayinenergy/detail.php?id=38752> (“Growth in . . . wind and solar, has been driven by federal and state policies and declining costs.”); Anna Mikulska & Michael Maher, *Who’s Winning The Battle To Replace Coal?*, FORBES (May 17, 2016), <https://www.forbes.com/sites/thebakersistitute/2016/05/17/whos-winning-the-battle-to-replace-coal/#4153ec1a765d>.

293. For example, solar and wind energy produce zero GHG emissions, while burning subbituminous coal from Wyoming’s Powder River Basin (the primary source of coal in the United States) emits 212 pounds of carbon dioxide per million British thermal units (Btu). See B.D. Hong & E.R. Slatick, *Carbon Dioxide Emission Factors for Coal*, U.S. ENERGY INFO. ADMIN., https://www.eia.gov/coal/product/quarterly/co2_article/co2.html (last visited Jan. 6, 2020).

294. See, e.g., *Natural Gas Explained: Factors Affecting Natural Gas Prices*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/energyexplained/natural-gas/factors-affecting-natural-gas-prices.php> (last updated July 12, 2019).

295. See 42 U.S.C. § 4332; 40 C.F.R. §§ 1502.1, 1502.14(a)–(b), (d).

296. See *infra* Section IV.B.

297. See N. GREGORY MANKIW, *PRINCIPLES OF ECONOMICS* 74–78, 80–81 (5th ed. 2008).

298. See U.S. ENERGY INFO. ADMIN., FUEL COMPETITION IN POWER GENERATION AND ELASTICITIES OF SUBSTITUTION 13 (2012).

299. See *Renewable Energy Explained*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/energyexplained/renewable-sources> (last updated June 27, 2019) (“Renewable energy plays an important role in

Agencies can choose from several sophisticated models to evaluate the effect of alternatives on the energy market, such as ICF International's Integrated Planning Model (IPM)³⁰⁰; the U.S. Energy Information Administration's National Energy Modeling System (NEMS)³⁰¹; and MarketSim,³⁰² which the Bureau of Ocean Energy Management uses to analyze lease sale scenarios in its offshore planning process.³⁰³ Each of these models has benefits and drawbacks that should be considered and disclosed in an environmental review process.³⁰⁴ This Article does not discuss the nuances of each model but makes high-level recommendations for transparently disclosing modeling inputs and assumptions, and conducting proper energy substitution analysis, at the end of this Part.

B. Regulatory Approach to Energy Substitution Analysis

Federal agencies have been inconsistent in how they conduct energy substitution analysis and have often made irrational assumptions that make the climate change effects of even massive fossil fuel projects appear small or non-existent. This head-in-the-sand approach to greenhouse gas emissions analysis is a disservice to decisionmakers and the public, who must develop solutions for the mounting climate crisis on an ever-shorter timeline.

1. The Fallacy of "Perfect Substitution," Whereby Fossil Fuel Projects Have Little or No Effect on Greenhouse Gas Emissions

In several NEPA documents for fossil fuel-related projects, such as mineral lease sales, programmatic plans that guide future leasing, and interstate natural gas pipelines, agencies have made flawed assumptions to arrive at perfect substitution, or its close relative, nearly perfect substitution.

In BLM's 2010 EIS for the Wright Area coal leases, located in the Powder River Basin region of Wyoming, BLM reasoned that if it were to select the no-action alternative (not leasing the coal), other mines would increase production to entirely replace the two billion tons of coal anticipated from the leases, such that the amount

reducing greenhouse gas emissions. Using renewable energy can reduce the use of fossil fuels, which are major sources of U.S. carbon dioxide emissions.").

300. Integrated Planning Model, ICF Int'l Inc., <https://www.icf.com/technology/ipm> (last visited June 14, 2020).

301. U.S. ENERGY INFO. ADMIN., NATIONAL ENERGY MODELING SYSTEM: AN OVERVIEW 2018 (2019).

302. U.S. DEP'T OF INTERIOR, BUREAU OF OCEAN ENERGY MGMT., CONSUMER SURPLUS AND ENERGY SUBSTITUTES FOR OCS OIL AND GAS PRODUCTION: THE 2015 REVISED MARKET SIMULATION MODEL (MARKETSIM) (2015).

303. See also HOWARD, MODELING CHOICE, *supra* note 282, at 2.

304. For more information on the benefits and drawbacks of these three models, see *id.*

of coal burned in the United States—and the resulting carbon dioxide and methane emissions—would be identical whether or not the leases were approved.³⁰⁵ The leases would produce up to 230 million tons of coal per year—more than 20 percent of the total U.S. coal used for electricity in 2010.³⁰⁶ BLM did not appear to use any modeling to calculate the greenhouse gas emissions in the leasing and no leasing scenarios.³⁰⁷ The final EIS was challenged in federal court, resulting in an adverse decision for the agency, as discussed in the caselaw subsection below.

Even where agencies do model energy substitution effects, they sometimes fail to rely upon certain results or make arbitrary assumptions that strongly affect their analysis. Only a tenacious observer is likely to identify these errors; readers must follow the agency through a “choose your own adventure” style cascade of flawed assumptions, often buried in technical documents outside the actual EIS or EA in question. Needless to say, this approach does not encourage meaningful public participation.

This cascade of faulty yet well-buried energy market assumptions is present in BOEM’s NEPA analysis for its five-year offshore leasing program.³⁰⁸ The agency prepared a detailed assessment of the upstream and downstream greenhouse gas emissions associated with offshore oil and natural gas leasing pursuant to its five-year program for 2017 to 2022.³⁰⁹ The Bureau quantified GHG emissions from the production, processing, transportation, and consumption of oil and gas that could be produced in three different price scenarios.³¹⁰ However, it declined to rely upon the actual energy substitution analysis that it conducted and instead, “assumed that . . . foreign sources of oil will substitute for reduced OCS supply, and the production and transport of that foreign oil would emit more [greenhouse gases].”³¹¹ As a result, the Bureau found that the “no action” alternative—not leasing any offshore tracts in the United States for oil production—would emit *more* greenhouse gases than the

305. BLM, FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE WRIGHT AREA COAL LEASE APPLICATIONS 4-141 (2010) (“It is not likely that selection of the No Action alternatives would result in a decrease of U.S. CO₂ emissions attributable to coal mining and coal-burning power plants in the longer term, because there are multiple other sources of coal that, while not having the cost, environmental, or safety advantages, could supply the demand for coal.”).

306. *WildEarth Guardians v. U.S. Bureau of Land Mgmt.*, 870 F.3d 1222, 1227, n. 2 (10th Cir. 2017).

307. *See id.* at 1227–28.

308. *See* U.S. BUREAU OF OCEAN ENERGY MGMT., 2017-2022 OUTER CONTINENTAL SHELF OIL AND GAS LEASING PROPOSED FINAL PROGRAM 2–6 (2016), <https://perma.cc/KRV7-MV98> [hereinafter BOEM, 2017-2022 Proposed Final Leasing Program].

309. U.S. BUREAU OF OCEAN ENERGY MGMT., OCS OIL AND NATURAL GAS: POTENTIAL LIFECYCLE GREENHOUSE GAS EMISSIONS AND SOCIAL COST OF CARBON 15 (2016), <https://perma.Cc/2mxn-Qxbv> [hereinafter BOEM, LIFECYCLE GHG REPORT].

310. *Id.* at v, 29-31.

311. *Id.* at *Foreword*.

leasing alternative, due to perfect substitution of domestic and foreign oil and greater transportation-related emissions from foreign production.³¹²

However, the Bureau's key assumption was contrary to its own findings in a separate report on the offshore leasing program's lifecycle greenhouse gas emissions. There, it used MarketSim to model energy substitution. The Bureau found that:

. . . for the global oil market, MarketSim substitutions under the No Action Alternative show a reduction in foreign oil consumption of approximately one, four, and six billion barrels of oil for the low-, mid-, and high-price scenarios, respectively, over the duration of the 2017–2022 Program. GHG impacts for this reduction in oil consumption, as well as possible changes for natural gas, are not captured in this analysis.³¹³

Translating this projected reduction in foreign oil consumption into greenhouse gas emissions, the “no action” alternative would decrease global carbon dioxide emissions by up to 2.3 billion metric tons over the duration of the 2017–2022 program,³¹⁴ or more than the annual CO₂ emissions from the entire U.S. transportation sector.³¹⁵ This finding makes sense as a matter of supply and demand: decreasing global oil supply by billions of barrels should lead to higher global oil prices, and consequently less oil consumption and greenhouse gas emissions.³¹⁶ However, the agency downplayed its own findings and stated that it would not rely on them, writing, “[e]xcluding the foreign oil and gas markets is reasonable. Oil consumption in each country is different, and BOEM does not have information related to which countries would consume less oil.”³¹⁷ Thus, while the agency used MarketSim to conduct energy market substitution analysis, it omitted relevant information from its EIS.

312. *Id.* at 24, tbl.8-1; BOEM, 2017-2022 PROPOSED FINAL LEASING PROGRAM, *supra* note 307, at 5-23. The document provides detail on possible offshore production substitutes: for example, foreign imports would replace 63% of anticipated production under a No Sale option; 22% of onshore production; and 7% of reduced consumption. BOEM, 2017-2022 PROPOSED FINAL LEASING PROGRAM, *supra* note 307 at 6-17.

313. BOEM, LIFECYCLE GHG REPORT, *supra* note 308, at 23.

314. *Id.* at 24; *see also* Peter Erickson, *Final Obama Administration Analysis Shows Expanding Oil Supply Increases CO₂*, STOCKHOLM ENV'T INST. (Jan. 30, 2017), <https://perma.cc/4MX6-F7QD> (translating oil consumption projections from BOEM's Lifecycle Greenhouse Gas Emissions report into estimated carbon dioxide emissions).

315. One year of U.S. transportation sector CO₂ emissions is about 1.7 billion metric tons CO₂. EPA, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2014 ES-7 tbl.ES-2 (2016).

316. *See* Peter Erickson, *Obama's Arctic Oil Ban Advances Key Climate Test*, SEATTLE TIMES (Dec. 30, 2016), <https://perma.cc/FP59-YD2L>.

317. BOEM, Lifecycle GHG Report, *supra* note 308, at 23.

Perhaps as a direct result of the Wright Area coal lease litigation in which the Tenth Circuit ruled against it,³¹⁸ BLM has begun offering a different flavor of the perfect substitution argument. In recent NEPA documents, BLM has claimed that in the “no action” alternative, other production of the same resource would occur elsewhere, replacing about ninety-five percent of the resource.³¹⁹ In other words, there is *nearly* perfect substitution. In reaching this conclusion, however, BLM has relied upon the MarketSim model, and has repeated BOEM’s error of ignoring any changes in foreign oil demand.³²⁰ This makes BLM’s energy substitution analysis a house of cards, as it relies on the same flawed assumptions detailed above.

For instance, in BLM’s EIS for oil and natural gas production in the Arctic National Wildlife Refuge—prepared pursuant to the directive in the 2017 Tax Cut and Jobs Act to hold two lease sales in the Refuge within seven years³²¹—the agency found nearly perfect substitution in the “no leasing” scenario and thereby downplayed the climate change consequences of opening the Refuge to oil and gas extraction.³²² BLM concluded that if, under the no action alternative, supply from the Refuge is reduced by up to ten billion barrels of oil, substitute domestic and foreign energy sources will fill in almost all of the shortfall, with U.S. oil demand decreasing by only 3.9 percent.³²³

The agency’s energy substitution analysis had serious deficiencies. Because BLM adopted BOEM’s assumptions about foreign demand, “the reduction in foreign consumption of oil and gas in a no action analysis *is not taken into account*.”³²⁴ But according to BOEM’s actual runs of MarketSim in the context of the offshore oil and gas leasing, taking 8 billion barrels of U.S. oil production off the global market would result in “a reduction in foreign oil consumption of approximately . . . 4 . . . billion barrels of oil” in the mid-price scenario.³²⁵ A fifty percent reduction in foreign demand is significantly more than *zero* change in foreign demand.

In its draft EIS for the Willow Master Plan, BLM likewise claimed that more than ninety-five percent of downstream emissions from new federal oil and natural production described in the plan would, absent the project, be offset by

318. See *infra* Part IV.C.

319. See, e.g., U.S. BUREAU OF LAND MGMT., WILLOW MASTER DEVELOPMENT PLAN DRAFT ENVIRONMENTAL IMPACT STATEMENT 26 (Table 3.2.2); App. E.2B, p.3 (Aug. 2019) (stating, for instance, “Under all three action alternatives, more than 96% of the anticipated production would displace other carbon-emitting fuel sources.”) [hereinafter WILLOW PLAN DEIS].

320. See BOEM, LIFECYCLE GHG REPORT, *supra* note 308, at 23.

321. LAURA B. COMAY ET AL., CONG. RESEARCH SERV., ARCTIC NATIONAL WILDLIFE REFUGE (ANWR): An Overview 9-10 (2018), <https://perma.cc/UNW9-FYK9>.

322. See ARCTIC FINAL EIS, *supra* note 286, at 3-7, 3-8.

323. *Id.* at 3-7.

324. BOEM, LIFECYCLE GHG REPORT, *supra* note 308, at 23 (emphasis added).

325. *Id.*

increased emissions in other locations.³²⁶ The EIS analyzed the “no action” alternative and three development alternatives proposed by ConocoPhillips on oil and gas leases in the National Petroleum Reserve in Alaska.³²⁷ If the EIS is approved, ConocoPhillips could build up to 5 drill sites, airstrips, pipelines, and related infrastructure, and produce up to 130,000 barrels of oil per day over the project’s 30-year lifespan.³²⁸ Yet, BLM’s analysis suggests that new leasing in the Willow area would be responsible for only five percent of the project’s generated emissions.³²⁹ BLM did not release its full substitution analysis, and its estimates were based on MarketSim,³³⁰ presumably with the same flaws accepted by the agencies in other contexts.³³¹

In several NEPA documents, including the EISs for drilling in the Arctic Refuge and the five-year offshore leasing plan, the agencies’ energy substitution analysis also assumed near constant demand on the global energy market for oil and gas over the next forty to seventy years.³³² In fact, the MarketSim model took this assumption as its baseline. BOEM wrote:

This analysis uses a projection of near constant demand over the next 40–70 years using the 2016 AEO Reference Case, for which EIA does not assume any future changes in laws or policies other than what is incorporated in existing laws and policies. As countries, including the U.S., address climate change with individual policy targets, this assumption could no longer hold . . .³³³

Ample peer-reviewed studies from the IPCC, U.S. Global Change Research Program, and others make clear that a “business as usual” approach to consuming and burning fossil fuels for the next forty to seventy years would lead to catastrophic warming and cascading ecological harms.³³⁴ In order to avert dangerous and costly

326. WILLOW PLAN DEIS, *supra* note 318, at 26 (Table 3.2.2); App. E.2B, p.3.

327. *Id.* at ES-1.

328. *Id.*

329. See *id.* at 26 (Table 3.2.2), app. E.2B, 5. Specifically, BLM reports that 225.157 million metric tons of GHG equivalence out of 237.626 million metric tons in Alternative B would be produced through substitute emissions under a no action alternative. *Id.* at 26 (Table 3.2.2). This equates to 94.75 percent.

330. *Id.* at 25.

331. See Lexi Krupp, *The Interior Department Is Using Faulty Logic to Justify New Oil Projects*, Audubon (Jan. 9, 2019) <https://www.audubon.org/news/the-interior-department-using-faulty-logic-justify-new-oil-projects>.

332. BOEM, OCS LIFECYCLE GHG REPORT, *supra* note 308, at 20.

333. *Id.*

334. See INTERGOV^{TL} PANEL ON CLIMATE CHANGE, SUMMARY FOR POLICYMAKERS, GLOBAL WARMING OF

climate change, fossil fuel demand and consumption must decrease substantially from current levels, well before forty to seventy years in the future.³³⁵ For this reason, even as the United States has withdrawn from the Paris agreement, nations around the world are adopting policies to reduce fossil fuel production and consumption to avert catastrophic climate impacts.³³⁶

In light of these scientific findings and international action, it is irrational for the U.S. government to assume that global oil and gas demand will remain constant more than four decades into the future as the baseline for its energy market analysis. A far more rational approach would be to model at least two policy scenarios: one taking the “constant demand” approach, and the other based on fossil fuel consumption consistent with meeting the 1.5 or 2 degrees Celsius warming targets laid out in the Paris Accord.³³⁷ The second baseline would allow government agencies to map policy scenarios that will result in a stable climate. In part because of the assumption of constant demand for oil and natural gas up to the end of the century, the agencies are able to claim that at no point will a decrease in U.S. production of oil or gas under a no action alternative affect foreign consumption.³³⁸ But that assumption is at odds with policy scenarios that predict large decreases in fossil fuel demand and consumption in order to meet global emissions targets.

The assumption of constant global demand and production also infiltrates other findings in NEPA analyses, like this one in BLM’s Arctic Refuge Final EIS:

Assuming a 70-year period for this production, . . . post-lease oil and gas activities could supply in the range of 0.1 to 0.5 percent of

1.5°C: AN IPCC SPECIAL REPORT 15 (2018), https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_SPM_version_report_LR.pdf (“Pathways limiting global warming to 1.5°C with no or limited overshoot would require rapid and far-reaching transitions in energy, land, urban and infrastructure (including transport and buildings), and industrial systems (*high confidence*).”). See also Wuebbles, D.J., et al., *Executive Summary*, in CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT VOLUME I 11 (2017), https://science2017.globalchange.gov/downloads/CSSR_Executive_Summary.pdf.

335. See *id.*; Ilona Otto, et al., *Social Tipping Dynamics for Stabilizing Earth’s Climate by 2050*, 5 PROC. NAT’L ACAD. SCI. 2354 (2020) (“Limiting global warming to 1.5 °C as stipulated in the Paris Climate Agreement scientifically implies a complete net decarbonization of the world’s energy and transport systems, industrial production, and land use by the middle of this century.”); J. Rockström et al., *A Roadmap for Rapid Decarbonization*, 355 SCI. 1269, 1269–1271 (2017).

336. See, e.g., Climate Change Response (Zero Carbon) Amendment Act 2019, (N.Z.); Niclas Rolander, *Denmark Strikes Deal to Slash CO2 Emissions by 70% in a Decade*, BLOOMBERG GREEN (Dec. 7, 2019), <https://www.bloomberg.com/news/articles/2019-12-07/denmark-strikes-deal-to-slash-co2-emissions-by-70-in-a-decade>; Alice Tidey, *Can Europe Become ‘World’s First Climate-Neutral Continent’? Von der Leyen Thinks So*, EURONEWS (Nov. 12, 2019), <https://www.euronews.com/2019/12/11/european-green-deal-eu-chief-von-der-leyen-to-unveil-measures-to-tackle-climate-emergency>.

337. Art. 2, Conference of the Parties, *Adoption of the Paris Agreement*, U.N. Doc. FCCC/CP/2015/L.9/Rev/1 (Dec. 12, 2015).

338. See BOEM, LIFECYCLE GHG REPORT, *supra* note 308, at 23.

global oil production . . . *Given that global oil production continues to increase, the development that could occur with the Coastal Plain oil and gas leasing program would represent a smaller fraction of global production as the years pass.*³³⁹

BLM assumed that the world would continue to produce and consume increasing amounts of oil and gas up to seventy years in the future, making the Refuge's marginal contribution to global emissions relatively smaller over time.³⁴⁰ But according to experts, such a scenario of global oil and gas consumption would result in tens of millions of climate refugees, accelerated collapse of ice sheets and glaciers, and more frequent and severe droughts and storms.³⁴¹ Nowhere in the EIS was this stark reality acknowledged.

In short, the irrationality of BLM's energy market assumptions is underscored by the profoundly damaging climate change consequences that follow from them.

2. The Fallacy of "All Upside": Inconsistent Treatment of Expected Revenue and Expected Emissions Places a Thumb on the Scale in Favor of Development

While agencies frequently assume perfect or near-perfect substitution for greenhouse gas emissions, they often ignore substitution effects altogether when reporting expected economic benefits, such as revenue. This fallacy of "all upside" makes projects appear to have significant revenue and other economic benefits, yet little or no climate consequences. A few examples elucidate this phenomenon, which artificially places a thumb on the scale in favor of development.

In the Arctic Refuge EIS discussed above, BLM took an inconsistent approach by monetizing economic benefits like oil and gas royalties without applying any energy substitution analysis while using substitution analysis to make downstream climate effects appear very small.³⁴² BLM found that the "no action" alternative would result in ninety-six percent of the greenhouse gas emissions that

339. ARCTIC FINAL EIS, *supra* note 286, at 3-7 (emphasis added).

340. *Id.*

341. See, e.g., RIGAUD, ET AL., WORLD BANK GRP., GROUNDSWELL: PREPARING FOR INTERNAL CLIMATE MIGRATION xxi-xxvi (2018), <https://openknowledge.worldbank.org/handle/10986/29461>; INTERGOV'TL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE AND LAND: SUMMARY FOR POLICYMAKERS 5-6, 40-41 (2019), https://www.ipcc.ch/site/assets/uploads/2019/08/Edited-SPM_Approved_Microsite_FINAL.pdf; Dana Nuccitelli, *Brief Overview of New IPCC Report on Oceans and Ice Risks*, YALE CLIMATE CONNECTIONS (Oct. 11, 2019), <https://www.yaleclimateconnections.org/2019/10/brief-overview-of-new-ipcc-report-on-oceans-and-ice-risks/>.

342. ARCTIC FINAL EIS, *supra* note 286, at 3-8, 3-9, 3-10, 3-11.

the project alternative does.³⁴³ BLM then reported only the net (action minus “no action”) greenhouse gas emissions for the project.³⁴⁴ Even accepting BLM’s flawed substitution assumptions, in the “no action” alternative, production from substitute sources would also generate royalty and revenue for the federal government and states where that production occurs. But BLM did *not* offset its estimate of expected revenue by the revenue that substitute energy sources would provide, and never explained this inconsistency. In calculating an estimated forty-three billion in royalties, BLM used total production figures, did not apply any substitution analysis, and did not assume that increased production from the Refuge would offset other sources of energy.³⁴⁵ The result was an unexplained, inconsistent approach to projected economic benefits versus climate change costs.³⁴⁶ BLM painted the project as conferring nearly all upside in the form of revenue, with miniscule climate change costs.

In the Willow Master Plan EIS, BLM likewise found that absent any leasing in the region, substitute sources of oil and gas would be produced elsewhere.³⁴⁷ But again, BLM failed to apply this substitution analysis to the economic benefits, thus inflating the plan’s projected benefits relative to its environmental costs.³⁴⁸ As the next section describes, courts have found similar illogical assumptions and errors to be arbitrary and capricious.

C. Case Precedent

NEPA analyses in which agencies fail to conduct any modeling yet find perfect substitution are the simplest for legal challengers—and courts—to point to as implausible and thereby arbitrary and capricious. Where agencies do conduct energy market modeling, courts are more apt to defer to agencies’ technical judgment.

As early as 2003, the Eighth Circuit held that federal agencies have an obligation to assess indirect emissions for fossil-fuel related projects and to make accurate energy market substitution assumptions. In *Mid-States Coalition for Progress v. Surface Transportation Board*, the court considered the Surface Transportation Board’s (“the Board”) approval of 280 miles of new railroad lines and upgrade of existing railroad lines that would allow coal from the Powder River Basin in

343. *Id.* at 3-8.

344. *See id.* tbls.3-4.

345. Letter from Env’t. Def. Fund, Inst. for Pol’y Integrity, Mont. Env’tl. Info. Ctr., Union of Concerned Scientists & The Wilderness Soc’y, *Comments on Failure to Monetize Greenhouse Gas Emissions in Coastal Plain Oil & Gas Leasing Program Draft EIS 9-20* (Mar. 13, 2019), https://policyintegrity.org/documents/Coastal_Plains_ANWR_Joint_SCC_Comments_20119.3.13-final.pdf.

346. *See id.*

347. WILLOW PLAN DEIS, *supra* note 318, at 25-26.

348. *See id.* at 124, tbl.3.15.3 (providing total government revenues from the plan).

Wyoming to be transported to power plants.³⁴⁹ The Board argued that coal would be produced regardless of whether the rail lines were built. And even if the railroad did induce some coal production, the Board reasoned, the extent of the effect would be too speculative to include in its EIS.³⁵⁰ The court disagreed. Although the *extent* of the induced coal production might be uncertain, the nature of the effect followed basic economic principles of supply and demand and was thus entirely foreseeable. The court explained: “[t]he increased availability of inexpensive coal will at the very least make coal a more attractive option to future entrants into the utilities market when compared with other potential fuel sources, such as nuclear power, solar power, or natural gas.”³⁵¹ This increased competitiveness would surely increase the nation’s demand for coal; thus, the court concluded that the NEPA analyses must account for increased indirect emissions.³⁵²

As a result of the Eighth Circuit decision, the Board prepared a supplemental EIS in 2005 that used the NEMS model to project changes to coal supply and demand and related emissions associated with the rail project.³⁵³ The model projected that coal use would increase by less than one percent as a result of the rail lines, so the Board approved the project. In a subsequent legal challenge, the Eighth Circuit upheld the Board’s supplemental EIS.³⁵⁴

In the litigation concerning BLM’s approval of the Wright Area leases, the Tenth Circuit applied similar reasoning as the Eighth Circuit to conclude that BLM’s assumption of perfect substitution ran counter to the basic economic principles of supply and demand and the empirical state of knowledge concerning the U.S. coal market.³⁵⁵ In its NEPA analysis, BLM stated, absent any supporting evidence, that: “[d]enying this proposed coal leasing is not likely to affect current or future domestic coal consumption used for electric generation.”³⁵⁶ The court disagreed. It reasoned that in the “no action” alternative, removing over twenty percent of annual U.S. production would be a non-marginal change that would affect overall coal prices, demand, and greenhouse gas emissions. The court found BLM’s “blanket assertion that coal would be substituted from other sources[] unsupported by hard data” and held that BLM did not provide sufficient information to permit a reasoned choice between alternatives.³⁵⁷

349. *Mid States Coal. for Progress v. Surface Transp. Bd.*, 345 F.3d 520, 532 (8th Cir. 2003).

350. *Id.* at 548–50.

351. *Id.* at 549.

352. *Id.* at 550.

353. *Mayo Found. v. Surface Transp. Bd.*, 472 F.3d 545, 555 (8th Cir. 2006).

354. *Id.* at 556.

355. *WildEarth Guardians v. BLM*, 870 F.3d 1222, 1237 (10th Cir. 2017).

356. *Id.* at 1236.

357. *Id.* at 1235.

Perhaps most strikingly, the Tenth Circuit stated that even if BLM *had* data to support its assertion, it “would still conclude this perfect substitution assumption arbitrary and capricious because the assumption itself is irrational (i.e., contrary to basic supply and demand principles).”³⁵⁸ The court noted that it did not owe BLM any special deference, distinguishing the case at hand from the Supreme Court’s decision in *Baltimore Gas & Electric Company v. Natural Resources Defense Council*, which upheld the Nuclear Regulatory Commission’s conclusion that permanent nuclear waste storage would not have a significant environmental impact.³⁵⁹ In *Baltimore Gas*, the Supreme Court noted that courts are more deferential to agency decisions when they are based on the agency’s “special expertise, at the frontiers of science.”³⁶⁰ The Tenth Circuit stated that climate science “is not a scientific frontier,” and therefore, found no reason to defer to BLM’s judgment.³⁶¹ Moreover, the court noted that “climate modeling technology exists: the NEMS program is available for the BLM to use,” yet the agency failed to use it.³⁶²

Similarly, in *Sabal Trail*, discussed previously in Parts II and III,³⁶³ the D.C. Circuit Court of Appeals rejected FERC’s argument that it need not quantify combustion emissions in a natural gas pipeline review because some of the natural gas would replace dirtier fossil fuels, thereby offsetting the project’s emissions estimates.³⁶⁴ FERC argued that it was impossible to know exactly what quantity of greenhouse gases would be emitted as a result of the project being approved and also argued that some natural gas from the pipeline would offset dirtier coal power.³⁶⁵ The court found that a purely qualitative analysis of substitution was inadequate because “[a]n agency decisionmaker reviewing this EIS would . . . have no way of knowing whether total emissions, on net, will be reduced or increased by this project, or what degree of reduction or increase will be.”³⁶⁶ The court concluded that the agency failed to discuss the “significance” of the indirect and cumulative climate change effects.³⁶⁷ Notwithstanding the D.C. Circuit opinion in *Sabal Trail*, FERC has continued to claim that it is impossible to measure the upstream and downstream emissions associated with its pipeline approvals.³⁶⁸

358. *Id.* at 1236.

359. 462 U.S. 87, 104–06 (1983).

360. *Id.* at 103.

361. *WildEarth Guardians*, 870 F.3d at 1237.

362. *Id.*

363. *See supra* Parts II & III.

364. *Sierra Club v. Fed. Energy Regulatory Comm’n*, 867 F.3d 1357, 1363 (D.C. Cir. 2017).

365. *Sierra Club*, 867 F.3d at 1364, 1373–75.

366. *Id.* at 1375.

367. *Id.* at 1374 (citing 40 C.F.R. § 1502.16(b); 40 C.F.R. § 1508.7).

368. *See, e.g.,* Pamela King, *Pipelines: Climate Impacts are ‘Virtually Unknowable’—FERC*, E&E NEWS (Jan. 28, 2019) <https://www.eenews.net/stories/1060118701>.

A second category of cases addresses agencies' failure to apply substitution analysis evenly to a project's costs and benefits. In *Montana Environmental Information Center v. U.S. Office of Surface Mining*, the District Court of Montana scrutinized the Office of Surface Mining's EA for a coal mining plan, which applied substitution analysis to reported greenhouse gas emissions, while touting the plan's revenue benefits without accounting for any substitution.³⁶⁹ The court held that this "places the Enforcement Office's thumb on the scale by inflating the benefits of the action while minimizing its impacts."³⁷⁰ The court described the fallacy of all upside as "the kind of "[i]naccurate economic information" that "may defeat the purpose of [NEPA analysis] by impairing the agency's consideration of the adverse environmental effects and by skewing the public's evaluation of the proposed agency action."³⁷¹

In a third category of cases, courts have examined agency NEPA analyses involving energy substitution where agencies did use energy market models. In such cases, courts have generally shown deference to agencies with respect to modeling choices and assumptions. This illustrates a potential double-edged sword of energy market modeling: while modeling can provide more realistic energy market scenarios—which is a useful and a positive development, in general—agencies can also hide behind complex, technical choices and thereby become more immunized from judicial reproach.

In *Sierra Club v. U.S. Department of Energy*, the D.C. Circuit Court of Appeals upheld the Department of Energy's authorization of the export of liquefied natural gas from the Freeport Terminal in Texas, rejecting claims that the Department had not sufficiently examined greenhouse gases under NEPA because it relied on a lifecycle emissions report that omitted renewable energy as a substitute fuel source.³⁷² The court dismissed petitioner's argument as mere "flyspecking" and deferred to the Department.³⁷³ Similarly, a federal district court deferred to the Forest Service's modeling and technical assumptions in a case concerning the adequacy of the agency's NEPA analysis for coal leases.³⁷⁴

However, at least one court has scrutinized—and found lacking—agency reliance on outdated energy market information. In *Indigenous Environmental Network*

369. 274 F. Supp. 3d 1074, 1098–99 (D. Mont. 2017).

370. *Id.*

371. *Id.* (citing *Nat. Res. Def. Council v. U.S. Forest Serv.*, 421 F.3d 797, 811 (9th Cir. 2005) (finding Forest Service's reliance on mistaken market demand projections that inflated the economic benefits and discounted the environmental impacts of revision of the Tongass Land Management Plan violated NEPA)).

372. 867 F.3d 189, 194 (D.C. Cir. 2017).

373. *Id.* (citing *Myersville Citizens for a Rural Cmty., Inc. v. FERC*, 783 F.3d 1301, 1324 (D.C. Cir. 2015)).

374. *High Country Conservation Advocates v. U.S. Forest Serv.*, 333 F. Supp. 3d 1107, 1129 (D. Colo. 2018).

v. U.S. Department of State, plaintiffs alleged that the State Department violated NEPA when issuing a Presidential Permit to allow construction of the cross-border Keystone XL oil pipeline.³⁷⁵ The court found that the Department failed to address “significant changes in oil prices that have occurred since 2014” and thus failed to satisfy NEPA’s hard look requirement.³⁷⁶ The court also noted that the EPA called upon the Department to revisit the EIS’s conclusions after oil prices dropped.³⁷⁷ The court held that this information was material to the Department’s consideration of Keystone’s impact on tar sands oil production, and enjoined construction and operation of the pipeline until the EIS could be supplemented.³⁷⁸

These cases illustrate that courts are willing and able to scrutinize agencies’ unsupported claims of perfect substitution and “all upside.” However, courts are less willing to overturn agencies’ technical judgments, especially where there is evidence that an agency gave logical reasons for rejecting a challenger’s preferred approach.³⁷⁹

D. Solutions for Governmental Agencies

Based on our scrutiny of past agency energy substitution analysis and court decisions, some principles for conducting proper substitution analysis emerge.

First, agencies should use accurate models and the most up-to-date energy market information available, including for renewable energy sources. Agencies should carefully model alternative scenarios and their resulting production, emissions, and other impacts. Models should account for renewable energy and increased energy conservation, both of which often act as substitutes for fossil fuel production.

Three sophisticated models are already used by federal agencies, and can be used to conduct this analysis: MarketSim, NEMS, and IPM.³⁸⁰ BOEM’s MarketSim “is a relatively simple partial-equilibrium model of U.S. energy markets” that “models the supply and demand of multiple energy resources (coal, natural gas, oil) and energy use by four domestic sectors (residential, commercial, industrial, and transportation) at the national scale.”³⁸¹ The EIA’s NEMS “is a general equilibrium

375. *Indigenous Env’t. Network v. U.S. Dep’t of State*, 347 F. Supp. 3d 561, 576 (D. Mont. 2018).

376. *Indigenous Env’t.*, 347 F. Supp. 3d at 576.

377. *Id.* at 577.

378. *Id.* at 577, 591.

379. *E.g.*, *Sierra Club v. Fed. Energy Regulatory Comm’n*, 867 F.3d 1357, 1367-68 (D.C. Cir. 2017) (“The role of the courts in reviewing agency compliance with NEPA is accordingly limited...The overarching question is whether an EIS’s deficiencies are significant enough to undermine informed public comment and informed decisionmaking”); *see also* *Baltimore Gas & Electric Co. v. Nat. Res. Def. Council*, 462 U.S. 87, 103 (1983) (noting that courts are more deferential to agency decisions when they are based on the agency’s “special expertise, at the frontiers of science”).

380. HOWARD, MODELING CHOICE, *supra* note 282, at 2.

381. *Id.* at 6.

electricity model” (energy inputs, electricity, transportation and transmission) set in the context of a macro-economy and global electricity market to capture feedbacks and interactions.³⁸² And ICF International’s Integrated Planning Model (IPM) “is a linear programming model” that “captures [several] aspects of the power sector, including [energy inputs,] generation, transmission, and dispatch.”³⁸³ Like NEMS, IPM models energy substitutes (coal, natural gas, oil, and renewables) and combustion emissions.³⁸⁴ Agencies should disclose the limitations of the models they use, make all inputs and data publicly available, and conduct sensitivity analysis for key parameters. It may be preferable to use multiple models to balance the tradeoffs of each model.³⁸⁵ Moreover, as a baseline, agencies should model at least two policy scenarios: one taking the “constant fossil fuel demand” approach and the other based upon fossil fuel consumption projections consistent with limiting global warming to 1.5 or 2-degrees Celsius.³⁸⁶ It is irrational—and dangerous—for federal agencies to assume constant global fossil fuel demand decades into the future as the baseline for energy modeling.

Second, where estimates are uncertain, agencies should provide a range of likely emissions, from the highest possible emissions to the lowest, rather than assume that emissions will be zero or *de minimus* due to energy substitution. This would help agencies measure the significance of environmental effects, as the NEPA regulations define “significantly” by reference to both context and intensity.³⁸⁷ As a default upper bound on greenhouse gas emissions, agencies should assume no energy substitution: that 100 percent of the resource will be *produced and consumed, and that all of this resource is additional to a no action baseline*. For instance, as discussed in Parts II and III, as an upper-bound estimate, it would be reasonable for FERC to assume that a pipeline will continuously transport 100 percent of its capacity, that all transported gas will be combusted, and that all combusted gas is additional and displaces no other fuels. FERC has called this a “full burn” assumption.³⁸⁸

A full burn assumption is consistent with analyses prepared by other agencies. In 2017, BLM and the Office of Surface Mining issued an EA for a federal coal lease modification where the agencies “assume[d] that the remaining portion of the maximum year coal to be shipped . . . is eventually combusted.”³⁸⁹ The State

382. *Id.* at 8.

383. *Id.* at 10-11.

384. *Id.* at 11.

385. *Id.* at 12.

386. *See supra* notes 19 through 21 and accompanying body text.

387. 40 C.F.R. § 1508.27.

388. *E.g.*, Sabal Trail Remand Order, 162 FERC ¶ 61,233, 2018 WL 1364645, at *6–8. (Mar. 14, 2018).

389. *See* BLM, ENVIRONMENTAL ASSESSMENT, DOI-BLM-CO-S010-2011-0074-EA 81 (2017), <https://bit.ly/2ufWNSL>.

Department provided a similar upper bound analysis in its 2014 Final EIS for the Keystone XL Pipeline, calculating lifecycle greenhouse gas emissions from the pipeline based on “the maximum throughput of the proposed project (830,000 bpd), assuming operation over the full 365 days in a year.”³⁹⁰

If an agency also provides a lower bound estimate of emissions, rather than assuming perfect or near-perfect substitution, it should accurately account for global energy market dynamics. One recent economic study suggests that, for oil projects, it would be reasonable to assume eighty percent substitution under conditions of low oil prices and forty percent substitution under conditions of high oil prices.³⁹¹ This is far lower than the ninety-five percent or higher assumed substitution used in recent EISs for offshore leasing and drilling in the Arctic National Wildlife Refuge. And in fact, the State Department recently used these assumptions in its 2019 Draft Supplemental EIS for the Keystone XL pipeline. The Department modeled a range of greenhouse gas impacts under four different substitution assumptions: no substitution (an upper bound); eighty percent substitution under conditions of low oil prices; forty percent substitution under conditions of high oil prices; and complete substitution.³⁹² While including a full-substitution scenario is still problematic, this is a vast improvement over the practice of other agencies.

However, the State Department’s 2019 EIS for the Keystone XL pipeline erred by not applying any substitution to the project’s economic effects, thus displaying the fallacy of “all upside.”³⁹³ This underscores a final principle of proper energy substitution analysis: agencies should apply substitution analysis evenly across environmental and economic costs and benefits. This can be accomplished by applying the same range of realistic substitution scenarios to revenue and other benefits that agencies apply to greenhouse gas emissions.

By conducting energy market substitution analysis appropriately, decisionmakers can have a better picture of the net costs or benefits of projects, including climate change consequences, and disclose those consequences to the public. As the next Part explains, NEPA also requires agencies to use available metrics like the social cost of greenhouse gases to assess the significance of environmental impacts, especially where economic benefits are monetized.

390. U.S. DEP’T OF STATE, FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE KEystone XL PIPELINE tbl.4.14–8 (2014).

391. Peter Erickson & Michael Lazarus, *Would Constraining US Fossil Fuel Production Affect Global CO2 emissions? A Case Study of US Leasing Policy*, 150 *Climate Change* 29, 32–33 (2018).

392. U.S. DEP’T OF STATE, DRAFT SUPPLEMENTAL ENV’T. IMPACT STATEMENT FOR THE PROPOSED KEystone XL PIPELINE, DOS-2019-0033 at 4–79 (2019).

393. *See id.* at 4–62, 4–63, 4–64 (stating economic benefits without acknowledging that these projections represent an upper bound, absent any substitution).

V. THE SOCIAL COST OF CARBON: PLACING A DOLLAR VALUE ON EXPECTED CLIMATE DAMAGES

Even where agencies do attempt to quantify greenhouse emissions in NEPA analyses, they often chronically undervalue the cost to society of those emissions, frequently treating the cost as zero. The result is a skewed analysis that makes the economic benefits of projects look much greater than the costs. Agencies can remedy this by using available tools like the Interagency Working Group's social cost of greenhouse gases metric.³⁹⁴

A. What Is the Social Cost of Carbon?

The social cost of greenhouse gases “is an estimate, in dollars, of the economic damages that result from emitting one additional ton of greenhouse gases into the atmosphere.”³⁹⁵ The social cost of carbon dioxide (“SCC”) and social cost of methane are the two most commonly used metrics, each of which place a dollar value on the most significant, quantifiable damages caused by each additional ton of carbon dioxide or methane emitted, respectively. These metrics translate the effects of climate change into U.S. dollars, in order to help policymakers and stakeholders understand the economic impacts of decisions that will increase or decrease greenhouse gas emissions.³⁹⁶

Translating the abstract concept of metric tons of carbon dioxide into a dollar figure makes climate change costs much more tangible and easier to compare to other quantified project costs and benefits, such as revenue or jobs. For instance, one million metric tons of carbon dioxide is equivalent to approximately \$53 million in climate damages using a 3% discount rate.³⁹⁷ Moreover, merely disclosing a project's aggregate greenhouse gas emissions in NEPA analysis does not actually describe the climate change consequences—including physical effects on the ground. By using the social cost of greenhouse gases to place a dollar figure on the most salient damages, stakeholders can much more easily grasp the degree of harm associated with

394. INTERAGENCY WORKING GROUP ON SOCIAL COST OF CARBON, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 2 (2010) [hereinafter TSD 2010].

395. Rennett & Kingdon, *supra* note 41, at 1.

396. *Id.*

397. See INTERAGENCY WORKING GRP. ON SOCIAL COST OF GREENHOUSE GASES, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 4 (2016) [hereinafter TSD 2016] (translating the figures provided into U.S. dollars in 2020, to account for inflation). A discount rate is the rate of return used to discount future costs and benefits back to their present value. See also OFFICE OF MGMT. BD., CIRCULAR A-4, “DISCOUNT RATES” 32–36 (2003) (stating that “[i]f your rule will have important intergenerational benefits or costs you might consider a further sensitivity analysis using a lower but positive discount rate in addition to calculating net benefits using discount rates of 3 and 7 percent”).

emissions, and better measure the significance of environmental effects.³⁹⁸ For these reasons, the metric is used by local, state, and federal governments to inform billions of dollars of policy and investment decisions in the United States and abroad.³⁹⁹

The metric was developed by an Interagency Working Group (“Working Group”) convened in 2009 by President Obama.⁴⁰⁰ The group was assembled in response to a Ninth Circuit ruling requiring the National Highway Traffic Safety Administration to account for the economic effects of the reduction in CO₂ emissions in its analysis of national fuel economy standards.⁴⁰¹

As defined by the Working Group, the social cost of greenhouse gases is “intended to include (but not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services.”⁴⁰² The Working Group developed the SCC values using the three most widely cited, peer-reviewed climate economic impact models that link physical impacts to the economic damages of CO₂ emissions.⁴⁰³ These three integrated assessment models, PAGE, FUND, and DICE, produce a value for three different discount rates: 2.5%, 3%, and 5%.⁴⁰⁴ The Working Group gives each model equal weight in developing the values. Discount rates allow economists to measure the value of money over time—the tradeoff between what a dollar is worth today and what a dollar would be worth in the future.⁴⁰⁵ Higher discount rates result in a lower SCC; if future climate damages are discounted at a high rate, we would be placing less value on avoiding those damages today.⁴⁰⁶ In 2020, the SCC estimates are \$15, \$53, and \$78 per metric ton of CO₂, measured in 2020 dollars.⁴⁰⁷ The 3% discount rate is described as the “central value,” corresponding to \$53 per metric ton of carbon

398. See, e.g., William D. Nordhaus, *Revisiting the Social Cost of Carbon*, 114 PROC. NAT'L ACAD. SCI. 1518, 1518 (2017) (“The social cost of carbon (SCC) is a central concept for understanding and implementing climate change policies.”).

399. Rennett and Kingdon, *supra* note 41; Iliana Paul et al., INST. FOR POL'Y INTEGRITY, THE SOCIAL COST OF GREENHOUSE GASES AND STATE POLICY: A FREQUENTLY ASKED QUESTIONS GUIDE (2017), http://policyintegrity.org/files/publications/SCC_State_Guidance.pdf (describing state uses of the metric).

400. INST. FOR POL'Y INTEGRITY, SOCIAL COSTS OF GREENHOUSE GASES 2 (2017), www.policyintegrity.org/files/publications/Social_Cost_of_Greenhouse_Gases_Factsheet.pdf.

401. *Id.*; see also *Ctr. for Biological Diversity v. NHTSA*, 538 F.3d 1172 (9th Cir. 2008).

402. TSD 2010, *supra* note 394, at 1.

403. *Id.* at 5.

404. *Id.*; see also TSD 2016, *supra* note 397.

405. INST. FOR POL'Y INTEGRITY, SOCIAL COSTS OF GREENHOUSE GASES, *supra* note 400, at 4.

406. *Id.*

407. TSD 2016, *supra* note 397, at 4 (placing the 2020 SCC values at \$12, \$42, \$62 in 2007 dollars). The numbers in the main text have been updated to 2020 dollars to account for inflation.

dioxide in 2020.⁴⁰⁸ The Working Group's social cost of greenhouse gases is considered to be a lower bound estimate of climate damages, as it omits certain effects that are more difficult to measure.⁴⁰⁹

While agencies frequently used the social cost of greenhouse gases during the Obama Administration in regulatory impact analyses (cost benefit analysis prepared by federal agencies in rulemakings) and sometimes in NEPA analyses, in 2017 the Trump administration withdrew all SCC guidance and technical documents as "no longer representative of government policy."⁴¹⁰ The Trump administration also disbanded the Working Group that had developed the metric.⁴¹¹

In October 2017, the Environmental Protection Agency issued interim social cost of carbon values of approximately \$1 and \$7, in 2020 dollars.⁴¹² The SCC values decreased so markedly because EPA applied higher discount rates (3% and 7%) and incorporated the domestic impacts associated with carbon emissions, only, rather than the global impacts.⁴¹³ While a critique of the interim domestic value is beyond the scope of this article, the Trump administration's changes to the metric have been widely criticized by economists and legal scholars.⁴¹⁴

B. Regulatory Approach to Monetizing Emissions

NEPA itself is silent with respect to cost-benefit analysis, and NEPA's implementing regulations provide that NEPA does not require a monetary cost benefit analysis of the alternatives considered.⁴¹⁵ That said, nothing in the statute or regulations prevents agencies from monetizing effects, and agencies frequently monetize the expected economic benefits of projects, such as revenue.

408. *Id.* at 16 ("the central value that emerges is the average SC-CO2 across models at the 3 percent discount rate.") (internal citation omitted).

409. PETER HOWARD, INST. FOR POL'Y INTEGRITY, OMITTED DAMAGES: WHAT'S MISSING FROM THE SOCIAL COST OF CARBON 6-7 (2014), https://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf.

410. Exec. Order No. 13783, 82 Fed. Reg. 16,093 § 5 (Mar. 31, 2017).

411. *Id.*

412. The figures have been updated from 2011 to 2020. USD. ENV'T. PROT. AGENCY, REGULATORY IMPACT ANALYSIS FOR THE REVIEW OF THE CLEAN POWER PLAN: PROPOSAL 44 (2017).

413. *Id.*

414. SEE INST. FOR POL'Y INTEGRITY, HOW THE TRUMP ADMINISTRATION IS OBSCURING THE COSTS OF CLIMATE CHANGE (2018), https://policyintegrity.org/files/publications/Obscuring_Costs_of_Climate_Change_Issue_Brief.pdf; see also Revesz et al., *The Social Cost of Carbon: A Global Imperative*, 11 REV. ENV'TL ECON. & POL'Y 172 (2017); Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 Sci. 655 (2017); Richard Newell, *Unpacking the Administration's Revised Social Cost of Carbon*, RFF BLOG: RESOURCES FOR THE FUTURE (Oct. 10, 2017), <https://www.resourcesmag.org/common-resources/unpacking-the-administrations-revised-social-cost-of-carbon/>.

415. 40 C.F.R. § 1502.23.

Under the Obama administration, CEQ expressed support for using the social cost of greenhouse gases in NEPA analysis, describing the Working Group's metric as "a harmonized, interagency metric that can give decision makers and the public useful information."⁴¹⁶ However, as described in Part I, the Trump administration rescinded that CEQ guidance and proposed new guidance stating that agencies need not weigh NEPA alternatives "in a monetary cost-benefit analysis using any monetized Social Cost of Carbon (SCC) estimate."⁴¹⁷ The 2019 proposed guidance noted that the SCC estimates were developed for rulemakings, not NEPA analysis or project-level decisions.⁴¹⁸ And teeing up a potential conflict with legal precedent, CEQ further stated that, "[m]onetization or quantification of some aspects of an agency's analysis does not require that all effects, including potential effects of GHG emissions, be monetized or quantified."⁴¹⁹

As a result of the change in guidance, agencies are left to decide whether to cease using the metric at all, whether to use the "domestic only" interim value, or whether to use the Working Group's global value. In the absence of federal institutional support for the social cost of greenhouse gases metric in NEPA analysis, agencies have expressed growing reluctance to use it in environmental reviews. But by retreating from monetizing climate damages, agencies are also rolling the dice with respect to litigation.

In its 2019 draft EIS for the Willow Master Development Plan, which describes planned oil and gas drilling, BLM failed to use the SCC to monetize any climate damages.⁴²⁰ BLM stated that it is "not currently possible to determine the [climate] impact of a single project."⁴²¹ Of course, BLM overlooked the social cost of greenhouse gases metric, which was designed to monetize the incremental impact of as little as one metric ton of carbon dioxide. In the EIS, BLM also monetized a number of effects, including tax revenue and royalties from fossil fuel production, yet failed to treat expected climate costs with proportional rigor by translating them into a dollar figure.⁴²² The end result is an EIS that gives BLM and the public essentially no information on whether the climate damages are significant, despite the existence of the social cost of greenhouse gases as an appropriate and accessible metric that can help assess the significance of emissions by presenting them in dollar terms.

416. Memorandum from Council on Env't. Quality, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews 33 n.86 (2016).

417. Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions, 84 Fed. Reg. 30,097, 30,098 (June 26, 2019).

418. *Id.* at 30,099.

419. *Id.*

420. WILLOW PLAN DEIS, *supra* note 318, at 25.

421. *Id.*

422. *Id.* at 124.

In its Final EIS for leasing in the Arctic National Wildlife Refuge, BLM likewise failed to use the social cost of greenhouse gases metric.⁴²³ Yet, BLM monetized many of the lease sales' expected monetary benefits, including property taxes and mineral royalties, thereby "placing its thumb on the scale" in favor of more leasing.⁴²⁴ The agency made several dubious arguments to justify its decision to not monetize emissions, including that the SCC was developed for rulemakings only, that BLM did not provide a "complete monetary cost-benefit analysis," and that the SCC "does not measure the actual incremental impacts of a project on the environment."⁴²⁵ Each of these arguments is easily refuted: many federal and state agencies use the metric in environmental impact reviews;⁴²⁶ BLM presented a misleading analysis by quantifying the economic impacts yet omitting climate damages;⁴²⁷ and the metric was designed to measure incremental impacts.⁴²⁸ Applying a back-of-the-envelope calculation, BLM's leasing plan is projected to cause more than \$265 million per year in climate damages, but the public would have no way of knowing this by reviewing the EIS.⁴²⁹

BLM is not alone in its failure to use the social cost of greenhouse gases metric. Recall the extensive EIS prepared by BOEM for its five-year offshore drilling program, described in Part IV.⁴³⁰ The agency is instructed by statute to conduct an analysis somewhat akin to a cost benefit analysis, "selecting the timing and location of leasing, to the maximum extent practicable, so as to obtain a proper balance between the potential for environmental damage, the potential for the discovery of oil and gas, and the potential for adverse impact on the coastal zone."⁴³¹

423. ARCTIC FINAL EIS, *supra* note 286, at 3-9.

424. *See id.* at 3-328 (monetizing expected labor income), 3-329 (monetizing local, state and federal revenues, including property taxes and royalties); *see also* Montana Env'tl. Info. Ctr. v. U.S. Office of Surface Mining, 274 F. Supp. 3d 1074, 1098-99 (D. Mont. 2017).

425. ARCTIC FINAL EIS, *supra* note 286, at F-2-F-3.

426. *See, e.g.*, BOEM, LIBERTY DEVELOPMENT AND PRODUCTION PLAN DRAFT EIS 3-129, 4-50 (2017); Peter Howard & Jason Schwartz, *Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon*, 42 COLUM. J. ENV'T. L. 203, 270-84 (2017) (listing all uses by federal agencies through July 2016); Paul et al., *The Social Costs of Greenhouse Gases and State Policy*, *supra* note 399 (describing state uses of the metric).

427. *See* High Country Conservation Advocates v. U.S. Forest Serv., 52 F. Supp. 3d 1174, 1182 (D. Colo. 2014).

428. *See* Inst. for Pol'y Integrity, *Social Costs of Greenhouse Gases*, *supra* note 400, at 1 ("Simply, the SCC is a monetary estimate of the damage done by *each ton* of carbon dioxide¹ that is released into the air.") (emphasis added).

429. We derived this figure by multiplying the Final EIS's stated emission volumes by \$53 per metric ton of CO₂e, the 2020 central value for the global SCC, provided in 2020 U.S. dollars. *See* ARCTIC FINAL EIS, *supra* note 286, at 3-8, tbl.3-4.

430. *See supra* Part IV.B.2.

431. 43 U.S.C. § 1344(a)(3).

However, the agency's 2016 net benefits analysis omitted the costs associated with greenhouse gas emissions from oil and gas production, transport, processing, and consumption.⁴³² The agency explained: "[a] key reason for not incorporating these costs is that benefits and costs in the net benefits analysis are appropriately assessed at the domestic or national level, not at a global scale."⁴³³ Of course, this argument ignores that climate costs are borne internationally, and even climate effects in foreign countries harm U.S. economic and security interests.⁴³⁴ For this reason, the Working Group developed a global social cost of greenhouse gases for use in domestic policy creation.⁴³⁵

BOEM, however, has not been internally consistent with respect to its use of the social cost of greenhouse gases. In a 2017 EIS for an offshore development plan, it explained that the social cost of carbon was "a useful measure to assess the benefits of CO₂ reductions and inform agency decisions" and used it to monetize the emissions difference between the proposed oil and gas project and the no-action baseline.⁴³⁶ BOEM does not appear to have used the SCC in any subsequent NEPA analyses.

In short, agencies have shown growing reluctance to use the social cost of greenhouse gases metric in NEPA analysis during the Trump Administration, perhaps in light of CEQ's revised guidance that counsels against the use of this tool.⁴³⁷ The next section considers whether the agencies' failure to monetize climate effects may make them more vulnerable to legal challenges.

C. Case Precedent

Despite the move away from the social cost of greenhouse gases protocol by federal agencies, NEPA and decades of legal precedent interpreting the statute make clear that agencies must describe the "actual environmental effects" of actions

432. BOEM, ECONOMIC ANALYSIS METHODOLOGY FOR THE 2017–2022 OUTER CONTINENTAL SHELF OIL AND GAS LEASING PROGRAM 3-1 (2016), <https://www.boem.gov/sites/default/files/oil-and-gas-energy-program/Leasing/Five-Year-Program/2017-2022/Economic-Analysis-Methodology.pdf>,

433. *Id.*

434. See, e.g., TSD 2010, *supra* note 394, at 10-11; THE WHITE HOUSE, FINDINGS FROM SELECT FEDERAL REPORTS: NATIONAL SECURITY INTERESTS OF CLIMATE CHANGE 3 (2015), https://obama.whitehouse.archives.gov/sites/default/files/docs/National_Security_Implications_of_Changing_Climate_Final_051915.pdf; *Fourth National Climate Assessment*, U.S. GLOBAL CHANGE RESEARCH PROGRAM, <https://nca2018.globalchange.gov/> (last visited June 15, 2020) ("The impacts of climate change beyond our borders are expected to increasingly affect our trade and economy.")

435. TSD 2010, *supra* note 394, at 10-11.

436. BOEM, LIBERTY DEVELOPMENT AND PRODUCTION PLAN DRAFT EIS 3-129, 4-50 (2017).

437. See Draft National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions, 84 Fed. Reg. 30,097, 30,098-99 (June 26, 2019).

and alternatives in a way that “brings those effects to bear on decisions.”⁴³⁸ Courts review agency compliance with NEPA by assessing whether they have taken a “hard look” at the effects of alternatives.⁴³⁹ Moreover, information presented in EISs and EAs “cannot be misleading.”⁴⁴⁰ Because economic benefits are often presented using dollar figures, some courts have held that it is misleading to fail to also monetize climate change costs, especially where the social cost of greenhouse gases is an available, peer-reviewed metric that provides an estimate of climate damages.⁴⁴¹ That said, as Part IV on energy substitution made clear, courts often defer to agencies when they make choices that depend upon their technical or scientific expertise; the use of the metric (or refusal to do so) has been interpreted by some, but not all, courts as falling into this category.⁴⁴²

Before discussing illustrative NEPA cases, one important decision addressed the legality of agencies relying upon the global social cost of greenhouse gases. In 2016, the U.S. Court of Appeals for the Seventh Circuit upheld the Department of Energy’s use of the metric in its analysis of a rule setting energy efficiency standards for commercial refrigerators pursuant to the Energy Policy and Conservation Act.⁴⁴³ In *Zero-Zone, Inc. v. U.S. Department of Energy*, the court considered an industry-led challenge to the Department’s energy efficiency standards that the agency justified, in part, by quantifying and monetizing the environmental benefits of the standards using the SCC.⁴⁴⁴ Petitioners alleged that agency’s analysis was arbitrary and capricious because it used the global SCC value to assess projected climate benefits, but only assessed national costs.⁴⁴⁵ The court upheld the Department’s use of the global social cost of greenhouse gases over these objections, finding that the agency adequately explained its rationale for relying on the global value because climate change is a “global externality.”⁴⁴⁶ The Department relied on

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

439. *Robertson v. Methow Valley Citizen Council*, 490 U.S. 332, 350 (1989).

440. *High Country Conservation Advocates v. U.S. Forest Serv.*, 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) (“[I]t is essential that the EIS not be based on misleading economic assumptions.”).

441. *See infra* Part V.C. and citations therein.

442. *Marsh v. Or. Nat. Res. Council*, 490 U.S. 360, 377 (1989) (citing *Kleppe v. Sierra Club*, 427 U.S. 390, 412 (1976)).

443. *Zero-Zone, Inc. v. U.S. Dep’t of Energy*, 832 F.3d 654 (7th Cir. 2016).

444. *Id.* at 677.

445. *Id.* at 678–79. The court also rejected the argument that DOE could not consider environmental benefits under EPCA, citing the Act’s mandate to consider energy conservation. *Id.* at 677.

446. *See id.* at 678; *see also* Energy Conservation Standards for Commercial Refrigeration Equipment, 79 Fed. Reg. 17,726, 17,778–79 (Mar. 28, 2014).

the Working Group's technical documents to support its use of the metric.⁴⁴⁷ Because these documents have been withdrawn by the Trump administration,⁴⁴⁸ it is less clear how a court presented with a similar case would rule today.

One of the most cited NEPA cases for the proposition that agencies must use the social cost of greenhouse gases to monetize climate damages when they describe other project effects in dollar terms is the 2014 decision in *High Country Conservation Advocates v. U.S. Forest Service*.⁴⁴⁹ BLM and the Forest Service argued that it was sufficient to quantify expected emissions relative to state and national emissions and provide a general discussion of the impacts of climate change.⁴⁵⁰ The agencies did not discuss the impacts caused by the project's expected emissions, and claimed "that such an analysis is impossible."⁴⁵¹ The court disagreed, noting that while the SCC was designed to assist agencies in cost-benefit analyses associated with rulemakings, "EPA has expressed support for its use in other contexts."⁴⁵² Moreover, the agencies *did* monetize climate change costs using the protocol in the draft EIS for the project, but they removed that analysis prior to the final EIS while retaining monetization of the project's benefits, such as coal royalties.⁴⁵³ The court held that the agencies did not offer a non-arbitrary reason to exclude the SCC from the final analysis and, moreover, relied upon the economic benefits of the project in selecting their chosen alternative.⁴⁵⁴

In 2017, in *Montana Environmental Information Center v. U.S. Office of Surface Mining*, the U.S. District Court of Montana found that the agency engaged in a "socioeconomic analysis" of the benefits associated with a mining plan proposal and held that the agency was putting its "thumb on the scale" by failing to monetize the climate damages associated with greenhouse gas emissions.⁴⁵⁵ In the EA, the Office of Surface Mining concluded that the plan would generate a \$400,000 monthly payroll in Montana and contribute \$21.8 million per year in tax revenue to the states.⁴⁵⁶ The agency quantified the greenhouse gas emissions associated with the

447. See *Zero-Zone*, 832 F.3d at 678–79.

448. Exec. Order No. 13,783, 82 Fed. Reg. 16,093, 16,095 (Mar. 31, 2017).

449. *High Country Conservation Advocates v. U.S. Forest Serv.*, 52 F. Supp. 3d 1174, 1181–82 (D. Colo. 2014).

450. *Id.* at 1190.

451. *Id.* at 1190.

452. *Id.* (citing Sarah E. Light, *NEPA's Footprint: Information Disclosure as a Quasi-Carbon Tax on Agencies*, 87 TUL. L. REV. 511, 545–46, 545 n.160 (2013) (noting the EPA recommendation to the State Department to "explore . . . means to characterize the impact of the GHG emissions, including an estimate of the 'social cost of carbon' associated with potential increases of GHG emissions" in connection with the State Department's review of the Keystone XL pipeline)).

453. *Id.* at 1190–91.

454. *Id.* at 1191–92.

455. 274 F. Supp. 3d 1074, 1098 (D. Mont. 2017).

456. *Id.* at 1096.

project and compared them to total U.S. emissions, but it failed to monetize them. The court concluded that quantifying the benefits but not the climate change costs was arbitrary and capricious, especially when the social cost of greenhouse gases was available.⁴⁵⁷

And in 2020, the Northern District of California cited similar failings when vacating a BLM regulation weakening Obama-era standards for methane venting from natural gas and oil production.⁴⁵⁸ Although the agency quantified methane emissions, it failed to communicate the “*actual* environmental effects” of the emissions, instead invoking the frivolous fraction fallacy to dismiss climate concerns.⁴⁵⁹ BLM attempted to trivialize climate impacts by explaining that the project’s effects would amount to less than one percent of total United States methane emissions.⁴⁶⁰ Rejecting this comparison as unhelpful in capturing the cumulative effects of such projects, the court explained that “[m]ere quantification [of emissions] is insufficient” to satisfy a hard look standard.⁴⁶¹ Moreover, the court said that although NEPA does not require a particular type of methodology for assessing climate impacts, BLM could not ignore available scientific tools for assessment, like the social cost of methane, by claiming climate effects were not foreseeable.⁴⁶² The failure to use the Working Group’s social cost of methane not only failed NEPA, but also contaminated the agency’s cost-benefit analysis, according to the court, making the agency’s analysis arbitrary and capricious.⁴⁶³ Notwithstanding an executive order by the Trump administration to abandon the Working Group’s global social cost of methane, the court concluded that “the President did not alter by fiat what constitutes the best available science,” and therefore could not absolve agencies of statutory responsibilities to accurately evaluate a rule’s effects through methods like the Working Group’s social cost of methane.⁴⁶⁴ The court rejected BLM’s use of an interim “domestic only” social cost of methane, which was not peer-reviewed and ignored climate harms to Americans abroad, foreign American-owned assets, and harms to all Americans from reduced geopolitical security.⁴⁶⁵

Other federal courts have been less willing to overturn agency NEPA analyses even where some economic benefits are monetized but climate change costs are not, though. In 2018, in *Wilderness Workshop v. Bureau of Land Management*, the

457. *Id.* at 1094.

458. *California v. Bernhardt*, No. 4:18-cv-05712-YGR (July 15, 2020).

459. *Id.* at 45–46.

460. *Id.* at 46.

461. *Id.* at 45–46.

462. *Id.* at 46–47.

463. *Id.* at 32, 36.

464. *Id.* at 32–33.

465. *Id.* at 33–34.

District Court of Colorado held that estimates of average annual labor income and royalty distributions did not constitute the “benefit” side of a cost-benefit analysis.⁴⁶⁶ Further, the court stated that because BLM did not “expressly rely” on the cited economic benefits in the plan, it held that BLM’s failure to monetize climate damages was not arbitrary and capricious.⁴⁶⁷ The court thus narrowed the application of *High Country*.

One year later, in *WildEarth Guardians v. Zinke*, the District Court of the District of Columbia noted that the EAs at issue, for a series of oil and gas lease sales, discussed economic benefits in a manner that was “abbreviated and involved little quantification,” distinguishing the facts at hand from those in *High Country*.⁴⁶⁸ However, the EAs did cite dollar figures for projected lease sales. Nonetheless, the court held that “the EAs’ cursory discussion of the economic benefits of oil and gas development” did not obligate BLM to monetize climate change effects at the leasing stage.⁴⁶⁹ The court held that BLM provided a reasoned explanation for declining to use the social cost of carbon protocol; namely that, “calculating the [social cost of carbon] from CO₂ emissions from the combustion of an unknown quantity of produced oil and gas would be highly speculative.”⁴⁷⁰

Finally, in 2016, in *EarthReports v. Federal Energy Regulatory Commission*, the D.C. Circuit considered whether FERC needed to use the social cost of greenhouse gases or a comparable tool when assessing emissions that would result from the construction and operation of a liquefied natural gas export facility.⁴⁷¹ FERC stated that it would not use such a metric because: (1) “lack of consensus on the appropriate discount rate leads to significant variation in output;” (2) it does not measure the actual incremental impacts of a project on the environment; and (3) “there are no established criteria identifying the monetized values that are to be considered significant for NEPA purposes.”⁴⁷² Notably, the underlying EA did monetize several project benefits, such as tax and business sale revenue, without monetizing any climate damages.⁴⁷³ However, the court upheld FERC’s decision.⁴⁷⁴ The D.C.

466. 342 F. Supp. 3d 1145, 1159 (D. Colo. 2018).

467. *Id.*

468. 368 F. Supp. 3d 41, 78 (D.D.C. 2019).

469. *Id.*

470. *Id.* (internal citations omitted).

471. 828 F.3d 949, 954–56 (D.C. Cir. 2016).

472. *Id.* at 956 (internal quotes omitted); *see also* Dominion Cove Point LNG, 151 FERC ¶ 61,095, 61,634-35 (May 4, 2015) (rejecting consideration of SCC for identical reasons).

473. FERC, ENVIRONMENTAL ASSESSMENT FOR THE COVE POINT LIQUEFACTION PROJECT 87–88, 92 (2014), <https://www.ferc.gov/industries/gas/enviro/eis/2014/05-15-14-ea/ea.pdf>; *see also* Dominion Cove Point LNG, 151 FERC at 61,635–36.

474. *EarthReports*, 828 F.3d at 956 (“[P]etitioners provide no reason to doubt the reasonableness of the Commission’s conclusion.”).

Circuit has repeatedly cited *EarthReports* in rejecting arguments for applying the social cost of greenhouse gases in FERC's environmental reviews.⁴⁷⁵

In short, many—but not all—courts examining agency NEPA analyses have deferred to agency's judgments as to whether to use the Working Group's social cost of greenhouse gases. They have been more willing to overturn agencies' failure to use the metric where an agency monetized some benefits of the project, but not climate costs. But courts have not been consistent on this point over time and across jurisdictions. The result is less a "bright line" rule for when agencies must use the social cost of greenhouse gases and more a general rule of thumb for agency best practice in order to reduce legal risk.

D. Solutions for Government Agencies

Monetizing climate damages fulfills an agency's legal obligations under NEPA in ways that simple quantification of tons of greenhouse gas emissions cannot. As described earlier in this Article, climate change is a "death by a thousand cuts problem," and this problem is exacerbated when agencies fail to use available tools that provide meaningful context for emissions. In 2014 alone, the extraction and combustion of fossil fuels from federal lands produced 1,279 million metric tons of CO₂, which amounts to 23% of U.S. total CO₂ emissions and more than \$67 billion in climate damages.⁴⁷⁶ It is generally easier to comprehend climate damages when presented in dollar terms. This makes our recommendation for agencies straightforward: use the global social cost of greenhouse gases in NEPA analyses.

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."⁴⁷⁷ Moreover, NEPA requires a "reasonably thorough discussion" and "necessary contextual information" on real-world climate impacts and their significance, which the social cost of greenhouse gases provides.⁴⁷⁸

The "actual environmental effects" of emitting greenhouse gases 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

475. *E.g.*, *Sierra Club v. Fed. Energy Regulatory Comm'n*, 867 F.3d 1357, 1375 (D.C. Cir. 2017); *Sierra Club v. FERC*, 672 Fed. App'x 38 (D.C. Cir. 2016).

476. MATTHEW D. MERRILL ET AL., U.S. GEOLOGICAL SURVEY, FEDERAL LANDS GREENHOUSE GAS EMISSIONS AND SEQUESTRATION IN THE UNITED STATES: ESTIMATES FOR 2005–14 8 (2018). The estimate of \$67 billion in climate damages is calculated using a 2020 SCC value of \$53 per metric ton of CO₂e, which is provided in 2020 U.S. dollars.

477. *Baltimore Gas & Elec. v. Nat. 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").

478. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1194, 1217 (9th Cir. 2008).

events; lost productivity and other impacts to agriculture, forestry, and fisheries; human health impacts, including cardiovascular and respiratory mortality from heat-related illnesses, changing disease; and changes in fresh water availability, to name just a few.⁴⁷⁹ While a lower bound estimate, the social cost of greenhouse gases was designed specifically to capture the aggregate cost of such impacts.

Agencies should monetize climate costs using the social cost of greenhouse gases in all NEPA analysis in order to provide a meaningful accounting of actual environmental effects. This duty becomes heightened where economic benefits are presented in dollar terms.⁴⁸⁰ While not all courts are uniform on this point, lopsided analysis that omits a thorough accounting of climate damages is precisely the kind of “inaccurate economic information” that may defeat the purpose of NEPA analysis and skew the public’s evaluation of the proposed agency action.⁴⁸¹

CONCLUSION

The National Environmental Policy Act was designed to force federal agencies to think about environmental challenges. Climate change is the greatest environmental challenge of our time. Yet NEPA analyses have frequently failed to account for projects’ climate impacts. Such failure is unacceptable. For each of the four areas in which NEPA analyses commonly fall short—downstream emissions, upstream emissions, energy substitution analysis, and monetizing emissions—agencies already possess tools to estimate and contextualize climate impacts. Some courts have begun to demand more of agency climate assessments, and it is likely that as climate change grows direr, judges’ expectations will increase. To fulfill their duty to the public, agencies must fully consider the consequences of their own actions in contributing to the climate crisis. Only then can agencies “create and maintain conditions under which man and nature can exist in productive harmony.”⁴⁸²

479. See generally HOWARD, OMITTED DAMAGES, *supra* note 409.

480. See, e.g., High Country Conservation Advocates v. U.S. Forest Serv., 52 F. Supp. 3d 1174, 1190-91 (D. Colo. 2014).

481. See *Montana Env’t. Info. Ctr. v. U.S. Office of Surface Mining*, 274 F. Supp. 3d 1074, 1098 (D. Mont. 2017) (internal citations omitted); see also *California v. Bernhardt*, No. 4:18-cv-05712-YGR (July 15, 2020).

482. 42 U.S.C. § 4331(a).