THE NATIONAL ENVIRONMENTAL POLICY ACT AND THE VALUE OF INFORMATION

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The National Environmental Policy Act requires many federal actions to be accompanied by a "detailed statement" on the expected environmental impacts of the action and its alternatives. But despite half a century since its passage, agencies still lack clear, reasoned guidance as to (1) what kinds of impacts must be considered, (2) how thoroughly those impacts must be analyzed, and (3) what kinds of alternatives to the federal action must be also assessed. The existing literature regarding these three "stopping-point" problems has largely overlooked one possible approach: to assess the expected benefits and costs of gathering more information through value-of-information analysis. Such a framework does not provide easy answers, but at least gives a basis for agencies and courts to reason about what environmental disclosures should be required, and why.

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INTRODUCTION

The National Environmental Policy Act of 1969[1] ("NEPA" or "Act") was passed with grand aspirations to establish a national policy of environmental protection, to use "all practicable means" to achieve lofty environmental goals,[2] and to have all federal agencies administer the law in accordance with such ideals.[3] In practice, the primary impact of NEPA has been its requirement that federal agencies prepare a "detailed statement" on the impacts of "major Federal actions significantly affecting the quality of the human environment,"[4] and the alternatives to taking such actions. Today, that statement is known as an Environmental Impact Statement ("EIS").

Despite over half a century since the passage of NEPA, agencies are still often faced with difficult questions over what, exactly, is required of them to comply. The Act's implementing regulations and a long history of case law provide no easy answers, leading agencies to either risk burdensome litigation or expend significantly more resources than necessary in order to ensure that compliance is beyond dispute.[5]

It is not possible to predict the precise extent of every possible environmental effect that may result from a major federal action. To

1. Pub. L. No. 91-190, 83 Stat. 852 (1970) (codified as amended at 42 U.S.C. §§ 4321–4347 (2018)).

2. 42 U.S.C. § 4331(b) (2018). Among these goals are to "promote the general welfare," create and maintain a "productive harmony" with nature, "fulfill the social, economic, and other requirements of present and future generations of Americans," assure "safe, healthful, productive, and esthetically and culturally pleasing surroundings," and "achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities." *Id.*

3. *Id.* § 4332(2); *see also* Eric Pearson, *Section 102(1) of the National Environmental Policy Act*, 41 CREIGHTON L. REV. 369, 370 (2008).

4. 42 U.S.C. § 4332(2)(C).

5. *See* Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government's Environmental Performance*, 102 COLUM. L. REV. 903, 917–18 (2002) (describing how NEPA review incentivizes agencies to err on the side of producing too much information).

avoid total paralysis, there must be some point at which an agency is free to move ahead, despite some amount of uncertainty regarding an action's environmental effects.[6] How much uncertainty, though, is a matter of ongoing debate.

Value of information ("VOI") analysis, from the field of decision theory,[7] provides a possible limiting principle to delineate the appropriate requirements of NEPA analysis. The "value of information," put simply, refers to the difference between the expected value of a decision when informed, compared to the expected value of that decision when not so informed.[8] VOI analysis is essentially cost-benefit analysis applied to the decision to gather additional information. Better information may enable better decisions, but obtaining that information is costly.

In the face of the significant discretion afforded to agencies in interpreting the provisions of NEPA, agencies could use formal or informal VOI analysis to make better decisions about the contents and extent of their analyses. Courts could also use the framework conceptually to assess whether an agency acted reasonably in fulfilling their obligations under NEPA and the Administrative Procedure Act.[9] If VOI analysis helps to form a consensus regarding the required scope of analysis, federal projects may become less vulnerable to unanticipated setbacks. Agencies and courts already use VOI concepts, at least implicitly, to justify their decisions, and explicit recognition of this framework for analysis would help to delineate the line between what analysis is required and what is excessive.

This Note explains what VOI is and how it might be used in NEPA; demonstrates how agencies and reviewing courts have explicitly or implicitly used concepts from the VOI framework; and argues

6. *Id.* at 906 ("NEPA ambitiously, and naively, demands the impossible: comprehensive, synoptic rationality, in the form of an exhaustive, one-shot set of *ex ante predictions* of expected environmental impacts.").

7. *See generally* GIOVANNI PARMIGIANI & LURDES INOUE, DECISION THEORY: PRINCIPLES AND APPROACHES 255–84 (2009) (explaining how to conduct VOI analysis); Aatto J. Repo, *The Value of Information: Approaches in Economics, Accounting, and Management Science*, 40 J. AM. SOC'Y FOR INFO. SCI. 68 (1989) (describing how economists, accounting researchers and management scientists study VOI).

8. *See* PARMIGIANI & INOUE, *supra* note 7, at 255 (defining the value of information as "the expected change in utility from observing [additional data], compared to the 'status quo' of not observing any additional data"); John P. Gould, *Risk, Stochastic Preference, and the Value of Information*, 8 J. ECON. THEORY 64, 66–67 (1974); *see also* M. GRANGER MORGAN & MAX HENRION, UNCERTAINTY: A GUIDE TO DEALING WITH UNCERTAINTY IN QUANTITATIVE RISK AND POLICY ANALYSIS 172 (1990) (describing how including uncertainty in decision models is valuable in part because it can help to determine whether gathering more information will be worth the effort).

9. 5 U.S.C. §§ 551–559 (2018).

for more explicit incorporation of these concepts into agency decision-making and judicial review of those decisions. Part I describes NEPA, its costs, its benefits, and the calls for its reform. Part II provides an overview of VOI analysis. Part III applies the VOI framework to three central line-drawing problems under NEPA and explores how they are answered by NEPA's implementing regulations and the courts.

I.
The Problems with Implementing NEPA

A. The Current NEPA Process

NEPA requires agencies of the federal government to prepare a detailed statement[10] for every major federal action "significantly affecting the quality of the human environment."[11] The "major federal actions" covered by NEPA include the adoption of rules and regulations, establishment of agency policies, and the granting of permits to private developers.[12]

NEPA establishes the Council on Environmental Quality ("CEQ"),[13] whose regulations describe the process necessary to comply with the Act. First, the agency must determine whether its planned action will affect the environment "significantly," triggering the statutory requirement to prepare an EIS.[14] If the action will clearly have a significant impact, an EIS is required. When action will *not* clearly have a significant impact, the action may be categorically excluded and no environmental statement need be prepared.[15] However, when the significance of the action is *unclear*, the agency must prepare an Environmental Assessment ("EA") to make the preliminary determination regarding whether the full EIS must be prepared.[16] If the EA demonstrates that the action will not be significant, the agency will issue a Finding of No Significant Impact ("FONSI").[17] Otherwise, when the EA indicates that the action will be significant, an EIS must be prepared in order to more thoroughly evaluate the environmental

10. 40 C.F.R. § 1508.11 (2019).
11. 42 U.S.C. § 4332(2)(C) (2018).
12. *See* 40 C.F.R. § 1508.18(b)(1), (4).
13. 42 U.S.C. § 4342.
14. 40 C.F.R. §§ 1502.3, 1508.9.
15. *See id.* § 1507.3(b) (requiring agency procedures to define categorical exclusions); *id.* § 1508.4 (defining a categorical exclusion as "a category of actions which do not individually or cumulatively have a significant effect on the human environment" as determined by such procedures).
16. *Id.* § 1508.9. An agency may also decide to prepare an EIS without coming to any conclusion about the significance of the action. *See id.* § 1501.3.
17. *Id.* § 1508.13.

impacts of the action.[18] When agencies prepare an EA or EIS, they must involve the public by disclosing environmental documents, holding hearings and meetings, and soliciting public comments.[19]

NEPA does not mandate particular results, "but simply prescribes the necessary process for preventing uninformed—rather than unwise—agency action."[20] If the adverse environmental effects of the proposed action are adequately identified and evaluated, the agency is not constrained by NEPA from deciding that other values outweigh the environmental costs.[21]

B. NEPA's Costs and Benefits

Proponents of NEPA typically identify two categories of benefits that the Act provides. First, NEPA helps to ensure that an agency carefully considers information concerning the potential environmental effects of proposed development projects, and improves the quality of agency decisionmaking.[22] The considerations required by NEPA have the potential to change agency decisions for the better, which is the "core focus" of the Act.[23] Analysis might reveal cheaper, more effective, or less damaging alternatives; that the action should not be taken at all; or that there exist additional actions that an agency, or nonagency actors, might take in conjunction with a project to minimize its environmental impacts.

Second, NEPA helps to ensure that environmental information is made available to the public and thereby promotes public participation in federal decisionmaking.[24] Regulations currently require agencies undertaking environmental reviews to solicit and respond to comments from the public.[25] Even before regulations required it, several

18. *Id.* § 1501.4; *see, e.g.*, City of Dall. v. Hall, 562 F.3d 712, 717 (5th Cir. 2009); City of Las Vegas v. FAA, 570 F.3d 1109, 1115 (9th Cir. 2009).

19. 40 C.F.R. § 1506.6.

20. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 333 (1989); *see also* Strycker's Bay Neighborhood Council, Inc. v. Karlen, 444 U.S. 223, 227–28 (1980); Vt. Yankee Nuclear Power Corp. v. Nat. Res. Def. Council, Inc., 435 U.S. 519, 558 (1978).

21. *See Robertson*, 490 U.S. at 333.

22. *See* NAT'L ASS'N OF ENVTL. PROF'LS, ANNUAL NEPA REPORT 2015, at 3 (Karen Johnson ed., 2016).

23. Dep't of Transp. v. Pub. Citizen, 541 U.S. 752, 769 n.2 (2004).

24. *See* COUNCIL ON ENVTL. QUALITY, THE NATIONAL ENVIRONMENTAL POLICY ACT: A STUDY OF ITS EFFECTIVENESS AFTER TWENTY-FIVE YEARS 17–19 (1997). However, not everyone agrees that the public participation process is an unequivocal good. *See, e.g.*, Susan Baker & F. Stuart Chapin III, *Going Beyond "It Depends:" The Role of Context in Shaping Participation in Natural Resource Management*, 23 ECOLOGY & SOC'Y 685, 685 (2018).

25. 40 C.F.R. §§ 1503.1–1503.4 (2019).

courts read these public participation requirements into the text of the statute.[26] This public participation may help agencies make better decisions, especially when interested organizations or members of the public are better able to develop or gather relevant environmental information.[27] Additionally, public participation in the NEPA process may also be socially beneficial regardless of any effect on agency decisions, as it promotes norms of transparent, democratic governance.[28]

In contrast, critics of NEPA often blame it for delaying or foreclosing the development of major infrastructure projects, putting agencies at risk of lengthy and costly litigation, or forcing agencies and private actors receiving federal permits to spend inordinate resources preparing environmental information without any proportional benefit.[29] Determining the relevant requirements for any given project can, indeed, be difficult. The NEPA case law has been described as "notoriously convoluted."[30] Whether an agency fairly considered the impacts of its proposed action depends on issues that are highly and necessarily fact-intensive: the nature and scope of the action, the information currently and potentially available to the agency, and difficult judgments regarding uncertain future outcomes.

Although Congress has repeatedly tried to streamline the NEPA process under both Democratic and Republican administrations, the Act's regulations have not been updated since 1986.[31] Reform efforts

26. *See, e.g.*, Hanly v. Kleindienst, 471 F.2d 823, 836 (2d Cir. 1972) (establishing a requirement under NEPA to "give notice to the public of the proposed major federal action and an opportunity to submit relevant facts which might bear upon the agency's threshold decision" to prepare an EIS).

27. *See* Karkkainen, *supra* note 5, at 913–16 (discussing how NEPA is associated with a pluralist or interest group representation model of governance, wherein public participation requirements enable non-governmental organizations to advance environmental interests).

28. *See* Cass R. Sunstein, *Informational Regulation and Information Standing:* Akins *and Beyond*, 147 U. PA. L. REV. 613, 625 (1999) (describing the democratic values promoted by informational regulation such as NEPA).

29. *See, e.g.*, Karkkainen, *supra* note 5, at 917–25 (2002) (arguing that in practice, NEPA produces a high volume of low-quality information that generally fails to improve agency decisionmaking); *The Weaponization of the National Environmental Policy Act and the Implications of Environmental Lawfare: Oversight Hearing Before the H. Comm. on Nat. Res.*, 115th Cong. (2018) (statement of Rep. Rob Bishop, Chairman, H. Comm. on Nat. Res.) (recent hearing on NEPA reform).

30. James W. Coleman, *Beyond the Pipeline Wars: Reforming Environmental Assessment of Energy Transport Infrastructure*, 2018 UTAH L. REV. 119, 127 (2018).

31. *See* National Environmental Policy Act Regulations; Incomplete or Unavailable Information, 51 Fed. Reg. 15,618 (Apr. 25, 1986) (codified at 40 C.F.R. pt. 1502); *History of CEQ NEPA Regulations and Guidance*, ENERGY.GOV, https://www.energy.gov/nepa/nepa-guidance-requirements/history-ceq-nepa-regulations-and-guidance (last visited Dec. 21, 2019).

in the early 2000s included at least four enacted statutes with NEPA-streamlining provisions and four "task forces" charged with improving NEPA implementation generally or for specific sectors.[32] In 2015, Congress enacted the FAST Act,[33] building on a 2012 executive order[34] and included provisions for the creation of a federal steering council,[35] a reduction in the statute of limitations to challenge agency action under NEPA to two years (from six),[36] and other provisions designed to accelerate the NEPA process.

NEPA reform is also part of the Trump administration's broader deregulatory agenda. A February 2018 White House proposal for infrastructure reform contained fifteen suggestions, including new policies and updated CEQ regulations, all designed to lower the burdens imposed by NEPA.[37] Proposed reforms include imposing a two-year deadline for permit decisions, reducing the required scope of detail in analyses, and the increased use of categorical exclusions.[38] CEQ has thereafter issued notices of proposed rulemaking on NEPA in June 2018,[39] and again in January 2020,[40] though no new regulations have yet been adopted.

The rhetoric surrounding these efforts has been, at times, extreme. In early 2018, the House Committee on Natural Resources held a hearing on NEPA reform based on the premise that NEPA has been "weaponize[d]" by "litigation activists" engaging in "lawfare" to "damage or delegitimize projects," to "distract time and resources" from completing the project, or for other allegedly nefarious motivations.[41] This view of NEPA is consistent with the views of at least two

32. *See* LINDA LUTHER, CONG. RESEARCH SERV., RL33267, THE NATIONAL ENVIRONMENTAL POLICY ACT: STREAMLINING NEPA 15, 22 (2007).

33. Fixing America's Surface Transportation Act, Pub. L. No. 114-94, 129 Stat. 1312 (2015).

34. Improving Performance of Federal Permitting and Review of Infrastructure Projects, Exec. Order No. 13,604, 77 Fed. Reg. 18,887 (Mar. 28, 2012).

35. Fixing America's Surface Transportation Act § 41002.

36. *Id.* § 41003.

37. THE WHITE HOUSE, LEGISLATIVE OUTLINE FOR REBUILDING INFRASTRUCTURE IN AMERICA 35–41, 49–50 (2018), https://www.whitehouse.gov/wp-content/uploads/2018/02/INFRASTRUCTURE-211.pdf.

38. *Id.* The proposed reform leads with the creation of a "One Agency, One Decision" review structure, focusing decisionmaking authority in a single agency. Longstanding regulations, however, already provide for the determination of a lead agency and cooperation by lead agencies. *See* 40 C.F.R. §§ 1501.5–.6 (2019).

39. Update to the Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 83 Fed. Reg. 28,591 (June 20, 2018).

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

41. Memorandum from the Majority Comm. Staff to the Comm. on Nat. Res. on the oversight hearing titled The Weaponization of the National Environmental Policy Act

federal courts of appeals that the requirement to prepare an EIS has been "the kiss of death to many a federal project."[42]

Although this kind of rhetorical flourish probably overstates the negative impacts of the Act, NEPA compliance does come with costs. Analysis requires employing scientists to research and model the likely environmental effects of a proposed action, and may delay the completion of a project. Compliance has costs for both significant and non-significant actions, since both an EIS and an EA must also be sufficiently thorough. Agencies may adopt mitigation measures so that the net impact of the project is not significant, in part to avoid the higher burden of preparing an EIS.[43] But to establish this "mitigated FONSI,"[44] an agency must still evaluate the combined significance of both the project and the measures to mitigate its impact.[45]

The total cost of NEPA compliance is difficult to estimate. In the 2008–2012 period, the Federal Government completed around 200–300 EISs each year.[46] Although most agencies do not track the cost of NEPA compliance,[47] it can be substantial: in 2013, the Department of Energy contracted four EISs at an average cost of $2.9 million, and eight EAs at an average cost of $301,000.[48] Additional NEPA analysis may also delay completion of projects, and if these projects are expected to benefit the public, deferral imposes a social cost. One government study found that an EIS takes an average of 4.6

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and the Implications of Environmental Lawfare 1–2, 4 (Apr. 23, 2018), https://docs.house.gov/meetings/II/II00/20180425/108215/HHRG-115-II00-20180425-SD027.pdf [https://perma.cc/ZU5A-3YGH].

42. City of Dall. v. Hall, 562 F.3d 712, 717 (5th Cir. 2009) (quoting Sabine River Auth. v. U.S. Dep't of Interior, 951 F.2d 669, 677 (5th Cir. 1992) (quoting Cronin v. U.S. Dep't of Agric., 919 F.2d 439, 443 (7th Cir. 1990))).

43. *See* 39 C.F.R. § 775.4(b) (2019) ("*Mitigated FONSI* means a FONSI which requires the implementation of specified mitigation measures in order to ensure that there are no significant impacts to the environment").

44. *Id.*

45. *See, e.g.*, Cabinet Mountains Wilderness v. Peterson, 685 F.2d 678, 679 (D.C. Cir. 1982) (holding that the U.S. Forest Service's decision to not prepare an EIS was not arbitrary or capricious because of mitigation measures that compensated for the environmental impact of concern); O'Reilly v. U.S. Army Corps of Eng'rs, 477 F.3d 225, 234 (5th Cir. 2007) (holding that the USACE's decision to not prepare an EIS was arbitrary because the EA's explanation of mitigation measures failed to show why USACE's action would not have a significant effect on the environment).

46. U.S. GOV'T ACCOUNTABILITY OFF., GAO-14-370, NATIONAL ENVIRONMENTAL POLICY ACT: LITTLE INFORMATION EXISTS ON NEPA ANALYSES 9 (2014).

47. *Id.* at 12.

48. *Id.* at 13.

years to complete, with significant variability.[49] However, it is difficult to know to what extent project delays might be attributable to NEPA rather than other environmental or economic issues with projects that are large and complex enough to require an EIS.

C. Courts and the "Rule of Reason"

In Supreme Court decisions, there appear to be two modes for analyzing the sufficiency of an EIS. The first depends on whether the impacts of a federally approved action are "reasonably foreseeable."[50] That, in turn, is based on analogy to proximate cause in tort law,[51] where the proximate cause analysis "turns on policy considerations and considerations of the 'legal responsibility' of actors."[52]

The second mode invokes the "rule of reason." Through the "rule of reason" analysis, the Supreme Court has held that agencies should "determine whether and to what extent to prepare an EIS based on the usefulness of any new potential information to the decisionmaking process,"[53] and that the decision to supplement an EIS with additional analysis "turns on the value of the new information to the still pending decisionmaking process."[54] This is a clear reference to the value-of-information concept.

In practice, NEPA analysis leaves a large amount of discretion to reviewing courts. For example, courts in the Ninth Circuit review an EIS to determine whether it contains "a reasonably thorough discussion of the significant aspects of the probable environmental consequences."[55] However, a court attempting to apply this standard has significant latitude in determining how much detail is required for a discussion to be "reasonably thorough," which aspects of the environmental consequences are "significant," and how likely those consequences must be before they are "probable." As a result, this level of discretion leaves courts with a critical role in ensuring that agencies

49. *See id.* at 14 n.28; NAT'L ASS'N OF ENVTL. PROF'LS, ANNUAL NEPA REPORT 2012, at 11 (Judith Charles et al. eds., 2013), https://www.naep.org/assets/nepawgannualreport2012final.pdf [https://perma.cc/5CQ6-4YNX].

50. Dep't of Transp. v. Pub. Citizen, 541 U.S. 752, 763–64 (2004).

51. *Id.* at 767.

52. *Id*.

53. *Id.* at 754.

54. Marsh v. Or. Nat. Res. Council, 490 U.S. 360, 373–74 (1989).

55. *E.g.*, Friends of Santa Clara River v. U.S. Army Corps of Eng'rs, 887 F.3d 906, 913 (9th Cir. 2018) (quoting other Ninth Circuit cases for this language); Nw. Coal. for Alts. to Pesticides v. Lyng, 844 F.2d 588, 591 (9th Cir. 1988) (using the same language).

fulfill their obligations under NEPA.[56] Reviewing courts generally defer to an agency's determination on matters within the scope of its expertise, such as whether the proposed action is likely to be "significant" and thus require an EIS.[57] But even so, courts need a benchmark against which to measure the reasonableness of the agency's decisions. Therefore, in order to promote the most socially beneficial outcomes, as consistent with executive directives,[58] reviewing courts should ideally find an EA or EIS sufficient where the court concludes that, given currently available information, additional research would be expected to cost more than the total social benefits such information would provide.

II.
Decision Theory and the Value of Information

A. A Primer on VOI

Gathering and using information has benefits and costs. A VOI analysis is designed to estimate those costs and benefits and determine how much more information to collect and apply.[59] VOI is part of the broader field of decision theory, which includes other methods to make good decisions in the face of uncertainty.[60]

The relevant factors in a VOI analysis are (1) the cost of obtaining the new information; (2) the likelihood that new information will change the decision that would be made without the new information; and (3) the expected benefit from changing the decision (or not) after the new information is obtained. Additional studies should be conducted only when the average or expected benefits from potentially changing a decision based on the new information exceeds the cost of obtaining that information.

VOI analysis is rooted within a Bayesian statistical framework, where probabilities represent degrees of belief about the likelihood of

56. *See* Wendy B. Davis, *The Fox Is Guarding the Henhouse: Enhancing the Role of the EPA in FONSI Determinations Pursuant to NEPA*, 39 Akron L. Rev. 35, 40, 72 (2006).

57. *E.g.*, *Pub. Citizen*, 541 U.S. at 763 (holding that an agency decision not to prepare an EIS is governed by the Administrative Procedure Act's "arbitrary [or] capricious" standard).

58. *See infra* Section II.B.

59. Fumie Yokota & Kimberly M. Thompson, *Value of Information Analysis in Environmental Health Risk Management Decisions: Past, Present, and Future*, 24 Risk Analysis 635, 635 (2004).

60. *See generally* Morgan & Henrion, *supra* note 8.

outcomes.[61] The process generally assumes a single decisionmaker with known preferences over the possible—albeit uncertain—outcomes from alternatives that might be chosen. In the context of NEPA, VOI analysis would involve an agency's *ex ante* assessment of expected economic, environmental, and social effects of a given project, as well as the predicted costs and range of outcomes from engaging in additional research to reduce that uncertainty.

Informal VOI analysis is very common. People generally engage in informal VOI-based reasoning whenever they make decisions in the face of uncertainty, such as deciding which version of a product to buy, what book to read, or where to go on vacation. At some point, efforts to gather information about such decisions are subject to diminishing returns. More formally, the American Cancer Society applies VOI concepts in its recommendations for cancer screenings;[62] while these screenings can provide critical and actionable information, excessive testing also comes with medical expenses, false positives, and cumulative exposure to diagnostic X-rays.[63] VOI analysis can also be used in environmental matters, such as to determine the value of reducing uncertainty in decisions regarding environmental remediation.[64]

One helpful illustrative concept used in this field is the "expected value of perfect information," defined as the average benefit a decisionmaker would expect if perfect information were available.[65] The expected value of perfect information is the amount that a risk-neutral, rational actor would be willing to pay to eliminate the uncertainty associated with a decision.

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61. *See* Edward C.F. Wilson, *A Practical Guide to Value of Information Analysis*, 33 PHARMACOECONOMICS 105, 105 (2014).

62. *See* Robert A. Smith et al., *Cancer Screening in the United States, 2017: A Review of Current American Cancer Society Guidelines and Current Issues in Cancer Screening*, 67 CA: CANCER J. CLINICIANS 101, 104 (2017).

63. *Id.* at 105; *see also Breast Cancer Screening (PDQ®)–Health Professional Version*, NAT'L CANCER INST., https://www.cancer.gov/types/breast/hp/breast-screening-pdq [https://perma.cc/53V9-PVSQ] (last updated Dec. 18, 2019) (describing risks and benefits of mammography and other breast cancer screenings); Tara Parker-Pope, *Benefits and Risks of Cancer Screening Are Not Always Clear, Experts Say*, N.Y. TIMES (Oct. 21, 2009), https://www.nytimes.com/2009/10/22/health/22screen.html.

64. *E.g.*, Maxine E. Dakins et al., *Risk-Based Environmental Remediation: Decision Framework and Role of Uncertainty*, 13 ENVTL. TOXICOLOGY & CHEMISTRY 1907, 1907 (1994).

65. *See, e.g.*, Jan B. Oostenbrink et al., *Expected Value of Perfect Information: An Empirical Example of Reducing Decision Uncertainty by Conducting Additional Research*, 11 VALUE HEALTH 1070, 1072 (2008); James C. Felli & Gordon B. Hazen, *Sensitivity Analysis and the Expected Value of Perfect Information*, 18 MED. DECISION MAKING 95, 100 (1998).

For example, suppose a decisionmaker is faced with a project that will cost $100 to deploy. Suppose further that, *ex ante*, the decisionmaker believes the project has an eighty percent chance of success, in which case it will be extremely valuable, but a twenty percent risk of failure, in which case it will be worthless. Although the very large expected benefit from the project would make it worthwhile to proceed with the project as-is on an expected-value basis, a risk-neutral decisionmaker would be willing to pay something to learn whether the twenty percent risk of failure will, in fact, manifest. The decisionmaker should expect a perfect forecast to reveal, in that twenty percent of cases, that the project will indeed fail. In that twenty percent of cases, the forecast would allow the decisionmaker to avoid a $100 loss by forgoing the investment in the project (i.e., a $100 benefit). Thus, the expected value of perfect information in this situation is $20 (i.e., twenty percent—0.2—multiplied by the expected benefit of $100).

The real world, of course, is more complicated. Perfect forecasts are not available, the costs and benefits of projects are uncertain, risks are numerous and diverse, and decisionmakers are not always risk-neutral or purely rational.[66] New data collected to improve a decision could be inaccurate. However, these complications can be addressed in a formal VOI analysis through techniques designed to quantify uncertainty, and at least could be explained in a less formal analysis.[67]

Another common issue with VOI analysis is that authority over a decision may be split among multiple stakeholders with divergent views of the desirability of various outcomes. Any such divergence will lead to correspondingly different views on the value of gathering new information. Under NEPA, views may differ between multiple agencies involved in a decision, or between individuals within an agency.[68] Resolving possible conflicts between multiple actors with overlapping authority is an important issue, but for purposes of this Note I assume a single authoritative decisionmaker.

The VOI approach is iterative: a decisionmaker must evaluate the likelihoods of outcomes to determine the best path forward for evaluating those outcomes. The results of any initial VOI analysis may further reveal what additional information should be gathered. This is an inherent attribute of decisionmaking under uncertainty: someone must

66. *See* Yokota & Thompson, *supra* note 59, at 636 (describing the lack of VOI applications likely due to the "inherent complexities" in constructing these models).

67. *See generally* MORGAN & HENRION, *supra* note 8.

68. *See* Marc J. Stern et al., *The Meaning of the National Environmental Policy Act Within the U.S. Forest Service*, 91 J. ENVTL. MGMT. 1371, 1377 (2010).

make the call about what is worth studying before it is studied. For smaller projects, or those more with outcomes that can be predicted well *ex ante*, the cost of doing a formal VOI analysis study may be too high compared to the expected gain. In such cases, a decisionmaker would appropriately proceed, at least initially, with only readily available information.

B. VOI Analysis and Benefit-Cost Analysis under Executive Directives

VOI analysis is consistent with longstanding federal directives on agency benefit-cost analysis. Under Executive Order 12,866, all agencies are directed to assess all costs and benefits of available regulatory alternatives, and to select alternatives that maximize net benefits.[69] As with other federal agencies, CEQ could use VOI as a helpful tool for maximizing the net benefits of the regulations it promulgates for NEPA.[70]

In 2003, the Office of Management and Budget ("OMB") issued Circular A-4, instructing federal agencies on regulatory analysis under Executive Order 12,866.[71] This guidance, still applicable today, encourages agencies to use "appropriate statistical techniques to determine a probability distribution of the relevant outcomes," including, for higher-consequence rules, formal probabilistic analysis.[72] As Circular A-4 describes, these formal probabilistic analyses encompass techniques to elicit *ex ante* beliefs from experts,[73] which can be used in VOI analysis to inform future research priorities.[74] These methods are particularly helpful because they can be used at relatively little expense as a preliminary step before deciding whether and how to engage in a more thorough environmental assessment. The same month that OMB issued Circular A-4, the agency issued a report to

69. Exec. Order No. 12,866, 58 Fed. Reg. 51,735 (Oct. 4, 1993); *see also* Exec. Order No. 13,563, 76 Fed. Reg. 3821 (Jan. 21, 2011) (supplementing and reaffirming Exec. Order No. 12,866).

70. NEPA also applies to non-regulatory federal actions, such as permit approvals, that are not covered by Executive Order 12,866.

71. Office of Mgmt. & Budget, Circular A-4, Regulatory Analysis (2003), https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf.

72. *Id.* at 41–42.

73. *Id*.

74. *Cf.* Alan Masinter, Mitchell Small & Elizabeth Casman, *Research Prioritization Using Hypothesis Maps*, 34 Env't Sys. & Decisions 49, 51–52 (2014) (using expert elicitation as part of a model for informing research priorities outside a benefit-cost framework).

Congress echoing these ideas and discussing VOI as a tool that agency decisionmakers might find useful.[75]

Circular A-4 also recognizes the necessarily iterative process of a VOI approach. The document recommends more formal and rigorous quantitative analysis of uncertainties (as might be done in a VOI analysis) as the expected economic impact of the rule increases, and requires such analysis for only highly significant rules that have expected annual economic effects of one billion dollars or more.[76] Some degree of VOI analysis may also be appropriate, however, for more moderately significant rules.

III.
Scope, Depth, and Alternatives: Three Stopping-Point Problems

VOI analysis can apply to three kinds of "stopping-point" problems that every agency must solve when deciding how much information to supply when attempting to satisfy NEPA. The first problem refers to the appropriate scope of impacts that should be considered in an environmental document. In preparing an EA, it is not always obvious which downstream effects an agency should consider when determining whether its action is "significant." Similarly, an agency preparing an EIS must also determine which potential effects of the action should be analyzed.

Once an agency decides which categories of impacts to examine, the second stopping-point problem is to determine the amount of detail or depth of analysis required to reduce uncertainty around the level of those impacts. For an EA, the significance of a given type of impact might not be well-understood. If so, the question is how much preliminary investigation should be done before an agency can reasonably conclude that the effects are not, in fact, "significant." For an EIS, an agency must decide how much detail should be included in the discussion of these impacts.

The third stopping-point problem relates to the requirement in any EIS to analyze "alternatives to the proposed action."[77] This includes other means of accomplishing the agency's objectives, as well

75. Office of Info. & Regulatory Affairs, Office of Mgmt. & Budget, Informing Regulatory Decisions: 2003 Report to Congress on the Costs and Benefits of Federal Regulations and Unfunded Mandates on State, Local, and Tribal Entities 60 (2003). The report provides five examples of VOI analysis for environmental regulation. *Id.* at 61.

76. *See* Office of Mgmt. & Budget, *supra* note 71, at 41.

77. 42 U.S.C. § 4332(2)(C)(iii) (2018).

as other measures the agency might take in addition (for instance, additional measures to mitigate the environmental impacts of the action). A limiting principle is needed to decide what alternatives in the universe of all permissible agency actions should be evaluated.

This Note intentionally elides the doctrinal distinction between "significant" actions that require preparation of an EIS, and those that are not "significant" and require only an EA. The roles of the two types of environmental documents are critically different, but they both effectively function as similar environmental disclosure documents subject to the same concerns regarding the required scope and depth of analysis. In fact, four different Courts of Appeals have recognized that, in practice, an EA is not a fundamentally different kind of document, but rather functions as a "rough-cut, low budget" EIS.[78] This characterization comports with the VOI perspective, wherein the categorization of agency actions into those that cross some imagined threshold of being "significant," and those that do not, is irrelevant. What matters, rather, is whether the expected value of gathering more information is worth the expected cost of obtaining it—regardless of which category of environmental document the agency happens to be writing.

A. The Scope of Analysis

The question of scope is about which effects must be analyzed under NEPA, and appears both in the threshold "significance" determination in an EA and the estimation of the magnitude of the environmental effects in an EIS. CEQ regulations provide that the analysis of impacts of an agency's action must include the effects of other connected, cumulative,[79] or other "reasonably foreseeable future"[80] actions, as well as "indirect" effects from the action.[81] An agency must prepare an EIS unless the cumulative impacts of its action are not significant.[82] But how far must an agency go to foresee future possible

78. Courts of Appeals for the Fifth, Sixth, Seventh, and Eight Circuits started using this phrase in the 1990s. Newton Cty. Wildlife Ass'n v. Rogers, 141 F.3d 803, 809 (8th Cir. 1998); Friends of Fiery Gizzard v. Farmers Home Admin., 61 F.3d 501, 504 (6th Cir. 1995); Sabine River Auth. v. U.S. Dep't of Interior, 951 F.2d 669, 677 (5th Cir. 1992); Cronin v. U.S. Dep't of Agric., 919 F.2d 439, 443 (7th Cir. 1990) (first using this phrase). This idea persists today. *E.g.*, Little Traverse Lake Prop. Owners Ass'n v. Nat'l Park Serv., 883 F.3d 644, 649 (6th Cir. 2018) (citing *Friends of Fiery Gizzard*, 61 F.3d 501).

79. 40 C.F.R. § 1508.27(b)(7) (2019).

80. *Id.* § 1508.7.

81. *Id.* § 1508.25(c).

82. *Id.* § 1500.5(k).

actions, and how far down the causal chain must indirect effects be analyzed?

For example, one disputed issue involves the treatment of low-probability, high-consequence events, such as the collapse of a dam,[83] an accident at a nuclear reactor, or the occurrence of an earthquake at a location with no known fault lines.[84] Courts sometimes decline to require agencies to assess such "improbable" scenarios.[85] But improbable risks are still worth considering if the consequences from those risks manifesting are sufficiently costly. A VOI approach would require agencies to assess these risks, at least in a qualitative fashion, when doing so is justified based on the expected costs of additional analysis and expected benefits from better agency decisions.

1. Pipeline Emissions and the Role of VOI

VOI principles can provide guidance as to whether the indirect consequences of an action should be included within the scope of an environmental assessment document. This stopping-point problem is illustrated by recent disputes over NEPA analyses for oil and natural gas pipelines regarding upstream and downstream emissions of greenhouse gases ("GHGs").[86] When a new pipeline is built, it may have the effect of increasing both upstream emissions from increased oil and gas production, and downstream emissions from additional use of those fuels.[87] The legal determination of whether such effects must be included in the analysis turns on whether these additional impacts from GHGs are "reasonably foreseeable."[88]

In August 2016, CEQ promulgated guidance on the appropriateness of including these upstream and downstream emissions in their analyses.[89] The draft version, issued in 2014, encouraged agencies to

83. *E.g.*, Warm Springs Dam Task Force v. Gribble, 621 F.2d 1017, 1026–27 (9th Cir. 1980).

84. *See* Daniel A. Farber, *Confronting Uncertainty Under NEPA*, 8 ISSUES LEGAL SCHOLARSHIP 1, 6–11 (2009).

85. *See id.* at 4–16 (2009) (first quoting Trout Unlimited v. Morton, 509 F.2d 1278, 1283 (9th Cir. 1974); then discussing other cases dealing with these scenarios).

86. *See* Coleman, *supra* note 30; JAYNI HEIN ET AL., INST. FOR POLICY INTEGRITY, PIPELINE APPROVALS AND GREENHOUSE GAS EMISSIONS 12–16, 32–36 (2019), https://policyintegrity.org/files/publications/Pipeline_Approvals_and_GHG_Emissions.pdf.

87. *See, e.g.*, Michael Burger & Jessica Wentz, *Downstream and Upstream Greenhouse Gas Emissions: The Proper Scope of NEPA Review*, 41 HARV. ENVTL. L. REV. 109, 122 (2017).

88. 40 C.F.R. §§ 1508.7–.8 (2019).

89. Memorandum from Christina Goldfuss, Chair, Council on Envtl. Quality, to the Heads of Fed. Dep'ts & Agencies 1–6 (Aug. 1, 2016), https://energy.gov/sites/prod/files/2016/08/f33/nepa_final_ghg_guidance.pdf [https://perma/.cc/Q2P7-FA9T].

include upstream and downstream emissions if those emissions had "a reasonably close causal relationship" to the action.[90] The final version, however, removed the reference to upstream and downstream emissions, and replaced it with a recommendation that "agencies should consider and disclose the reasonably foreseeable direct and indirect emissions when analyzing the direct and indirect effects of the proposed action."[91] This language essentially restated existing CEQ regulations, and was later withdrawn by the Trump administration.[92] More recently, in a move that could limit the obligation to consider upstream and downstream pipeline emissions, CEQ proposed to remove regulatory references to "indirect" effects entirely.[93]

The issue is still being litigated. The U.S. Court of Appeals for the D.C. Circuit in *Sierra Club v. FERC* required the Federal Energy Regulatory Commission (FERC) to either review downstream climate impacts from the Sabal Trail pipeline or explain why it cannot complete that analysis.[94] Subsequent FERC decisions have maintained that quantifying downstream GHG emissions from pipelines is not required by NEPA based in part on the rationale that there is no way to determine whether a given amount of GHG emissions is "significant."[95] But this misses the point: the value of including upstream and downstream GHG emissions estimates may or may not exceed the costs of gathering such information, regardless of whether such emissions pass a "significance" threshold under NEPA.[96]

The VOI perspective may help to explain why different agencies have different views on the wisdom of including upstream and downstream GHG emissions in their NEPA documents. Different classes of

90. Revised Draft Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews, 79 Fed. Reg. 77,802, 77,813 (Dec. 24, 2014).

91. *See* Memorandum from Christina Goldfuss to the Heads of Fed. Dep'ts & Agencies, *supra* note 89, at 16.

92. *See* Withdrawal of 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, 82 Fed. Reg. 16,576 (Apr. 5, 2017).

93. Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 1684, 1708 (Jan. 10, 2020).

94. Sierra Club v. Fed. Energy Regul'y Comm'n, 867 F.3d 1357, 1374 (D.C. Cir. 2017).

95. *See* Fla. Se. Connection, LLC, 162 FERC ¶ 61,233 (2018), 2018 WL 1364645; PennEast Pipeline Co., 164 FERC ¶ 61,098, ¶¶ 118–23 (2018), 2018 WL 3862022; *see also Sierra Club*, 867 F.3d at 1375.

96. *See PennEast Pipeline Co.*, 2018 WL 3862022, at *48 (LaFleur, Comm'r, concurring in part and dissenting in part) (noting that EPA had previously offered comments regarding how agencies might use the social cost of carbon to inform project-level decision-making).

projects administered by each agency can be expected, on average, to have different costs and benefits associated with gathering information. For example, the GHG impacts of building an oil pipeline may vary by factors that are especially difficult to predict, including the price of oil, the cost of alternative shipping routes (e.g., rail), and the effect of the pipeline on marginal well production.[97] In contrast, a natural gas pipeline may not have such alternate shipping routes, such that the agency approving the pipeline can be relatively certain regarding the marginal increase in fossil fuel use that the pipeline would induce.[98]

The benefits of investigating upstream and downstream effects might vary as well. For instance, if the decisionmakers at the agency would, before conducting an in-depth analysis, reasonably proceed with these projects even in the "worst case" scenario, then a "rule of reason" would advise against spending too much time and resources investigating the magnitude of those emissions.[99] Because both the costs and benefits of including secondary effects of an action vary predictably by class of project, one would expect that agency decisionmakers regularly dealing with such classes of projects would come to different views regarding the proper scope of analysis.

2. *Non-Discretionary Duties*

One area of NEPA doctrine that comports with the VOI perspective relates to the treatment of an agency's non-discretionary duties. When an agency is legally obligated to take some course of action, the agency should not be required to engage in any deep or costly analysis of the consequences of such actions. The main purpose of gathering more information—to make better decisions—is undermined if an agency is not permitted to use that information to change how it acts. When gathering additional information provides no additional opportunity to weigh the costs and benefits of the action, it makes little sense to require a particularly thorough analysis under NEPA.[100]

97. Coleman, *supra* note 30, at 144–45.

98. *See id.* at 149–50.

99. At one point in NEPA's history, a "worst case" analysis was required when essential information was not reasonably available. *See* Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 354 (1989) (holding that a worst case analysis was not required after the rescission of the regulation that had required it). *See generally* Edward A. Fitzgerald, *The Rise and Fall of Worst Case Analysis*, 18 U. DAYTON L. REV. 1 (1992) (discussing the history of this requirement).

100. Marsh v. Or. Nat. Res. Council, 490 U.S. 360, 371–72 (1989).

Department of Transportation v. Public Citizen illustrates this principle.[101] In 2001, President Bush announced an intention to lift a moratorium on the entry of Mexican motor carriers into the United States, as he was authorized to do under enabling legislation.[102] At the same time, Congress passed a second statute providing that no carriers could be registered to enter the United States before the Department of Transportation promulgated certain regulations.[103] As plaintiffs in *Public Citizen* argued, issuing these regulations would permit entry of the motor carriers, resulting in an increased volume of trade with Mexico and higher emissions within the United States. The plaintiffs argued the agency's failure to consider this increased trade volume in the EA for their regulations violated NEPA.[104]

The Supreme Court found, however, that the relevant cause of the increase in emissions from motor vehicle traffic was not the agency's regulations, but rather the President's lifting of the moratorium.[105] Given that the President had lifted the moratorium, the Department of Transportation was legally obligated to issue these regulations. The Court held that "where an agency has no ability to prevent a certain effect due to its limited statutory authority over the relevant actions, the agency cannot be considered a legally relevant 'cause' of the effect."[106]

Although the Court ultimately relied on a limited notion of causation to decide the issue, it made clear that a motivating factor for its ruling was based in VOI principles. The Court invoked a "rule of reason" that agencies determine "whether and to what extent to prepare an EIS based on the usefulness of any new potential information to the decisionmaking process."[107] Because the agency lacked the power to act on any information it would obtain through an EIS, requiring one "would have no effect on [the agency's] decisionmaking" nor would it serve the "informational purpose" of ensuring the public has an opportunity for relevant input.[108] The purely informational, public disclosure function of NEPA, the Court noted, "overlooks NEPA's core

101. 541 U.S. 752, 767–69 (2004).

102. *Id.* at 759–60.

103. *Id.* at 760–61.

104. *Id.* at 765–66.

105. *Id.* at 769; *see also id.* at 766 (noting the obligatory language contained in a second, earlier statute).

106. *Id.* at 770.

107. *Id.* at 767 (citing Marsh v. Or. Nat. Res. Council, 490 U.S. 360, 373–74 (1989)); *see infra* Section III.B.

108. *Pub. Citizen*, 541 U.S. at 768–69.

focus on improving agency decisionmaking."[109] In sum, despite the Court's professed reliance on a definition of causation, the reasons for its decision sound in VOI principles.

B. The Depth of Analysis

Once the scope of an EA or EIS is defined, there is the additional question of how in-depth the treatment of issues within the scope must be. For both types of documents, the agency must determine the likely nature and magnitude of environmental risks within the scope of the document. The issue is how much effort should be expended to reduce uncertainty associated with these risks before proceeding with the action.

1. VOI Rationales in CEQ Regulations Regarding the Depth of Analysis

NEPA requires that agencies prepare an EIS for "major Federal actions significantly affecting the quality of the human environment."[110] CEQ regulations provide that the significance of an action is to be determined with respect to both the "context and intensity" of the impacts.[111] Using the intensity of the project to determine whether to complete a more thorough EIS, rather than an EA, is consistent with VOI principles. When an agency's available options have uncertain costs and benefits that are expected to be large, one would typically expect the absolute differences between those options to also be large. If so, these greater benefits from choosing a superior alternative justify additional research.

CEQ's definition of significance also provides that intensity should be determined with respect to whether the impacts are highly uncertain or controversial.[112] This way of defining significance seems counterintuitive: normally, one would define the significance of an action by reference to the expected magnitude of its environmental effects—a separate issue from the degree of uncertainty or controversy regarding those effects. This raises the question: why did CEQ choose to read uncertainty and controversy into the definition of significance?

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109. *Id.* at 769 n.2.

110. 42 U.S.C. § 4332(2)(C) (2018).

111. 40 C.F.R. § 1508.27 (2019).

112. *Id.* § 1508.27(b)(4)–(5) ("The following should be considered in evaluating intensity . . . The degree to which the effects on the quality of the human environment are likely to be highly controversial . . . The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks."); *see* Anderson v. Evans, 371 F.3d 475, 494 (9th Cir. 2004).

One possible explanation is by reference to VOI principles. Higher levels of uncertainty should generally necessitate more thorough analysis because in most cases, a high level of uncertainty will indicate that gathering more information is especially valuable. There are diminishing returns to further analysis when much work has already been done.[113] It is true that sometimes uncertainties cannot be resolved no matter how much effort is expended, and the need for action—or the wisdom of inaction—might be clear despite substantial uncertainties. But often enough, the existence of controversy may indicate that gathering more information will be especially valuable.

Some courts have held the "controversy" factor for determining significance under CEQ regulations should be defined as "a substantial dispute [about] the size, nature, or effect" of the action, rather than the existence of opposing viewpoints.[114] Interpreted this way, the controversy surrounding an agency's proposed action functions as a proxy for the uncertainty regarding its impacts. Alternatively, if "controversy" is defined as the existence of public opposition, increased disclosure for such controversial projects nonetheless promotes values having to do with the desirability of public disclosure and the promotion of democratic values.[115]

2. *Judicial Standards on the Required Depth of Analysis*

Judicial standards regarding the required depth of analysis in an EA and EIS are also generally consistent with VOI principles. As courts have held, an EIS must contain the information that "appears to be reasonably necessary under the circumstances," but not "so all-encompassing" that preparing it would be "fruitless or well nigh impossible."[116] The existence of uncertainty in an EIS is permissible,

113. As described in *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*,

> The proposed plant underwent an incredibly extensive review. The reports filed and reviewed literally fill books. The proceedings took years, and the actual hearings themselves over two weeks. To then nullify that effort seven years later because one report refers to other problems, which problems admittedly have been discussed at length in other reports available to the public, borders on Kafkaesque.

435 U.S. 519, 557 (1978).

114. *E.g.*, Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1222 (9th Cir. 2008) (quoting Blue Mountains Biodiversity Project v. Blackwood, 161 F.3d 1208, 1212 (9th Cir. 1998)).

115. *See supra* notes 24–28 and accompanying text.

116. *E.g.*, Nat. Res. Def. Council v. Callaway, 524 F.2d 79, 88 (2d. Cir. 1975).

especially when the cost of resolving such uncertainty is high.[117] Additionally, the cost of delay is a permissible consideration when deciding to proceed with an action in the face of uncertainty.[118]

The Supreme Court offered perhaps its most clear endorsement of VOI principles in *Marsh v. Oregon Natural Resources Council*,[119] a case involving the ongoing operations of a three-dam project managed by the U.S. Army Corps of Engineers ("USACE"). USACE had completed an EIS for the project in 1971,[120] but the subsequent construction of the dams took decades, with construction of the third and final dam still underway when *Marsh* was decided in 1989.[121] In its 1971 EIS, USACE acknowledged the incomplete information that it had at the time, and later issued a supplemental EIS, released in 1980, that incorporated analysis of the effects of the first dam built in 1977.[122]

The USACE's actions were challenged as failing to adequately describe environmental impacts in the agency's initial and supplemental EIS.[123] In finding that USACE had complied with NEPA, the Court explained that both the decision to prepare an EIS and the depth of analysis required depend on the potential benefits from obtaining that new information:

> Application of the "rule of reason" thus turns on the value of the new information to the still pending decisionmaking process. In this respect the decision whether to prepare a supplemental EIS is similar to the decision whether to prepare an EIS in the first instance: If there remains major Federal action to occur, and if the new information is sufficient to show that the remaining action will affect the quality of the human environment in a significant manner

117. *See, e.g.*, Ctr. for Auto Safety v. Peck, 751 F.2d 1336, 1370 (D.C. Cir. 1985) (holding that courts generally will not reverse an agency's action "simply because there are uncertainties, analytic imperfections, or even mistakes in the pieces of the picture").

118. As stated by the D.C. Circuit,

> One of the costs that must be weighed by decisionmakers is the cost of uncertainty—*i.e.*, the costs of proceeding without more and better information. Where the cost *has* been considered, and where the responsible decisionmaker has decided that it is outweighed by the benefits of proceeding with the project without further delay, the courts may not substitute their judgment for that of the decisionmaker and insist that the project be delayed while more information is sought.

Alaska v. Andrus, 580 F.2d 465, 473–74 (D.C. Cir. 1978).

119. 490 U.S. 360 (1989).

120. *Id.* at 364.

121. *Id.* at 364, 367.

122. *Id.* at 364–65.

123. *Id.* at 368.

> or to a significant extent not already considered, a supplemental EIS must be prepared.[124]

Marsh illustrates a principle that applies to the issuance of supplemental EISs as much as the issuance of the initial environmental document: NEPA requires gathering information when the new information is expected to be valuable.

3. Quantification of Greenhouse Gas Impacts

The analysis of GHG impacts from federal projects provides an illustrative and hotly debated example of VOI issues. If the analysis and disclosure of impacts from the emissions of GHGs are within the scope of NEPA,[125] an additional question remains as to how much effort should be taken to reduce the uncertainty around those impacts, and whether NEPA further requires agencies to monetize the climate damages they are expected to cause. Recent draft guidance advises agencies to determine whether "quantifying a proposed action's projected reasonably foreseeable GHG emissions would be practicable and whether quantification would be overly speculative,"[126] which reflects VOI principles but begs the question as to how "practicable" quantification must be before analysis is appropriate.

Determining the expected amount of GHGs emitted from a project may be difficult, but many federal actions have relatively easy-to-determine ranges of expected GHG emissions. For example, oil and natural gas pipelines can be expected to deliver a percentage of their capacity. There are significant uncertainties associated with what these fuels would displace, and how much would be used absent the pipeline,[127] but the capacity provides a basis for an initial estimate for considering the impacts.

Further, it is possible to monetize the impacts from GHG emissions by reference to consensus literature on the social cost of carbon.[128] A federal interagency working group has developed the social cost of carbon, which represents the best available estimate for the

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124. *Id.* at 374 (internal quotations, citations, and alterations omitted).

125. *See supra* Section III.A.1.

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

127. *See* Coleman, *supra* note 30, at 124, 134 (criticizing the uncertainty associated with such studies).

128. *E.g.*, INTERAGENCY WORKING GRP. ON SOC. COST OF GREENHOUSE GASES, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12,866, at 6 (2016), https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf [https://perma.cc/WG73-Z7K9].

quantified impacts of GHG emissions.[129] Given an established range of values for the social cost of carbon, it is relatively simple to multiply the expected tonnage of GHG emissions by the expected social cost per ton. More complex analyses involve additional work, but this initial disclosure costs little.[130]

Moreover, consideration of GHG impacts, especially the monetary quantification of their impacts, might change agency decisions. Monetization is important because it helps to find a common basis for comparison (e.g., dollars) in order to meaningfully compare the impacts of GHG emissions with other impacts arising from a given decision. Climate change also presents a uniquely difficult global coordination problem that requires short-term costs for (mostly) long-term, uncertain benefits. These factors implicate several cognitive biases that make it difficult for society to fully appreciate and appropriately address the threat.[131] By quantifying the impacts of the damage caused by GHG emissions in a dollar figure, and by considering and disclosing that number, some of these biases can be overcome.

As discussed above, there has been recent controversy over whether NEPA requires FERC to quantify GHG emissions in its pipeline approvals—which is an issue regarding the proper scope of analysis. Given that such emissions are within the scope of NEPA, there is a further issue of whether the social cost associated with such emissions must also be monetized using a tool like the social cost of carbon.[132] From a VOI perspective, GHG impacts should be monetized if doing so is not unduly burdensome, might change the agency's decision, and would better inform the public about the climate impacts of pipeline approvals. Considering these factors, the precision with which it is necessary to quantify the amount of GHG emissions may depend on

129. *Id.* at 4, 6.

130. This is not to discount the complexity of establishing a value for the social cost of carbon, which involves numerous modeling choices. *See generally* NAT'L ACADEMIES OF SCI., ENG'G, & MED., VALUING CLIMATE DAMAGES: UPDATING ESTIMATION OF THE SOCIAL COST OF CARBON DIOXIDE (2017).

131. *See* Lisa Zaval & James F.M. Cornwell, *Cognitive Biases, Non-Rational Judgments, and Public Perceptions of Climate Change*, *in* OXFORD RESEARCH ENCYCLOPEDIA OF CLIMATE SCI. 2 (Hans von Storch ed., 2016), https://www.researchgate.net/publication/311276841_Cognitive_Biases_Non-Rational_Judgments_and_Public_Perceptions_of_Climate_Change; Jeffrey J. Rachlinski, *The Psychology of Global Climate Change*, 2000 U. ILL. L. REV. 299, 303–13 (listing relevant cognitive limitations, including biased assimilation, loss aversion, and the status quo bias).

132. *See* HEIN ET AL., *supra* note 86, at 40–44 (discussing the social cost of carbon in the context of NEPA analyses for pipeline approvals).

the project, but there are few good reasons not to disclose the monetized version of that range.[133]

C. The Alternatives that Must Be Analyzed

Any EIS for an action must analyze "alternatives to the proposed action."[134] CEQ has described the alternatives analysis as the "heart" of an EIS, and prescribed that agencies evaluate all "reasonable" alternatives, including "reasonable alternatives not within the jurisdiction of the lead agency," a no-action alternative, and "appropriate" mitigation measures.[135] But there may be virtually limitless potential actions that an agency could take—how should an agency choose which, and how many, to evaluate?

The case law on alternatives under NEPA provides little clear guidance. Various courts have suggested that alternatives need not be evaluated if they would not accomplish the stated goal of the agency action,[136] or if the agency has rejected them "in good faith" as too "remote, speculative, or . . . impractical, or ineffective."[137] However, any "viable" alternative must be examined.[138]

The breadth of alternatives to consider also requires some assessment, at least informally, of the value of information. There must be a preliminary assessment of the costs and benefits of each potential option before deciding to go forward with additional analysis. Under a VOI framework, analyzing additional alternatives is worthwhile only to the extent that (a) the alternative might be adopted, and (b) the benefits of switching to that alternative are expected to exceed the costs of investigating it.

1. Non-Jurisdictional Alternatives

Non-jurisdictional alternatives—alternatives that cannot legally be adopted by an agency—are still covered by NEPA's requirements.

133. FERC has declined to monetize GHG ranges, for example, because "several of the components of [the social cost of carbon] methodology are contested and because not every harm it accounts for is necessarily significant within the meaning of NEPA." Fla. Se. Connection, LLC, 162 FERC ¶ 61,233, ¶ 31 (2018), 2018 WL 1364645.

134. 42 U.S.C. § 4332(2)(C)(iii) (2018).

135. 40 C.F.R. § 1502.14 (2019).

136. Little Traverse Lake Prop. Owners Ass'n v. Nat'l Park Serv., 883 F.3d 644, 655–56 (6th Cir. 2018) ("Only alternatives that accomplish the purposes of the proposed action are considered reasonable." (quoting Webster v. U.S. Dep't of Agric., 685 F.3d 411, 422 (4th Cir. 2012))).

137. Colo. Envtl. Coal. v. Dombeck, 185 F.3d 1162, 1174 (10th Cir. 1999).

138. W. Watersheds Project v. Abbey, 719 F.3d 1035, 1050 (9th Cir. 2013).

This may initially appear to conflict with VOI analysis: how could more information about unavailable options lead to better choices? Correspondingly, part of the White House proposal for infrastructure policy encouraged Congress to clarify that in conducting environmental reviews, agencies "should not be required to consider alternatives that are outside its authority or outside the capability of the applicant," because such alternatives are "not feasible."[139] Accordingly, CEQ proposed this year to amend the definition of "reasonable alternatives" in a way it interprets as excluding alternatives outside the agency's jurisdiction.[140]

However, totally excluding non-jurisdictional alternatives from consideration surely goes too far, because analysis of non-jurisdictional alternatives certainly can improve agency decisions and/or the decisions of third parties. Even where an agency cannot or will not undertake mitigation measures, including such measures in the analysis of alternatives may provide helpful information. The availability of mitigation measures, their cost-effectiveness, and the likelihood that the other parties will adopt such measures will all influence the expected net benefits of an action. To the extent that an agency can expect other parties to undertake effective mitigation measures (perhaps with encouragement or support from the agency), the expected environmental consequence of the agency's action will be lower. The fact that the agency cannot *itself* take the mitigation measures to be analyzed does not mean that doing such analysis is a waste of time; it merely changes the balancing of expected benefits and costs.

The Supreme Court appeared to generally agree with this principle in *Robertson v. Methow Valley Citizens Council*.[141] In that case, the U.S. Forest Service had approved development of a ski resort on national forest land in the Methow Valley in Washington. In cooperation with state and local officials, the Forest Service prepared an EIS describing the expected impacts of the ski resort on five levels of development on local wildlife and air quality, both on the site of the resort itself and, more significantly, from off-site development on non-Forest Service lands.[142] The EIS also outlined on- and off-site mitigation measures that might be taken, the details of which the Forest Service planned to make more specific as the project went on.[143]

139. THE WHITE HOUSE, *supra* note 37, at 36.

140. Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 1684, 1702 (Jan. 10, 2020).

141. 490 U.S. 332 (1989).

142. *See id.* at 340.

143. *See id.* at 339–44.

Among other claims, the Methow Valley Citizens Council alleged that the Forest Service's EIS had an insufficiently detailed description of off-site mitigation measures that might be taken on private and state lands. The Court of Appeals for the Ninth Circuit agreed, finding that NEPA contained a requirement that agencies contemplating environmentally significant actions prepare a "complete mitigation plan" as well as a substantive requirement that agencies adopt such mitigation measures.[144]

Reversing in a unanimous opinion, the Supreme Court found that the Forest Service's "outline" of possible mitigation measures satisfied the agency's obligations under NEPA.[145] The Court emphasized that, for off-site and non-jurisdictional impacts, the EIS still had benefits in terms of providing notice and information.[146] However, in reaffirming that NEPA imposes only procedural obligations to consider environmental impacts, the Court noted that the analysis of mitigation measures required at least a "reasonably complete discussion" of mitigation measures,[147] setting a lower standard than the Ninth Circuit's "complete mitigation plan" requirement. The Court found it relevant that, in this instance, the off-site impacts of the project could not be mitigated unless third parties acted, and thus it would be "incongruous" to stop the Forest Service from acting until these third parties reached a "final conclusion" on what mitigation measures were necessary.[148] This reasoning suggests that the Forest Service's "outline" was both a necessary and sufficient treatment of mitigation measures that could be taken by non-agency actors, reflecting widely applicable VOI principles.

Climate change is a paradigmatic example of an issue that is outside the exclusive jurisdiction of any one agency, as sources of GHGs span the entire globe and nearly every sector of the economy. But, as the Ninth Circuit has held, "the fact that climate change is affected by actions outside of [the agency's] control . . . does not release the agency from the duty of assessing the effects of its actions on global warming within the context of other actions that also affect

144. *Id.* at 347–48.
145. *See id.* at 339.
146. *Id.* at 350 ("[W]here the adverse effects . . . are primarily attributable to predicted off-site development that will be subject to regulation by other governmental bodies, the EIS serves the function of offering those bodies adequate notice of the expected consequences and the opportunity to plan and implement corrective measures in a timely manner.").
147. *Id.* at 352.
148. *Id.* at 353.

global warming."[149] No single agency is solely responsible for dealing with climate change, and the existence of other actors that might also do something about climate change does not eliminate the responsibility for an agency to examine its climate impacts.

The fact that an agency cannot control certain downstream effects of its actions does not justify willful blindness to those effects. Developing additional details for non-jurisdictional alternatives may have high costs and dubious benefits at *some* point, but the fact that a given alternative cannot be adopted by the agency does not in itself eliminate the benefits of analysis.

2. *The No-Action Alternative*

The one established principal of the alternatives analysis is that an agency preparing an EIS must consider a "no-action" alternative.[150] This typically will make sense from a VOI perspective because the "business-as-usual" scenario is likely to be the least costly scenario to evaluate, because such an analysis can apply across multiple agency actions, may have been already done, and may require less speculation regarding the likely effects of new disturbances. Given agencies and their constituencies that may be risk-averse, doing nothing can often be the preferred option.

3. *Other "Reasonable" Alternatives*

Other than case law and regulations regarding non-jurisdictional alternatives and the no-action alternative, there is little solid guidance regarding the number of alternatives that must be analyzed or how in-depth such analysis must be. Given the discretion apparently afforded to agencies in this regard, agencies ought to adopt an approach that maximizes the net benefits of their alternatives analysis, consistent with executive directives to this effect.[151] The VOI approach would provide that, if the cost of investigation is otherwise equal, an agency ought to first investigate the alternative with the highest expected net benefits, then the second-highest expected net benefits, and so forth. Each additional alternative analyzed has some diminishing probability of turning out to be superior.

In some cases, the choice will be obvious: if an agency is deciding which of some small number of proposals from a contractor to

149. Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1217 (9th Cir. 2008) (internal quotations and alterations omitted).

150. *See* 40 C.F.R. § 1502.14(d) (2019).

151. *See supra* Section II.B.

accept, some analysis of each of those alternatives is probably necessary. If an agency is deciding what acreage of federal land to lease for development, it might be practicable to estimate net benefits from the full continuum of possible options, such as by assigning each acre an estimated economic or other benefit from development and an estimated social and environmental cost. In other cases, each additional analysis will provide some insight into the best course of action.

Conclusion

The benefits and costs associated with gathering more information can, and should, inform decisions about what environmental analysis is appropriate and necessary. Agencies and courts often use VOI concepts in their decisions already, but they do so inconsistently and implicitly. Explicit recognition and utilization of VOI analysis has the potential to improve the quality of their decisions. For agencies, formal or informal VOI analysis can inform and improve decisions as to whether and how to gather more information, and could help justify those decisions to the public and the courts. For courts, incorporating VOI analysis concepts in the standard for assessing whether an agency complied with NEPA is consistent with existing practice, and doing so could help to ensure agencies properly consider the costs and benefits of additional analysis.

To facilitate rational decisionmaking regarding the scope of NEPA analysis, CEQ should promulgate regulations encouraging or requiring agencies to use these tools where appropriate, or publish guidance on best practices for incorporating VOI principles into agency decisions. As a first step, CEQ could solicit comments regarding how incorporation of VOI principles might streamline the NEPA process or otherwise improve agency decisions. Regardless of whether regulations require it, a VOI approach could help provide a much-needed framework for determining what environmental disclosures should be analyzed. The VOI approach could help form a consensus regarding what NEPA requires, make projects less vulnerable to unanticipated setbacks, and provide some measure of long-awaited NEPA reform.