

ARTICLES

USING AI IN NEPA REVIEW: LEGAL CHALLENGES AND JUDICIAL SCRUTINY

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SUMMARY

The integration of artificial intelligence (AI) into implementation of the National Environmental Policy Act (NEPA) is unfolding against a backdrop of regulatory uncertainty and heightened judicial scrutiny. Along with significant Trump Administration changes to NEPA procedures, recent court decisions have cast doubt on the Council on Environmental Quality’s authority to issue binding NEPA regulations. Meanwhile, federal agencies have initiated pilot programs to apply AI in the preparation of environmental impact statements (EISs), which raises complex questions about transparency, algorithmic bias, public participation, and whether AI-generated EISs can withstand judicial review. This Article addresses two core questions: (1) What is the appropriate regulatory pathway for governing AI in NEPA compliance—rulemaking or legislation? (2) How can agencies ensure that AI-generated EISs meet judicial standards under NEPA and the Administrative Procedure Act? It proposes a dual-path solution: enhancing technical infrastructure through explainable, auditable AI systems, and embedding human oversight mechanisms into critical stages of the process. These reforms aim to uphold procedural integrity while responsibly harnessing AI’s potential.

The National Environmental Policy Act (NEPA) has long served as the procedural backbone of U.S. environmental governance, requiring agencies to take a “hard look” at the environmental consequences of major federal actions before proceeding.¹ Yet, as agencies confront increasingly complex projects—from renewable energy infrastructure to critical mineral extraction—the traditional tools of environmental impact assessment (EIA) are straining under the weight of technical and

informational demands. Artificial intelligence (AI) promises to alleviate some of these burdens, offering novel ways to process massive data sets, model ecological outcomes, and predict long-term impacts.² Proponents argue that AI could enhance efficiency and accuracy in preparing environmental impact statements (EISs), enabling agencies to meet NEPA’s procedural obligations more effectively in an era of climate urgency.

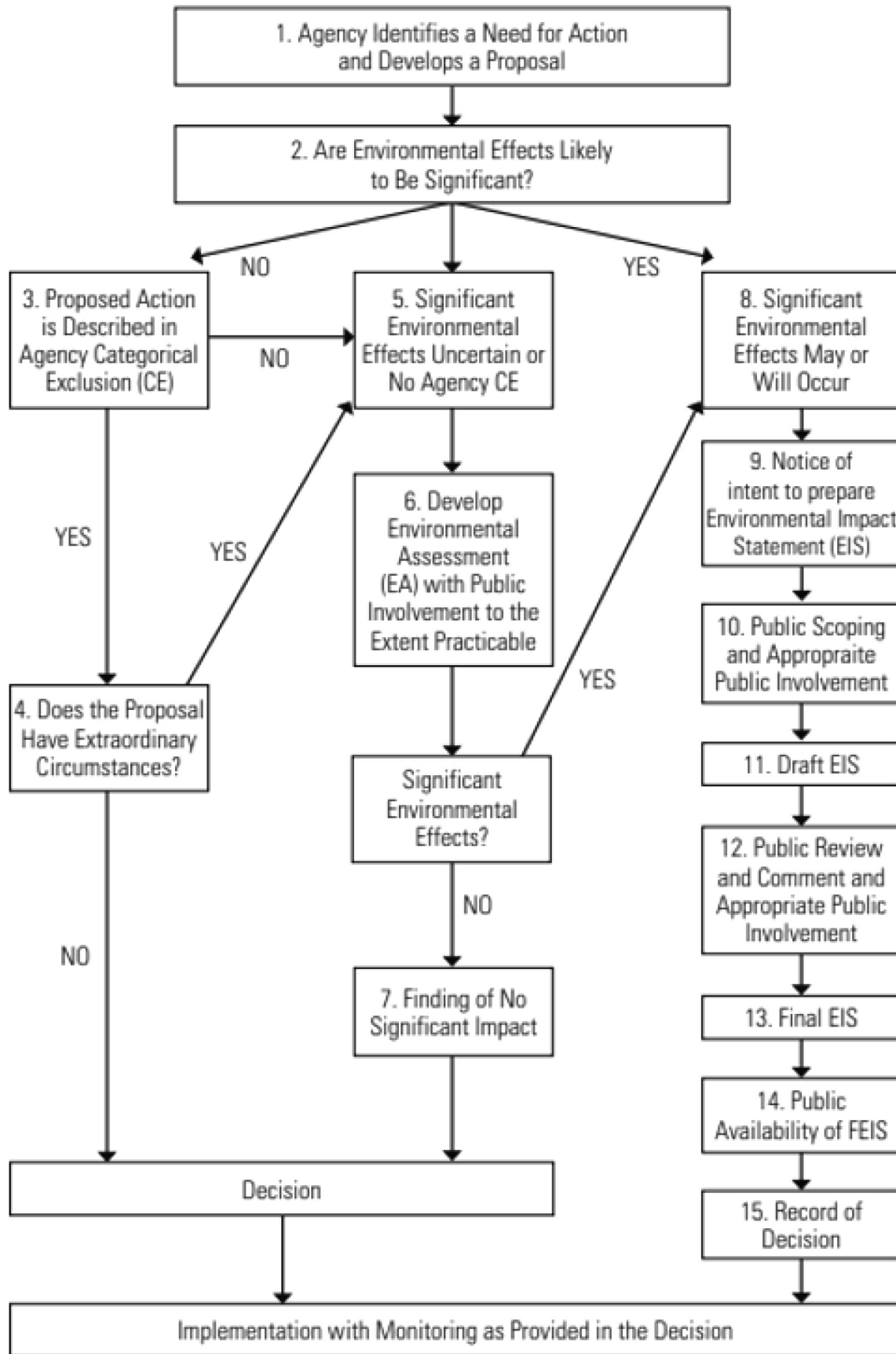
But alongside these promises lies a set of profound legal and institutional challenges. AI’s opaque algorithms raise questions about explainability and accountability, threatening the transparency that NEPA was designed to ensure.³ The delegation of critical analytic judgments to AI systems also unsettles long-standing doctrines of judicial review, particularly the “hard look” standard that courts have relied upon to evaluate whether agencies complied with NEPA’s procedural mandates.⁴ In the wake of *Chevron’s*

Author’s Note: With extensive experience as an environmental and energy lawyer in China, my research focuses on climate litigation, renewable energy law, and international climate governance, drawing comparative insights from China and the United States. This Article originated as a research paper for Prof. Mark Nevitt’s Environmental Law course at Emory University School of Law. I am especially indebted to Professor Nevitt for his thoughtful guidance and encouragement, which significantly shaped the arguments presented here. All errors remain my own.

1. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-52 (1989) (holding that NEPA requires agencies to take a “hard look” at environmental consequences, but does not mandate particular substantive results).

2. Cary Coglianese & David Lehr, *Regulating by Robot: Administrative Decision Making in the Machine-Learning Era*, 105 GEO. L.J. 1147, 1170-76 (2017).
 3. Ryan Calo, *Artificial Intelligence Policy: A Primer and Roadmap*, 51 U.C. DAVIS L. REV. 399, 423-25 (2017).
 4. *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43-44 (1983) (invalidating agency rescission of rule for failing to consider reasonable alternatives, reinforcing the requirement of reasoned decision-making under the Administrative Procedure Act).

Figure 1. The NEPA Process



Source: CEQ, A CITIZEN'S GUIDE TO NEPA: HAVING YOUR VOICE HEARD 5 (2021).

demise, the courts' willingness to defer to agency expertise is narrowing, meaning that AI-generated EIS outputs could face heightened scrutiny absent clear statutory or regulatory grounding.⁵

These doctrinal and institutional uncertainties extend to the administrative state itself. The Council on Environmental Quality (CEQ), traditionally responsible for NEPA oversight, has seen its authority constrained in recent years through litigation and political contestation.⁶ While CEQ has issued guidance on emerging issues, its limited capacity and lack of direct enforcement power make it an unlikely candidate to regulate AI comprehensively in the NEPA context. Scholars have therefore suggested alternative governance mechanisms, ranging from congressional legislation to interagency coordination or the creation of specialized oversight bodies.⁷ Each path implicates trade offs between democratic accountability, technical expertise, and institutional resilience.

Ultimately, the integration of AI into NEPA review exposes the "gray infrastructure" of the clean energy transition: while AI tools promise efficiency and predictive power, their deployment risks shifting the locus of discretion away from transparent, participatory processes toward opaque algorithmic logics. This Article argues that only by situating AI within NEPA's foundational commitments to procedural fairness and public participation can agencies both harness technological advances and withstand judicial scrutiny.

Part I reviews the doctrinal foundations of NEPA and the shifting standards of judicial review. Part II considers whether AI-generated EISs should be treated as agency judgment or expert evidence. Part III proposes a dual-track model that integrates *de novo* review of legal questions with *Daubert* scrutiny of technical reliability. Part IV addresses policy and institutional implications, including governance reforms and litigation risks. Part V concludes by outlining how courts can recalibrate their role to preserve both statutory fidelity and democratic legitimacy in the algorithmic age.

I. NEPA and AI: Legal and Policy Frameworks

A. Current NEPA Regulatory Structure: CEQ as the Primary Regulator

Since its creation, CEQ has played an evolving role in shaping federal environmental policy through executive orders, regulatory amendments, and judicial interpretation. In 1970, President Richard Nixon issued Executive

Order No. 11514, Protection and Enhancement of Environmental Quality, directing CEQ to issue guidelines to federal agencies for the preparation of detailed EISs under §102(2)(C) of NEPA.⁸ Following this directive, CEQ issued interim guidelines in April 1970, later revising them in 1971 and 1973 to provide greater clarity on NEPA compliance requirements.⁹

Recognizing the need for greater consistency in NEPA implementation, President Jimmy Carter issued Executive Order No. 11991 in 1977, amending Executive Order No. 11514 to grant CEQ binding regulatory authority over NEPA's procedural provisions.¹⁰ The amendments directed CEQ to issue mandatory regulations ensuring that EISs were concise, substantive, and supported by necessary environmental analyses.¹¹ Additionally, federal agencies were required to comply with CEQ regulations, reinforcing CEQ's role as the central coordinator of NEPA policy.¹²

In 1978, CEQ issued its binding NEPA regulations, which were later codified as 40 C.F.R. Parts 1500-1508, following their publication in the *Federal Register*.¹³ These regulations aimed to streamline the NEPA review process by reducing excessive paperwork and procedural delays, improving interagency coordination, and ensuring informed decisionmaking while upholding environmental protections. Although the U.S. Supreme Court in *Andrus v. Sierra Club* accorded CEQ's NEPA regulations substantial deference, it reaffirmed that NEPA is fundamentally procedural and that CEQ's role is to promote uniform implementation rather than to prescribe substantive outcomes.¹⁴ Nevertheless, the Court recognized CEQ's role in establishing a uniform procedural framework for NEPA compliance.

CEQ's NEPA regulations remained largely unchanged until 1986, when the agency revised 40 C.F.R. §1502.22 to replace the "worst-case analysis" requirement with a provision requiring agencies to consider reasonably foreseeable significant adverse effects.¹⁵ This amendment, later aligned with *Robertson v. Methow Valley Citizens Council*,¹⁶ was designed to prevent unnecessary speculation in EIAs.¹⁷

The Supreme Court has consistently affirmed CEQ's authority in shaping NEPA's implementation. In *Baltimore Gas & Electric Co. v. Natural Resources Defense Council*,¹⁸ the Court held that NEPA is a procedural statute, ensuring that agencies consider environmental consequences but not requiring them to prioritize environmental concerns over

5. See *Loper Bright Enters. v. Raimondo*, 603 U.S. ___, slip op. at 18-19 (2024) (overruling *Chevron* and holding that courts must exercise "independent judgment" in statutory interpretation).
6. See Ted Boling, Remarks at Environmental Law Institute/Tulane Webinar: NEPA in 2025: Rumor, Reality, and the Way Forward (Apr. 9, 2025).
7. See Wendy Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321, 1340-42 (2010).

8. Exec. Order No. 11514, 35 Fed. Reg. 4247 (Mar. 7, 1970).
9. Amended by 35 Fed. Reg. 7390 (May 12, 1970); 36 Fed. Reg. 7724 (Apr. 23, 1971); 38 Fed. Reg. 10856 (May 2, 1973); 38 Fed. Reg. 20550 (Aug. 1, 1973).
10. Exec. Order No. 11991, 42 Fed. Reg. 26967 (May 25, 1977).
11. 40 C.F.R. §1502.1.
12. COMMISSION ON FEDERAL PAPERWORK, A REPORT OF THE COMMISSION ON FEDERAL PAPERWORK: ENVIRONMENTAL IMPACT STATEMENTS 16 (1977).
13. 43 Fed. Reg. 55978 (Nov. 29, 1978), and later supplemented at 44 Fed. Reg. 873 (Jan. 3, 1979).
14. 442 U.S. 347, 357-58 (1979) (according CEQ's NEPA regulations substantial deference).
15. 51 Fed. Reg. 15618 (Apr. 25, 1986) (amending 40 C.F.R. §1502.22).
16. 490 U.S. 332 (1989).
17. See *id.*
18. 462 U.S. 87 (1983).

other factors.¹⁹ Similarly, in *Department of Transportation v. Public Citizen*,²⁰ the Court reaffirmed that CEQ’s regulations guide federal agencies in determining the applicability of NEPA’s statutory requirements.²¹

In 2020, CEQ issued its most significant update to the NEPA regulations in more than four decades.²² These revisions sought to clarify the scope of NEPA reviews, reduce delays, and improve coordination for infrastructure development.²³ However, critics argued that the changes weakened NEPA’s environmental protections by limiting the scope of review and excluding certain cumulative or indirect effects. The rule’s controversial nature has led to ongoing debate, and future administrations may reverse or revise these regulations.

The 2020 CEQ NEPA regulations introduced several significant procedural changes, including narrowing the definition of “major federal action,” eliminating explicit references to cumulative and indirect effects, and imposing presumptive time and page limits for EIS documents.²⁴ The rule was particularly designed to apply to large-scale infrastructure projects, such as pipelines, highways, and renewable energy facilities, especially those falling under the One Federal Decision (OFD) framework.²⁵ These changes reshaped how agencies scoped and documented their NEPA responsibilities, raising concerns about whether expedited processes would undercut substantive environmental review.²⁶

B. EISs: Procedural Depth and Legal Risk

EISs represent the most detailed form of environmental review under NEPA, and are required when federal actions may significantly affect the environment.²⁷ To manage this responsibility, many federal agencies have established dedicated NEPA offices with staff who develop internal guidance, oversee timelines, and ensure procedural compliance. A designated senior official typically oversees agencywide NEPA responsibilities.²⁸

Public participation is a foundational principle of NEPA. Agencies must notify the public of proposed

actions through the *Federal Register* or other outreach mechanisms and solicit feedback throughout the NEPA process, particularly during “scoping,” when alternatives and potential impacts are being evaluated.²⁹ For EISs, NEPA mandates a 45-day public comment period following publication of the draft document.³⁰ In contrast, environmental assessments (EAs)—used for actions unlikely to have significant environmental impact—require public involvement only “to the extent practicable.”³¹ Still, the public has the right to access documents and submit comments throughout, and early, specific input can significantly influence agency decisionmaking.³²

To avoid litigation, agencies often produce EISs that are excessively long and legally dense, sometimes exceeding thousands of pages.³³ Yet, courts have consistently held that clarity, procedural fairness, and analytical integrity matter more than volume.³⁴ Common procedural failures include using an EA where an EIS is required, delaying agency coordination, or focusing too heavily on immaterial impacts.³⁵ Paradoxically, the desire to avoid preparing EISs has itself become a leading cause of NEPA lawsuits. For instance, more than half of NEPA lawsuits against the U.S. Forest Service have stemmed from allegations that an EIS or EA was improperly omitted.³⁶

These risks underscore a broader point: NEPA’s legal defensibility rests on procedural integrity, not document size. As AI tools begin to support or automate EIS preparation, these tools must replicate—not circumvent—NEPA’s procedural safeguards. AI-assisted outputs that fail to provide traceable rationale, meaningful public input, or interagency collaboration may be especially vulnerable to judicial invalidation.

C. NEPA Reform: Donald Trump Administrations Versus Joseph Biden Administration

1. Trump (2017-2021): NEPA Reforms to Accelerate Review and Reduce Delays

The first Trump Administration’s approach to NEPA reform focused on reducing delays in the environmental review pro-

19. *Id.* at 97.

20. 541 U.S. 752 (2004).

21. *Id.* at 757.

22. CEQ, Update to the Regulations Implementing the Procedural Provisions of NEPA, 85 Fed. Reg. 43304 (July 16, 2020).

23. *Id.*

24. *Id.* at 43343 (codified at 40 C.F.R. pts. 1500-1508); see also CEQ, FACT SHEET: MODERNIZING CEQ’S NEPA REGULATIONS (2020), <https://ceq.doe.gov/docs/laws-regulations/ceq-final-rule-fact-sheet-2020-07-15.pdf>.

25. Memorandum from Mick Mulvaney, Director, OMB & Mary Neumayr, Chief of Staff, CEQ, to Heads of Federal Departments and Agencies, M-18-13, One Federal Decision Framework for the Environmental Review and Authorization Process for Major Infrastructure Projects Under Executive Order 13807, at 2-3 (Mar. 20, 2018), <https://www.whitehouse.gov/wp-content/uploads/2018/04/M-18-13.pdf> [hereinafter CEQ MOU].

26. John C. Ruple & Heather Tanana, *NEPA at 50: An Empirical Analysis of NEPA in the Courts*, 66 ROCKY MOUNTAIN MIN. L. INST. (prepublication draft 2020) (manuscript at 8-10), <https://ssrn.com/abstract=3716579> (noting concerns that CEQ’s 2020 changes were “largely unmoored from empirical information” and could increase litigation risks).

27. CEQ, A CITIZEN’S GUIDE TO NEPA: HAVING YOUR VOICE HEARD 5 (2021).

28. *Id.*

29. *Id.* at 19-20.

30. 40 C.F.R. §1503.1(a)(4) (2024); see also Exec. Order No. 14111, 90 Fed. Reg. 5624 (Jan. 21, 2025) (revoking CEQ 2020 regulations).

31. 42 U.S.C. §4332; see also CEQ NEPA Regulations, 40 C.F.R. §1501.5(c) (2020).

32. CEQ, *supra* note 27, at 20.

33. Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government’s Environmental Performance*, 102 COLUM. L. REV. 903, 918 (2002).

34. *Id.*

35. DAVID J. HAYES ET AL., COMMENTS AND RECOMMENDATIONS ON NEPA REFORM FOR THE WHITE HOUSE COUNCIL ON ENVIRONMENTAL QUALITY 28 (2021).

36. Shorna R. Broussard & Bianca D. Whitaker, *The Magna Charta of Environmental Legislation: A Historical Look at 30 Years of NEPA-Forest Service Litigation*, 11 FOREST POL’Y & ECON. 134, 138 (2009); Dinah Bear, *NEPA at 19: A Primer on an “Old” Law With Solutions to New Problems*, 19 ELR 10060, 10064 (Feb. 1989), <https://www.elr.info/articles/elr-articles/nepa-19-primer-old-law-solutions-new-problems>.

cess, particularly for large infrastructure and energy projects. The rationale was rooted in the belief that protracted review timelines—often extended further by litigation—were obstructing economic development and investment.³⁷

According to CEQ, NEPA reviews for Federal Highway Administration projects took, on average, more than seven years from the notice of intent to the issuance of an ROD,³⁸ a stark contrast to CEQ's 1981 prediction that most EISs could be completed within 12 months.³⁹ Governmentwide, the average time to complete an EIS was 4.5 years, with one-quarter taking more than six years.⁴⁰ These numbers did not include delays from legal challenges to the sufficiency of NEPA procedures.⁴¹

Recognizing these delays, President Trump issued Executive Order No. 13807, Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects, which introduced the OFD policy.⁴² Its core goals were to set a two-year time limit for completing EISs, reduce document length, require agencies to issue a single joint EIS and ROD, and strengthen interagency coordination.⁴³

The OFD policy was operationalized through a 2018 memorandum jointly issued by CEQ and the Office of Management and Budget (OMB),⁴⁴ and a subsequent memorandum of understanding signed by multiple agencies.⁴⁵ It formalized requirements for coordinated timelines, joint documents, and elevation procedures for disputes, all aimed at completing environmental reviews within two years.

CEQ later issued additional guidance to agencies like the U.S. Department of Transportation (DOT) and Department of Housing and Urban Development (HUD), clarifying how OFD applied under various statutory programs.⁴⁶ It also directed the Federal Energy Regulatory Commission (FERC) to comply with OFD by preparing joint RODs where applicable.⁴⁷

These reforms marked a significant procedural shift: rather than changing NEPA's substantive requirements, they aimed to make compliance faster and more predictable. However, because courts generally apply procedural—not substantive—review under NEPA, agencies still had to ensure every step complied with the statute. Otherwise, even under a streamlined process, procedural flaws could trigger litigation and halt projects.

These reforms, although not referencing AI directly, created regulatory conditions highly conducive to the experimental integration of AI into NEPA procedures.⁴⁸ By prioritizing speed, limiting EIS length, and requiring joint documents under the OFD framework, agencies were implicitly encouraged to explore technological solutions—such as AI-assisted drafting, automated data synthesis, and predictive modeling—to meet compressed timelines. However, these same pressures may also increase the risk that agencies adopt AI tools without ensuring procedural transparency, public engagement, or explainability. In this context, AI becomes both a potential compliance enabler and a legal vulnerability, especially if deployed without clear guidance or human oversight.

2. Biden (2021-2025): Reversal of NEPA Reforms to Strengthen Environmental Protections

President Biden's Administration reversed key NEPA reforms introduced under President Trump, aiming to strengthen environmental protection, restore scientific integrity, and reinforce procedural safeguards in federal environmental reviews. On January 20, 2021, Biden issued Executive Order No. 13990, which revoked Trump's Executive Order No. 13807 and directed agencies to review and rescind rules inconsistent with his Administration's climate and environmental policies.⁴⁹ The Order emphasized restoring public health protections, advancing environmental justice, and promoting science-based decisionmaking.⁵⁰

In 2023, Biden signed the Fiscal Responsibility Act, which formally amended NEPA. These amendments codified long-standing CEQ regulatory principles into statute, notably by revising §102(2)(C) and adding §§102(2)(D)-(F) and 106-111. These changes require:

- Consideration of reasonably foreseeable environmental effects and alternatives
- Use of reliable scientific data and technically feasible alternatives
- Professional integrity in EIS analysis⁵¹

37. Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 43304, 43305 n.1 (July 16, 2020).

38. *Id.*

39. Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026 (Mar. 23, 1981).

40. 85 Fed. Reg. at 43305 n.3.

41. PHILIP K. HOWARD, COMMON GOOD, TWO YEARS NOT TEN YEARS: REDESIGNING INFRASTRUCTURE APPROVALS (2015), <https://static1.squarespace.com/static/5db4d0eacb29b173254203d2/t/5fd39d3ac4a2b267e284960c/1607703867904/2YearsNot10Years.pdf>.

42. Exec. Order No. 13807, 82 Fed. Reg. 40463 (Aug. 24, 2017).

43. *Id.* §3(e).

44. CEQ MOU, *supra* note 25.

45. Memorandum of Understanding Implementing One Federal Decision Under Executive Order 13807 (Mar.-Apr. 2018), <https://whitehouse.gov/wp-content/uploads/2018/04/MOU-One-Federal-Decision-m-18-13-Part-2.pdf>.

46. OMB Memorandum M-19-11, Guidance on the Applicability of E.O. 13807 to States With NEPA Assignment Authority Under the Surface Transportation Project Delivery Program (Feb. 26, 2019); OMB Memorandum M-19-20, Guidance on the Applicability of E.O. 13807 to Responsible Entities Assuming Department of Housing and Urban Development Environmental Review Responsibilities (June 28, 2019).

47. Letter from Mary B. Neumayr, Chairman, CEQ, to Neil Chatterjee, Chairman, FERC (Aug. 22, 2019), <https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/11/20190822FERCOFDLetter.pdf>.

48. CEQ MOU, *supra* note 25, at 2-3; *see also* Ruple & Tanana, *supra* note 26, at 10-12.

49. Exec. Order No. 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis, 86 Fed. Reg. 7037 (Jan. 25, 2021).

50. *Id.*

51. Fiscal Responsibility Act of 2023, Pub. L. No. 118-5, 137 Stat. 76 (codified in scattered sections of 42 U.S.C. §§4332(2)(C)-(F), 4336-4336e).

Section 106 clarified that NEPA review is required when agencies take “final agency actions,” but not when actions are non-discretionary or legally constrained. This aligns with prior case law interpreting NEPA’s procedural scope.⁵² Other sections clarified the use of categorical exclusions (CEs), EAs, and EISs, and allowed agencies to adopt CEs used by other agencies.⁵³ Section 107 imposed clearer page limits and deadlines and emphasized unified, timely review processes.⁵⁴

CEQ operationalized these statutory reforms through a two-phase rulemaking process. In Phase 1, finalized in April 2022, CEQ restored the pre-2020 definitions of “effects” and “cumulative impacts” and removed Trump-era constraints on agency discretion.⁵⁵ In Phase 2, proposed in July 2023, CEQ sought to modernize the NEPA process with clearer guidance, scientific integrity, and stronger climate and environmental justice integration.⁵⁶

The Phase 2 proposal underwent a 60-day public comment period and received more than 148,000 public comments, most of which expressed support.⁵⁷ CEQ incorporated this input into the final rule, released in early 2024, to promote informed federal decisions and better environmental and community outcomes.⁵⁸

In essence, Biden’s NEPA reforms reestablished the importance of procedural compliance, particularly as courts continue to focus on procedural—not substantive—review. Agencies must now meet heightened expectations for transparency, scientific rigor, and public involvement, not just to comply with NEPA, but also to withstand judicial scrutiny.

Notably, while the Biden Administration’s NEPA reforms did not explicitly mention AI, they created a legal and policy environment that both enables and constrains AI’s integration into EAs. Under the U.S. Department of Energy’s (DOE’s) leadership, AI pilot programs such as PolicyAI, SearchNEPA, and NEPA-GPT were launched between 2022 and 2024 to assist with document summarization, public comment processing, and regulatory compliance. These efforts were aligned with Executive Order No. 14110 on AI governance and OMB’s 2024 AI risk management memorandum.⁵⁹

These initiatives demonstrate that the Biden-era NEPA framework functions as a regulatory “sandbox” for embedding emerging technologies—provided they uphold scientific integrity, procedural transparency, and human oversight. In contrast to the Trump-era focus on speed and streamlining, Biden’s model emphasizes explainability, risk classification, and participatory accountability, all of which are vital if AI-generated environmental documents are to withstand judicial review.⁶⁰ Thus, while AI adoption under NEPA may accelerate under both Administrations, the Biden approach offers clearer procedural guardrails for legally defensible implementation.

3. Second Trump Term (2025-2029): Potential Deregulation, NEPA Retrenchment, and AI as a Deregulatory Tool

On January 20, 2025, President Trump began his second term by issuing Executive Order No. 14154, *Unleashing American Energy*, which laid out a bold deregulatory agenda centered on reshaping the implementation of NEPA.⁶¹ The Order signaled a shift in federal environmental review policy, prioritizing “efficiency” and “certainty” in permitting over broader environmental and justice-based goals.⁶²

Section 5 of the Executive Order directs CEQ to propose rescinding its existing NEPA regulations under 40 C.F.R. §§1500-1508 within 30 days, and to issue new guidance.⁶³ Simultaneously, CEQ must convene an interagency working group to coordinate updates to agency-specific NEPA regulations.⁶⁴ This action also revoked Executive Order No. 11991, signed by President Carter in 1977, which historically empowered CEQ to oversee environmental quality.⁶⁵ The objective is to return NEPA implementation authority to individual agencies, potentially leading to inconsistent procedures and weakening federal oversight.⁶⁶

Agencies were further instructed to prioritize delivery timelines, limit procedural complexity, and restrict environmental analysis to statutory requirements, expressly barring reliance on climate science or tools not authorized by the U.S. Congress.⁶⁷ This included disbanding the Interagency Working Group on the Social Cost of Greenhouse Gases and directing the U.S. Environmental Protection Agency (EPA) to reconsider the 2009 endangerment finding, which underpins greenhouse gas regulation pursuant to *Massachusetts v. Environmental Protection Agency*.⁶⁸

52. *Flint Ridge Dev. Co. v. Scenic Rivers Ass’n of Okla.*, 426 U.S. 776, 791 (1976); *Department of Transp. v. Public Citizen*, 541 U.S. 752, 756 (2004).

53. 42 U.S.C. §§4336, 4336c.

54. *Id.* §4336a.

55. CEQ, National Environmental Policy Act Implementing Regulations Revisions, 87 Fed. Reg. 23453 (Apr. 20, 2022).

56. CEQ, National Environmental Policy Act Implementing Regulations Revision Phase 2, 88 Fed. Reg. 49924 (July 31, 2023).

57. *Id.*

58. *Id.*

59. DOE, GENERATIVE ARTIFICIAL INTELLIGENCE REFERENCE GUIDE 6-14 (2024), <https://www.energy.gov/sites/default/files/2024-12/Generative%20AI%20Reference%20Guide%20v2%206-14-24.pdf>; National Association of Environmental Professionals (NAEP), Webinar: Enhancing NEPA Practice With AI: Tools, Ethics, and DOE’s PolicyAI Framework for Responsible Integration (Dec. 9, 2024), https://naep.memberclicks.net/assets/webinars/2024/12.09.24_NAEP_Webinar_NEPA_and_AI_Slides_Keith.pdf; Exec. Order No. 14110, *Advancing Governance, Innovation, and Risk Management for Agency Use of Artificial Intelligence*, 88 Fed. Reg. 75123 (Oct. 30, 2023); OMB Memorandum M-24-10, *Advancing Governance,*

Innovation, and Risk Management for Agency Use of Artificial Intelligence (Mar. 28, 2024).

60. DOE, *supra* note 59, at 7-14; 88 Fed. Reg. at 49929.

61. Exec. Order No. 14154, *Unleashing American Energy*, 90 Fed. Reg. 8353 (Jan. 29, 2025).

62. *Id.*

63. *Id.* §5(a).

64. *Id.* §5(b).

65. *Id.* §5(d).

66. 90 Fed. Reg. 8353.

67. *Id.* §6.

68. *Id.*; *see also* 549 U.S. 497 (2007).

The shift away from centralized CEQ authority introduced significant legal uncertainty.⁶⁹ During this regulatory vacuum, agencies are expected to rely on their own NEPA procedures or fall back on statutory text.⁷⁰ This lack of clarity could lead to inconsistent implementation, regulatory delay, and increased litigation. For instance, in *Marin Audubon Society v. Federal Aviation Administration*, the U.S. Court of Appeals for the District of Columbia (D.C.) Circuit held that CEQ lacks statutory authority to promulgate binding NEPA regulations—an outcome arguably reinforced by President Trump’s Executive Order No. 14154, which then rescinded the prior directive upon which CEQ’s implementing regulations were based.⁷¹

Although framed as pro-fossil fuel, the deregulatory framework also affects renewable energy projects, which depend on NEPA approval.⁷² A fragmented process may exacerbate delays for offshore wind and utility-scale solar infrastructure.⁷³ Simultaneously, the Administration rescinded environmental justice mandates such as Executive Order No. 14008, effectively terminating the Justice40 Initiative and decommissioning the Climate and Economic Justice Screening Tool (CEJST).⁷⁴ These reversals reduce obligations to prioritize disadvantaged communities in federal environmental reviews.⁷⁵

Importantly, while Executive Order No. 14154 did not reference AI directly, the Administration quickly signaled a broader deregulatory push in the AI space.⁷⁶ On January 23, 2025, Trump issued Executive Order No. 14179, Removing Barriers to American Leadership in Artificial Intelligence, revoking Biden-era guidance and calling for a comprehensive federal AI action plan within 180 days.⁷⁷ The Order framed AI as a strategic asset to be deployed “unencumbered by ideological bias or regulatory overreach.”⁷⁸

In parallel, a presidential memorandum directed CEQ and related agencies to prepare a “Permitting Technology Action Plan” that encourages the use of AI and digital

tools to expedite NEPA reviews.⁷⁹ This agenda positions AI as a deregulatory instrument—streamlining agency workflows, shortening project timelines, and limiting review discretion.⁸⁰

Together, these developments suggest that under Trump’s second term, AI is likely to be adopted in NEPA procedures primarily to achieve speed and simplification, rather than to enhance accountability or deliberation. While such integration may improve administrative efficiency, it raises serious concerns about transparency, public input, and the legal defensibility of AI-assisted environmental decisions.⁸¹

D. The Role of AI in NEPA Evaluations

As the federal government continues to accelerate infrastructure development while simultaneously upholding environmental protection standards,⁸² AI is increasingly regarded as a key technological response to this tension. Although NEPA has long played a foundational role in procedural environmental governance, it has also faced long-standing criticism for being overly complex and time-consuming.⁸³ Recent innovations—especially the integration of AI—are gradually shifting this landscape.⁸⁴ At the forefront of this transition is DOE, which is actively promoting the institutionalization of AI within the NEPA framework through pilot programs and targeted resource investments.⁸⁵

As part of the National Artificial Intelligence Research Resource (NAIRR) pilot co-led with the National Science Foundation, DOE is supporting both general AI research infrastructure and the targeted deployment of AI in environmental and energy-related permitting procedures.⁸⁶ The VoltAIc initiative, developed under this context, has emerged as the flagship example of AI deployment in federal project review. Its anchor platform, PolicyAI, is led by the Pacific Northwest National Laboratory (PNNL) and received \$20 million in federal funding to build a system that “learns from the past, serves the present, and standardizes the future.”⁸⁷

PolicyAI’s AI models are trained to recognize recurring structures, language templates, legal references, and procedural patterns from past EISs. It aims to assist agencies in generating compliant documents more rapidly, with better consistency and reduced litigation risk stemming from procedural deficiencies.⁸⁸

69. Amy Turner, *Trump 2.0, Day One: Considerations for Cities and Community Partners*, SABIN CTR. FOR CLIMATE CHANGE L.: CLIMATE L. (Jan. 24, 2025), <https://blogs.law.columbia.edu/climatechange/2025/01/24/trump-2-0-day-one-considerations>.

70. Fiscal Responsibility Act of 2023, Pub. L. No. 118-5, 137 Stat. 10 (codified at 42 U.S.C. §§4336-4336e).

71. See 121 F.4th 902, 906-07 (D.C. Cir. 2024) (declining to defer to CEQ’s rules absent explicit congressional delegation); Exec. Order No. 14154, 90 Fed. Reg. 8353 (rescinding Exec. Order No. 11991, which had served as CEQ’s regulatory anchor).

72. Matthew W. Morrison, *Trump 2.0: The Changing Landscape of Renewable Energy Regulation*, PILLSBURY L. (Jan. 16, 2025), <https://www.pillsburylaw.com/en/news-and-insights/trump-renewable-energy.html>.

73. *Id.*

74. Harvard Law School Environmental & Energy Law Program, *Rollback: Trump Rescinded Biden’s Executive Order 14008 Establishing Justice40 Initiative*, <https://eelp.law.harvard.edu/tracker/rollback-trump-rescinded-bidens-executive-order-14008-that-established-justice40-initiative/> (last updated Mar. 1, 2025).

75. Turner, *supra* note 69.

76. *Id.*

77. Exec. Order No. 14179, Removing Barriers to American AI Leadership, 90 Fed. Reg. 8741 (Jan. 31, 2025).

78. *Id.*

79. *President Trump Unleashes Permitting Technology for the 21st Century*, WHITE HOUSE (Apr. 15, 2025), <https://www.whitehouse.gov/articles/2025/04/permitting-technology/>.

80. *Id.*

81. DOE, *supra* note 59, at 10-14 (discussing risks of unexplainable or unvalidated AI tools in EIS contexts).

82. Richard Lazarus, *The National Environmental Policy Act in the U.S. Supreme Court: A Reappraisal and a Peek Behind the Curtains*, 100 GEO. L.J. 1507, 1515-16 (2012).

83. *Id.*

84. *Id.*

85. NAER, *supra* note 59.

86. *Id.*

87. *Id.*

88. News Release, PNNL, Faster, More Informed Environmental Permitting With AI-Guided Support (Dec. 3, 2024), <https://www.pnnl.gov/news-media/faster-more-informed-environmental-permitting-ai-guided-support>.

Within PolicyAI, SearchNEPA functions as a beta-stage tool specifically designed for NEPA reviewers. It identifies frequently addressed environmental impact factors, compares mitigation strategies, and flags legally significant language patterns drawn from prior court-validated or invalidated EISs.⁸⁹ The tool is currently undergoing internal testing by approximately 30 DOE analysts, with plans for expansion to other agencies such as DOT and HUD.⁹⁰

To support model training, PNNL has built a comprehensive NEPA data repository comprising more than 28,000 EPA environmental review documents and nearly 3,000 full EIS texts.⁹¹ This corpus spans multiple project types and jurisdictions and is being gradually opened to public access.⁹² It allows developers, researchers, and stakeholders to retrieve structured environmental data with a level of transparency previously unavailable under traditional systems.⁹³

Functionally, AI tools under the NEPA umbrella are becoming increasingly modular and systematized. Metadata extraction and standardization tools automatically detect key information fields—such as project category, timeline, geolocation, and ecological parameters—supporting traceable, auditable decision pipelines.⁹⁴ Geospatial analysis features allow AI systems to overlay project impacts with land use data sets, species distribution models, and environmental sensitivity zones, thereby facilitating more rigorous and spatially nuanced site selection and cumulative impact evaluations.⁹⁵

On the drafting side, PolicyAI incorporates large language models capable of generating draft EIS sections, correcting formatting inconsistencies, and embedding legal references according to NEPA's regulatory structure.⁹⁶ These capabilities are particularly valuable in light of the Fiscal Responsibility Act, which now imposes statutory deadlines and length constraints on EIS documents.⁹⁷ Beyond content generation, AI models assist in workflow diagnostics, identifying procedural bottlenecks such as delays in public comment periods, interagency coordination gaps, or repeated deficiencies in cumulative effects analysis.⁹⁸

AI also plays a growing role in data visualization, transforming complex environmental information into accessible formats such as heat maps, interactive timelines, and cumulative effect overlays.⁹⁹ These outputs not only aid

agency reviewers, but also empower public stakeholders to better interpret and respond to draft documents.¹⁰⁰ Through scientific data recognition, AI systems can flag and extract references to climate models, pollutant thresholds, and ecological corridors embedded in technical appendices—features often missed during manual reviews.¹⁰¹

Of particular legal significance is AI's contribution to cumulative impact assessment. Long a point of judicial criticism, this aspect of NEPA review is being strengthened through cross-project modeling, historical parameter benchmarking, and dynamic simulation of overlapping impact vectors across space and time.¹⁰²

DOE is also advancing automated EIS template generation, pre-populating standard structure, statutory references, and procedural placeholders.¹⁰³ This is particularly valuable for smaller agencies lacking in-house environmental legal expertise.¹⁰⁴

Finally, AI tools are being piloted in public participation workflows. ChatNEPA provides automated answers to public inquiries based on prior precedent and rule interpretation, while EngageNEPA uses clustering and summarization tools to streamline comment processing and identify dominant public concerns.¹⁰⁵

Taken together, these innovations indicate that AI is not an existential threat to NEPA's procedural integrity but a tool that—if properly designed—may enhance it. However, for these tools to be legally defensible, they must be explainable, auditable, and embedded within governance structures that retain human discretion.¹⁰⁶ AI may accelerate permitting timelines, but only if it is embedded within a framework that protects procedural justice and withstands judicial review.¹⁰⁷

E. Institutional Constraints on CEQ's Regulatory Power

While CEQ has historically played a central role in shaping NEPA implementation, its authority to regulate emerging technologies such as AI has recently come under significant legal scrutiny. In *Marin Audubon*, the D.C. Circuit held that CEQ lacked statutory authority to issue binding NEPA regulations.¹⁰⁸ The court concluded that CEQ's role is advisory, not legislative, and deemed its regulatory outputs *ultra vires*—especially where they attempted to bind agency discretion.¹⁰⁹ This ruling called into question

89. *Id.*

90. *Id.*

91. Natalie Alms, *Energy Department Wants to Use AI to Speed Permitting*, NEXTGOV (Aug. 20, 2024), <https://www.nextgov.com/digital-government/2024/08/energy-department-wants-use-ai-speed-permitting/398933/>.

92. *Id.*

93. *Id.*

94. Shivam Sharma et al., *NEPATEC1.0: First Large-Scale Text Corpus of National Environmental Policy Act PDF Documents*, HUGGING FACE, <https://huggingface.co/datasets/PolicyAI/NEPATEC1.0> (last visited Apr. 18, 2025).

95. News Release, PNNL, *supra* note 88.

96. *Id.*

97. Fiscal Responsibility Act of 2023, Pub. L. No. 118-5, 137 Stat. 10 (codified at 42 U.S.C. §§4336-4336e).

98. *See* Coglianese & Lehr, *supra* note 2, at 1185-90.

99. *Id.*

100. *Id.*

101. Sharma et al., *supra* note 94.

102. News Release, PNNL, *supra* note 88.

103. *Id.*

104. OFFICE OF NEPA POLICY AND COMPLIANCE, DOE, NEPA LESSONS LEARNED QUARTERLY REPORT, JUNE 2020, at 3-6 (2020) (recommending measures to accelerate NEPA reviews), https://www.energy.gov/nepa/articles/consolidated-lessons-learned-quarterly-report-files?nrg_redirect=436678.

105. News Release, PNNL, *supra* note 88.

106. Margaret Huq, *Artificial Intelligence and the Administrative State*, 53 GA. L. REV. 123 (2019); Calo, *supra* note 3, at 429-35.

107. *See* Huq, *supra* note 106, at 140-50.

108. *See* 121 F.4th 902 (D.C. Cir. 2024).

109. *Id.*

the legitimacy of long-standing executive orders—particularly Executive Order No. 11991—which had historically expanded CEQ’s regulatory role.¹¹⁰ Although CEQ continues to issue environmental procedural guidance, its pronouncements may now be considered advisory rather than binding, directly impacting how agencies approach AI-assisted EISs.¹¹¹

Further compounding the uncertainty is the Supreme Court’s decision in *Loper Bright Enterprises v. Raimondo*,¹¹² which overruled the *Chevron* deference doctrine.¹¹³ Under this new standard, courts must independently interpret statutory meaning without deferring to agency expertise, even in complex technical fields like AI integration into NEPA compliance. As one commentator aptly noted after *Loper Bright*: “Agencies must now win their cases based on plain statutory text, not technical credibility.”¹¹⁴

Adding to CEQ’s weakened position, in *Iowa v. Council on Environmental Quality*, the U.S. District Court for the District of North Dakota enjoined CEQ’s interim NEPA regulations, holding that CEQ exceeded its authority by attempting to impose uniform NEPA procedures without congressional authorization.¹¹⁵ These back-to-back rulings leave CEQ without a clear statutory or judicial foundation to guide AI integration through binding regulation.

Moreover, the rollback of CEQ’s authority is occurring in parallel with deregulatory momentum in federal policy. Executive Order No. 14154, issued in 2025, revoked prior CEQ rules and re-empowered individual agencies to implement their own NEPA procedures, further eroding any presumption of centralized guidance.¹¹⁶

In this fragmented landscape, agencies may apply AI to NEPA reviews using different standards, tools, and interpretations—raising the risk of procedural defects and litigation.¹¹⁷ As recent analyses emphasize, post-*Loper Bright* judicial review of NEPA compliance is likely to be even more stringent, particularly where emerging technologies like AI are involved.¹¹⁸ Courts may now scrutinize not just procedural adherence, but also the transparency, reasonableness, and traceability of AI-supported environmental analyses.

Given these layered constraints—from judicial rulings to executive policy reversals—the institutional future of CEQ as a lead regulator of AI integration under NEPA remains precarious.¹¹⁹ The legal and structural gaps identified here raise a fundamental question that the next part will address: if CEQ lacks the capacity to govern AI in NEPA, then what institutional model should take its place?

Following *Marin Audubon*, multiple federal agencies moved swiftly to revise their NEPA procedures, underscoring both the limits of CEQ’s authority and the turn toward agency-specific discretion. DOE adopted new implementing regulations citing CEQ’s rescission, executive directives, and *Seven County Infrastructure Coalition v. Eagle County*¹²⁰ as justification for reform.¹²¹ DOT likewise promulgated an interim final rule at 23 C.F.R. Part 771, while the Federal Aviation Administration (FAA) updated its Order 1050.1G to emphasize independence from CEQ in response to *Marin Audubon*.¹²²

The U.S. Department of the Interior (DOI) consolidated its NEPA rules into the Departmental Manual, while the Bureau of Ocean Energy Management’s (BOEM’s) South-Coast Wind ROD explicitly acknowledged *Marin Audubon* and pledged to apply both CEQ guidance and DOI’s own rules.¹²³ The U.S. Department of Agriculture also amended its procedures under 7 C.F.R. Part 1b in response to CEQ’s rescission.¹²⁴ FERC modernized its NEPA regulations to eliminate references to CEQ and emphasize its own statutory mandates under the Federal Power Act and Natural Gas Act.¹²⁵ The U.S. Army Corps of Engineers (the Corps) replaced its long-standing Appendix B with new NEPA rules at 33 C.F.R. Part 333, expanding CEs and reducing reliance on CEQ’s framework.¹²⁶

Taken together, these reforms illustrate a centrifugal trend: with CEQ unable to provide a stable regulatory foundation, agencies are increasingly constructing their own frameworks. While such decentralization enhances flexibility, it also produces fragmentation and legal uncertainty—particularly acute for AI-assisted NEPA processes, where the absence of uniform standards heightens litigation risk.

110. Exec. Order No. 11991, 42 Fed. Reg. 26967 (May 25, 1977).

111. *Id.*

112. See 603 U.S. ___, slip op. at 18-19 (2024) (overruling *Chevron* and holding that courts must exercise “independent judgment” in statutory interpretation).

113. *Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 842-43 (1984) (establishing the two-step framework under which courts defer to reasonable agency interpretations of ambiguous statutes).

114. Marci Harris, *Loper Bright* and the New Judicial Approach to Administrative Interpretation, WBA Energy et al. (Apr. 22, 2025) (on file with author).

115. No. 1:24-cv-0089 (D.N.D. Mar. 4, 2024) (preliminarily enjoining CEQ’s interim NEPA rule).

116. Exec. Order No. 14154, 90 Fed. Reg. 8353 (Jan. 29, 2025).

117. Edward Boling, *NEPA Practice Without CEQ Regulations*, PERKINS COIE (Jan. 22, 2025), <https://perkinscoie.com/insights/blog/nepa-practice-without-ceq-regulations>.

118. Stacey Bosshardt, *Post-Loper Bright Trends in Judicial Review of NEPA Compliance*, WBA Energy et al. Webinar (Apr. 22, 2025) (on file with author).

119. See *Loper Bright Enters. v. Raimondo*, 603 U.S. ___, slip op. (2024).

120. No. 23-975, 605 U.S. ___ (2025).

121. National Environmental Policy Act Implementing Procedures; Final Rule, 90 Fed. Reg. 29498 (July 3, 2025) (to be codified at 10 C.F.R. pt. 1021).

122. Environmental Impact and Related Procedures; Interim Final Rule, 90 Fed. Reg. 29451 (July 3, 2025) (to be codified at 23 C.F.R. pt. 771); see also U.S. Department of Transportation Order DOT 5610.1D, Procedures for Considering Environmental Impacts (July 1, 2025); FAA Order 1050.1G, Environmental Impacts: Policies and Procedures (July 3, 2025).

123. National Environmental Policy Act Implementing Regulations; Interim Final Rule, 90 Fed. Reg. 29676 (July 3, 2025) (to be codified at 43 C.F.R. pt. 46); BOEM, RECORD OF DECISION FOR THE SOUTHCOAST WIND PROJECT OCS-A 0521, at 1 n.3 (2024).

124. National Environmental Policy Act Implementing Procedures; Interim Final Rule, 90 Fed. Reg. 29504 (July 3, 2025) (to be codified at 7 C.F.R. pt. 1b).

125. Modernization of the Commission’s NEPA Procedures; Final Rule, 90 Fed. Reg. 29423 (July 3, 2025) (to be codified at 18 C.F.R. pts. 380, 385).

126. Procedures for Implementing the National Environmental Policy Act; Interim Final Rule, 90 Fed. Reg. 29461 (July 3, 2025) (to be codified at 33 C.F.R. pt. 333).

II. Choosing a Path Forward: Who Should Regulate

Administrative agencies, by design, possess institutional advantages that make them well-suited to address emerging technologies. Unlike legislatures or courts, agencies can be structured for flexibility, rapid learning, and technical specialization.¹²⁷ Their staffs include subject matter experts capable of engaging in data-driven analysis, real-time decisionmaking, and iterative regulatory development.¹²⁸ These features are particularly valuable in high-velocity policy domains such as AI, where both the science and the risk profile evolve faster than traditional law making processes can accommodate.

Historically, CEQ has functioned as NEPA's primary coordinator—issuing guidance, advising federal agencies, and facilitating regulatory consistency.¹²⁹ In theory, CEQ would seem ideally positioned to manage AI's integration into environmental review: it can convene agencies, evaluate best practices, and issue procedural standards.¹³⁰ Yet, as discussed in Section I.D, recent judicial decisions and executive rollbacks have significantly constrained CEQ's regulatory authority. These developments raise a threshold question: if CEQ can no longer serve as a reliable regulator for AI under NEPA, then what institutional model should fill the vacuum?

A. Who Should Regulate AI in NEPA?

Given CEQ's weakened regulatory footing, alternative institutional arrangements may be necessary. One option is to shift authority to agencies like EPA or DOE, both of which have deeper technical capacity and statutory mandates relevant to environmental protection and energy infrastructure.¹³¹ These agencies have already engaged in pilot projects involving AI for environmental modeling, permitting, and risk assessment.¹³² DOE's ongoing initiatives—such as the PolicyAI platform and the NEPA-GPT tool—demonstrate its capacity to operationalize AI governance within NEPA compliance structures. These tools already include safeguards such as explainability, human-in-the-loop design, and environmental data standardization, offering a model for scaled federal adoption.¹³³ Congressional oversight could further enhance legitimacy,

ensuring that AI integration reflects not only technical feasibility but also democratic accountability.¹³⁴

As scholars have noted, democratic legitimacy is a crucial factor in regulating emerging technologies.¹³⁵ Legislatures are uniquely suited to make value-laden policy decisions, particularly where the public interest and long-term societal impacts are at stake. An AI regulatory regime built solely on agency discretion, without congressional input, risks both legal vulnerability and diminished public trust.¹³⁶ Moreover, as courts begin reassessing previously *Chevron*-protected agency actions under doctrines such as statutory *stare decisis*, a clear statutory framework for AI would insulate key NEPA workflows from destabilizing litigation risks—especially those involving new, technical interpretations.¹³⁷

B. The Case for Congressional Legislation

A legislative framework offers several key advantages:

- **Legal certainty:** Codifying the use of AI in NEPA would provide clear statutory authority and reduce ambiguity that might be exploited in litigation.¹³⁸
- **Stakeholder collaboration:** A legislative process encourages input from industry, environmental groups, and government agencies, ensuring a balanced and informed regulatory design.¹³⁹
- **Litigation risk reduction:** By embedding AI integration directly into the statutory NEPA framework, Congress can insulate agency actions from facial legal challenges and increase judicial deference.¹⁴⁰

However, legislation comes with challenges. The congressional process is often slow and subject to partisan gridlock, particularly in the environmental domain. Moreover, the rapid pace of AI development may render statutory language obsolete before implementation is complete.¹⁴¹

The growing judicial reliance on the “major questions” doctrine further underscores the limits of agency-led AI integration, particularly where regulatory decisions carry wide social and political implications. In such cases, only congressional authorization can ensure legitimacy and insulation from reversal.¹⁴² Still, many scholars agree that

127. Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 381 (2016).
128. *Id.*

129. CEQ, National Environmental Policy Act Implementing Regulations Revisions Phase 2, 89 Fed. Reg. 35442, 35443 (May 1, 2024).

130. HENRY M. HART JR. & ALBERT M. SACKS, THE LEGAL PROCESS: BASIC PROBLEMS IN THE MAKING AND APPLICATION OF LAW IX (1994).

131. U.S. EPA, *EPA Compliance With the National Environmental Policy Act*, <https://www.epa.gov/nepa/epa-compliance-national-environmental-policy-act> (last updated July 25, 2025); DOE, *DOE Is Advancing the AI Innovation Ecosystem*, <https://www.energy.gov/cet/doe-advancing-ai-innovation-ecosystem> (last visited Sept. 6, 2025).

132. News Release, PNNL, *supra* note 88.

133. DOE, *supra* note 59, at 12-14.

134. *Public Trust in Government: 1958-2024*, PEW RSCH. CTR. (June 24, 2024), <https://www.pewresearch.org/politics/2024/06/24/public-trust-in-government-1958-2024/>.

135. Scherer, *supra* note 127.

136. *Id.* at 394.

137. Perkins Coie, Some Litigation Tools Still Available: Statutory Stare Decisis, WBA Event (Apr. 22, 2025) (on file with author).

138. See Coglianese & Lehr, *supra* note 2.

139. Sheila Jasanoff, *Technologies of Humility: Citizen Participation in Governing Science*, 23 MINERVA 223, 227 (2003).

140. Emily Hammond Meazzell, *Deference and Dialogue in Administrative Law*, 111 COLUM. L. REV. 1722, 1735-36 (2011).

141. Aziz Z. Huq, *A Right to a Human Decision*, 105 VA. L. REV. 611, 631-33 (2019).

142. *West Virginia v. Environmental Prot. Agency*, 597 U.S. ____ (2022); WBA Webinar, *Loper Bright* and the Changing Face of Administrative Law (Apr. 22, 2025) (slide: “What’s Happening in the Courts?”) (on file with author).

the best approach to regulating AI in sensitive domains like NEPA is to begin with a foundational statute. Such legislation would clarify the scope of permissible AI use, designate responsible agencies, and set procedural safeguards for transparency and accountability.¹⁴³

III. Judicial Review of AI-Generated EISs

A. Judicial Standards for Reviewing NEPA Compliance

Although NEPA does not contain an express provision for judicial review, courts have long entertained NEPA-based challenges under the Administrative Procedure Act (APA), specifically 5 U.S.C. §706(2)(A), which authorizes courts to set aside agency actions that are “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”¹⁴⁴ In practice, this standard has evolved into a distinct “hard look” doctrine that courts consistently apply when evaluating the adequacy of agency compliance with NEPA.¹⁴⁵

1. NEPA’s Procedural Mandate

NEPA is fundamentally a procedural statute. It does not mandate substantive environmental outcomes, but instead requires that federal agencies engage in a transparent and interdisciplinary process to evaluate the environmental effects of major federal actions.¹⁴⁶ In *Calvert Cliffs’ Coordinating Committee v. U.S. Atomic Energy Commission*, the D.C. Circuit famously declared that NEPA “makes environmental protection a part of the mandate of every federal agency and department.”¹⁴⁷

Courts thus review whether agencies have complied with NEPA’s procedural requirements, including the preparation of EISs, the disclosure of environmental consequences, the examination of reasonable alternatives, and the solicitation and consideration of public input.¹⁴⁸

2. The Hard Look Doctrine

The hard look doctrine is the judicial centerpiece of NEPA enforcement. It reflects a long-standing requirement that agencies must not merely follow procedural formalities, but must meaningfully engage in environmental review. This doctrine has been clarified and entrenched through

key Supreme Court decisions—most notably *Robertson* and *Marsh v. Oregon Natural Resources Council*.

In *Robertson*, the Court emphasized that NEPA is designed “to ensure that environmental information is available to public officials and citizens before decisions are made and before actions are taken.”¹⁴⁹ It stressed that NEPA’s function is procedural rather than substantive, stating “NEPA itself does not mandate particular results, but simply prescribes the necessary process.”¹⁵⁰ “What it requires is that the agency . . . take a ‘hard look’ at environmental consequences.”¹⁵¹

In this case, the Court reversed a U.S. Court of Appeals for the Ninth Circuit decision that had interpreted NEPA to require inclusion of a detailed mitigation plan within the EIS. The Court held that so long as mitigation is discussed sufficiently to inform decisionmakers and the public, it satisfies the statute’s requirements. This ruling reinforced that the “hard look” is not about achieving the most environmentally favorable outcome, but ensuring informed and accountable agency deliberation.

Marsh deepened the doctrine’s reach by addressing how agencies must handle new scientific information arising after an EIS is issued. There, the Supreme Court upheld the Corps’ decision not to supplement an EIS despite new information, but only after affirming a high standard of procedural diligence. The Court held: “Agencies are entitled to a presumption of regularity, but that presumption is not to shield their decisions from a thorough, probing, in-depth review.”¹⁵² It continued: “The requirement that agencies take a ‘hard look’ at the environmental effects of their planned action . . . includes a duty to gather and evaluate new information relevant to the environmental impact.”¹⁵³ The Court also emphasized judicial restraint: “[T]he decision whether to prepare a supplemental EIS is similar to the decision whether to prepare an EIS in the first instance, and is therefore entitled to judicial deference.”¹⁵⁴

Taken together, these cases illustrate the dual expectations under the hard look standard: (1) agencies must engage in an iterative and good-faith evaluation of environmental data, including mitigation and alternatives, and (2) courts must assess whether that process was reasoned, thorough, and well-documented, without substituting their own policy judgments.

Critically, the hard look doctrine imposes substantive demands through procedural scrutiny. Agencies cannot rely on conclusory statements, undisclosed assumptions, or opaque methodologies. The record must reflect a logical bridge between data and decisions, enabling the public and judiciary to verify that the agency did not act arbitrarily.

143. Scherer, *supra* note 127, at 394.

144. 5 U.S.C. §706(2)(A).

145. See CONGRESSIONAL RESEARCH SERVICE, R47205, JUDICIAL REVIEW OF ENVIRONMENTAL IMPACT STATEMENTS UNDER NEPA 3-4 (2022).

146. See *Department of Transp. v. Public Citizen*, 541 U.S. 752, 756-57 (2004) (explaining that “NEPA imposes only procedural requirements”); see also *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 558 (1978) (clarifying that NEPA does not compel agencies to elevate environmental concerns above other policy goals).

147. 449 F.2d 1109, 1112 (D.C. Cir. 1971) (emphasizing judicial responsibility to ensure environmental considerations are integrated into agency decisionmaking).

148. See CEQ, *supra* note 27, at 4-6.

149. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349-350 (1989) (affirming that NEPA “does not mandate particular results, but simply prescribes the necessary process”).

150. *Id.*

151. *Id.*

152. *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 373-74 (1989) (emphasizing courts’ responsibility to ensure that agencies meet procedural obligations).

153. *Id.*

154. *Id.*

For agencies deploying AI tools in NEPA evaluations, this standard raises acute challenges. AI-generated EISs must not only synthesize data, but do so in a way that retains explainability, traceability, and scientific credibility. If the underlying rationale of an AI system is obscured or unexplained, courts may find that the agency failed to take the requisite “hard look,” regardless of the sophistication or efficiency of the tool used.

3. The “Arbitrary and Capricious” Standard (APA)

In addition to the hard look doctrine, courts evaluating agency compliance with NEPA also apply the APA’s more encompassing standard, which permits courts to set aside agency actions that are “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.”¹⁵⁵ While the hard look standard shapes the analytical depth of environmental reviews, the arbitrary-and-capricious test serves as a judicial enforcement mechanism to invalidate agency decisions that defy logic, scientific evidence, or procedural coherence.

The leading case is *Motor Vehicle Manufacturers Ass’n v. State Farm Mutual Automobile Insurance Co.*, in which the Supreme Court articulated that an agency rule is arbitrary and capricious if the agency

relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.¹⁵⁶

In *State Farm*, the Court invalidated DOT’s rescission of an automobile safety regulation after concluding that the agency had disregarded significant empirical data and failed to explain its abrupt policy reversal. The Court found that the agency’s justification lacked the “rational connection between the facts found and the choice made”—a foundational element of reasoned decisionmaking.¹⁵⁷

This principle has since guided courts in NEPA litigation, where the arbitrary-and-capricious standard is invoked not merely as a procedural safeguard, but as a substantive check on agencies that ignore environmental evidence or distort scientific judgment. Courts have applied this test to agency actions that (1) dismiss or overlook credible environmental data; (2) rely on outdated, biased, or scientifically unverified modeling; (3) mischaracterize the scope or implications of scientific uncertainty; or (4) fail to disclose key assumptions underlying impact projections. In each of these scenarios, judicial scrutiny centers on whether the agency’s conclusions reflect a reasoned

evaluation of the record or a departure from the evidence it purports to rely on.¹⁵⁸

Although courts generally grant agencies technical deference in complex fields, they do not tolerate decisions made in bad faith, unsupported by record evidence, or dressed in the language of expertise but rooted in political or economic expedience.¹⁵⁹ For instance, an EIS that omits foreseeable climate impacts without analysis, or one based on industry-supplied data lacking third-party validation, risks invalidation under this standard.

Notably, this standard does not demand flawless science or expert unanimity. Rather, it requires that agencies follow a transparent, reasoned, and scientifically grounded process. As the Court reiterated in *State Farm*, “an agency’s action must be upheld, if at all, on the basis articulated by the agency itself”—meaning post hoc litigation defenses are legally insufficient.¹⁶⁰

The implications for AI-generated NEPA documents are substantial. If an agency fails to verify the quality and relevance of training data, cannot articulate how an algorithm produced its conclusions, or delegates environmental reasoning wholesale to a black-box model (a term describing AI systems—particularly those based on deep neural networks—whose internal logic and decision processes are inaccessible or unintelligible to human users due to their structural complexity and lack of interpretability, such that even developers cannot fully explain their outputs),¹⁶¹ a reviewing court may well find the decision arbitrary—even if the agency formally satisfied procedural steps.¹⁶² The more opaque and untraceable the AI system, the greater the legal vulnerability under the APA’s standard.¹⁶³

Ultimately, the “arbitrary and capricious” doctrine remains a high threshold—but not an empty formality. It is a crucial safeguard that ensures agencies deploying emerging technologies like AI remain anchored in lawful, evidence-based, and intelligible decisionmaking.¹⁶⁴

4. Interrelationship Between Standards

The three standards—procedural compliance, the hard look doctrine, and the APA’s arbitrary-and-capricious test—are not mutually exclusive, but rather form a layered framework. The procedural standard ensures that agencies follow NEPA’s steps; the hard look doctrine ensures the depth and seriousness of those steps; and the APA provides the legal mechanism for judicial enforcement. Courts typically begin with the hard look inquiry and invoke the APA

155. 5 U.S.C. §706(2)(A).

156. *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (defining arbitrary-and-capricious standard).

157. *Id.* at 52 (requiring a “rational connection between the facts found and the choice made”).

158. See *Center for Biological Diversity v. Bernhardt*, 982 F.3d 723, 738-39 (9th Cir. 2020) (agency failed to account for cumulative emissions); *Sierra Club v. U.S. Army Corps of Eng’rs*, 803 F.3d 31, 43-45 (D.C. Cir. 2015) (invalidating agency reliance on flawed modeling).

159. See *Business Roundtable v. Securities & Exch. Comm’n*, 647 F.3d 1144, 1150-51 (D.C. Cir. 2011) (striking down agency rule as “unsubstantiated”).

160. See *State Farm*, 463 U.S. at 50.

161. See *Coglianesse & Lehr*, *supra* note 2.

162. *Id.* at 1175.

163. *Id.*

164. Sharma et al., *supra* note 94.

standard only if an agency's failure is so significant that it amounts to arbitrary action.

Overall, the hard look doctrine remains the judicial centerpiece of NEPA litigation. It reflects a balance between ensuring rigorous environmental review and respecting agency discretion. For agencies incorporating AI into NEPA processes—such as through AI-generated EISs—it is imperative to structure these tools in ways that produce transparent, auditable, and scientifically grounded outputs. Only by aligning with the hard look standard can agencies reduce litigation risks and uphold NEPA's core goal of informed environmental decisionmaking.

5. Post-Chevron and the Emerging Tension: *Loper Bright* and *Seven County*

The Supreme Court's recent decisions in *Loper Bright* and *Seven County* have introduced a striking tension into the judicial framework governing NEPA review. In *Loper Bright*, the Court formally overruled *Chevron U.S.A., Inc. v. Natural Resources Defense Council*, holding that courts must exercise independent judgment when interpreting ambiguous statutory provisions.¹⁶⁵ This doctrinal shift requires de novo¹⁶⁶ judicial review of statutory meaning, foreclosing the long-standing practice of affording agencies controlling deference on questions of law. For NEPA litigation, this means that disputes over statutory interpretation—such as what constitutes a “major federal action,” the extent of an alternatives analysis, or whether algorithmic tools may substitute for human review in satisfying NEPA's disclosure obligations—potentially now must be decided directly by courts, without automatic reliance on agency interpretations.¹⁶⁷

By contrast, in *Seven County*, the Court adopted a markedly deferential posture in the NEPA context. Writing for the majority, Justice Brett Kavanaugh described NEPA as a “procedural cross-check, not a substantive roadblock,” and announced that agencies are entitled to “substantial deference” when determining the scope and content of an EIS.¹⁶⁸ This reasoning extended not only to technical judgments, but even to questions about the breadth of an agency's legal authority in scoping decisions.¹⁶⁹ The majority's

approach echoes earlier precedent such as *Baltimore Gas & Electric Co. v. Natural Resources Defense Council*, which emphasized that reviewing courts must be “at their most deferential” when evaluating agency predictive judgments grounded in scientific or technical expertise.¹⁷⁰ Although the concurring opinion by Justice Sonia Sotomayor insisted that *Loper Bright*'s de novo¹⁷¹ rule should continue to govern questions of statutory meaning, the majority's framing signals an intent to minimize judicial micromanagement of NEPA reviews.¹⁷²

From a policy perspective, however, *Seven County* is not merely a doctrinal refinement. It reflects a broader political economy context in which NEPA has long been criticized for delaying energy and infrastructure projects. The decision resonates with deregulatory priorities crystallized during the first Trump Administration, which emphasize accelerating permitting timelines, reducing procedural barriers, and facilitating the development of traditional energy resources such as oil and gas.¹⁷³ More recently, Congress codified similar priorities in the Fiscal Responsibility Act, which imposed enforceable page limits and a two-year deadline for EISs.¹⁷⁴

Against this backdrop, the Court's endorsement of “substantial deference” can be understood as an effort to recalibrate NEPA's role: rather than functioning as a substantive obstacle to federal action, NEPA should operate as a procedural checkpoint that informs—but does not constrain—agency decisionmaking. In practical terms, this signals judicial reluctance to allow NEPA litigation to obstruct major projects absent a clear statutory violation, reflecting a policy-driven orientation toward reducing NEPA's obstructive potential. This policy logic, though politically salient, sits uneasily alongside *Loper Bright*'s insistence that courts—not agencies—retain the final word on statutory interpretation.¹⁷⁵

The juxtaposition of *Loper Bright* and *Seven County* thus creates a dual-track model of judicial review. On one track, courts must exercise independent judgment on statutory questions, scrutinizing whether agencies may lawfully rely on AI to fulfill NEPA's mandates. On the other, courts may afford substantial deference to agencies' technical judgments—such as algorithmic model design, parameter settings, or predictive assumptions—so long as those choices fall within a “zone of reasonableness.”¹⁷⁶ This doctrinal

165. See *Loper Bright Enters. v. Raimondo*, 603 U.S. ___, slip op. at 18-19 (2024) (overruling *Chevron* and holding that courts must exercise “independent judgment” in statutory interpretation); *Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 842-44 (1984) (establishing two-step deference framework later abrogated by *Loper Bright*).

166. See *Loper Bright*, slip op. at 19 (explaining that courts must exercise their “independent judgment” in statutory interpretation, applying de novo review). See also *Salve Regina Coll. v. Russell*, 499 U.S. 225, 231 (1991) (defining de novo review as independent judicial determination without deference to prior decisionmaker).

167. See *Department of Transp. v. Public Citizen*, 541 U.S. 752, 756-57 (2004) (emphasizing NEPA imposes only procedural duties, not substantive constraints, but acknowledging courts must determine scope of those duties).

168. See *Seven Cnty. Infrastructure Coal. v. Eagle Cnty.*, 604 U.S. ___, slip op. at 14-15 (2025) (Kavanaugh, J.) (holding courts must afford agencies “substantial deference” in scoping EIS).

169. *Id.* at 20 (“An agency's assessment of the limits of its NEPA obligations is entitled to substantial judicial deference so long as it is reasonable and reasonably explained.”).

170. See 462 U.S. 87, 103 (1983) (upholding the Nuclear Regulatory Commission's predictive judgment concerning long-term nuclear waste storage).

171. See *Loper Bright*, slip op.

172. See *Seven Cnty.*, slip op. at 2-3 (Sotomayor, J., concurring in judgment).

173. See Exec. Order No. 13807, 82 Fed. Reg. 40463 (Aug. 24, 2017).

174. Fiscal Responsibility Act of 2023, Pub. L. No. 118-5, div. C, tit. III, §321, 137 Stat. 10, 38-42 (codified at 42 U.S.C. §4336a).

175. See *Loper Bright*, slip op. at 19 (“It is emphatically the province and duty of the judiciary to say what the law is.”) (quoting *Marbury v. Madison*, 5 U.S. (1 Cranch) 137, 177 (1803)).

176. See *Seven Cnty.*, slip op. at 14-15 (Kavanaugh, J.) (directing courts to afford “substantial deference” to agency determinations so long as they are reasonable and reasonably explained); *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (requiring agency action to remain within the bounds of reasoned decisionmaking); *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 103 (1983) (holding that reviewing courts must be “at their most deferential” when agencies make predictive judgments within their expertise).

tion generates significant uncertainty: is the use of AI in NEPA compliance a matter of law, requiring de novo review, or a matter of technical expertise, warranting judicial deference? The answer may determine whether AI-generated EISs are upheld or invalidated in future litigation.

B. *AI-Specific Vulnerabilities That May Trigger Judicial Review*

As agencies increasingly incorporate AI tools into the preparation of EISs under NEPA, they must be cautious of legal vulnerabilities that may subject their decisions to judicial scrutiny. Courts, particularly under the hard look doctrine, are vigilant in ensuring that federal agencies undertake thorough, reasoned, and transparent environmental reviews. In this section are five major risks that may arise when AI is employed in NEPA processes, each of which may trigger litigation or remand.

1. Lack of Transparency and Explainability

AI systems—particularly deep learning or neural network-based models—are often criticized as “black boxes” because they produce results without offering a clear explanation of how those results were reached. If an agency cannot explain the rationale behind a model’s conclusions, courts may find that it has failed to demonstrate reasoned decisionmaking under NEPA.¹⁷⁷

For example, if an AI system predicts minimal air quality impacts but cannot disclose what data or assumptions it used, courts may conclude that the agency has not taken a “hard look” at the consequences. This opacity not only violates the hard look standard, but may also run afoul of NEPA’s public disclosure requirements, which demand that environmental effects be evaluated in a manner accessible to the public and stakeholders.¹⁷⁸

2. Incomplete or Biased Data Inputs

The quality of an AI model’s outputs depends on the reliability and completeness of its training data. If a model is trained on outdated EIS documents, lacks recent climate projections, or excludes site-specific variables, it may overlook critical environmental impacts or disproportionately favor certain project outcomes.¹⁷⁹

Courts may view such deficiencies as failing to consider important environmental factors, which could render an agency’s decision arbitrary and capricious under the APA.¹⁸⁰ Moreover, if AI tools fail to identify cumulative or indirect impacts because of data gaps, agencies could be found non-compliant with NEPA’s requirement to assess the full scope of environmental consequences.¹⁸¹

177. See Coglianesi & Lehr, *supra* note 2.

178. 40 C.F.R. §1502.24.

179. Sharma et al., *supra* note 94.

180. See *State Farm*, 463 U.S. at 43.

181. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 (1976).

3. Overreliance on AI Without Human Oversight

While AI can aid efficiency, it should not replace expert judgment. Courts have cautioned that agencies must independently evaluate the methods and assumptions underlying technical tools. If an agency defers blindly to an AI-generated EIS without subjecting it to human scrutiny, it risks a finding that the decisionmaking process was arbitrary.¹⁸²

For instance, the Ninth Circuit has noted that agencies cannot “abdicate” their NEPA responsibilities by relying on models or consultants without engaging critically with their content.¹⁸³ AI tools should be treated as supportive aids, not as substitutes for institutional expertise or statutory obligations.

4. Failure to Meaningfully Incorporate Public Input

NEPA mandates robust public participation. If AI-generated EISs merely summarize comments using automated tools or fail to address substantive public concerns, agencies may face legal challenges. Courts have emphasized that agencies must not only solicit but also meaningfully engage with and respond to public comments.¹⁸⁴

AI tools used for comment processing (e.g., clustering or sentiment analysis) should preserve comment specificity and context. Failure to do so may invite litigation, especially where the final EIS fails to explain how public feedback informed agency conclusions.¹⁸⁵

5. Algorithmic Bias in Alternatives Analysis

One of NEPA’s core components is the exploration of reasonable alternatives. If an AI tool disproportionately favors certain alternatives—such as the most economically expedient option—without balanced consideration of environmentally preferable options, the agency may be seen as predetermining outcomes.¹⁸⁶

This is particularly problematic if the tool’s training data reflect past biases (e.g., over-prioritizing infrastructure over conservation) or if economic metrics dominate its weighting schema. Courts may find this undermines the integrity of the alternatives analysis, a central feature of NEPA’s regulatory mandate.¹⁸⁷

C. *Mitigating Legal Risks*

To ensure the legal defensibility of AI-generated EISs under NEPA, agencies must proactively address the risks identified under the hard look doctrine. Three key strategies are proposed:

182. *Department of Transp. v. Public Citizen*, 541 U.S. 752, 768 (2004).

183. *Anderson v. Evans*, 314 F.3d 1006, 1018 (9th Cir. 2002).

184. *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 553 (1978).

185. News Release, PNNL, *supra* note 88.

186. 42 U.S.C. §4332(2)(C)(iii); see also 40 C.F.R. §1502.14.

187. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351-52 (1989).

1. Implement explainable AI (XAI) principles to enhance transparency.

Agencies should prioritize AI models that allow for clear articulation of their decisionmaking logic. Tools such as decision trees, attention-based natural language models, and interpretable visualizations can help demystify how environmental outcomes were derived. By increasing transparency, these models reduce the risk of judicial scrutiny and meet the courts' demand for reasoned, record-based agency action.

2. Combine AI with human oversight to maintain regulatory compliance.

Agencies must avoid overreliance on automated tools. Instead, AI-generated outputs should be reviewed by NEPA experts who understand both the legal standards and the environmental science. This “hybrid governance” model ensures compliance with statutory duties, supports institutional accountability, and aligns with courts' preference for agency discretion exercised with informed judgment.

3. Strengthen public participation mechanisms to uphold NEPA's procedural integrity.

AI should be used to facilitate—not replace—public engagement. Tools like EngageNEPA can streamline public comment analysis, but agencies must also ensure meaningful opportunities for dialogue and demonstrate how public feedback has influenced outcomes. This is critical to both NEPA's procedural mandate and to insulating final EIS documents from procedural litigation.

IV. Policy Recommendations

NEPA's modernization must contend with the growing integration of AI technologies in federal environmental review. Against the backdrop of judicial skepticism toward agency interpretive authority and the rollback of centralized regulatory oversight, AI-assisted EISs present both an opportunity to enhance efficiency and a risk of undermining procedural integrity.¹⁸⁸ While emerging tools like PolicyAI and NEPA-GPT offer promising innovations, they also expose agencies to heightened litigation risks unless carefully governed.¹⁸⁹

188. KRISTEN HITE & ABIGAIL A. GRABER, CONGRESSIONAL RESEARCH SERVICE, LSB11260, *MARIN AUDUBON SOCIETY V. FEDERAL AVIATION ADMINISTRATION: D.C. CIRCUIT CHALLENGES CEQ'S AUTHORITY TO ISSUE NEPA REGULATIONS* (2024); *Marin Audubon Soc'y v. Federal Aviation Admin.*, 121 F.4th 902 (D.C. Cir. 2024); *see also* *Loper Bright Enters. v. Raimondo*, 603 U.S. ___, slip op. at 18-19 (2024) (overruling *Chevron* and holding that courts must exercise “independent judgment” in statutory interpretation).

189. DOE, *supra* note 59, at 12-14.

A. Congressional Intervention Is Necessary to Provide Statutory Clarity for AI's Role in NEPA Processes

In light of *Marin Audubon* and *Loper Bright*, CEQ's authority to regulate AI integration is now precarious.¹⁹⁰ Congress should amend NEPA, specifically 42 U.S.C. §4332, to add a new subsection (e.g., §4332(2)(G)) formally addressing AI-assisted environmental reviews. In revising NEPA, Congress should adopt defensive drafting techniques to ensure statutory resilience—favoring functional definitions, articulating interpretive rules, and explicitly assigning responsibilities where AI systems are involved.¹⁹¹ The following subsections describe the key elements of the amendment that should be required.

1. Explainability

AI systems used in EIS preparation must produce outputs understandable by human reviewers.¹⁹² In the context of NEPA, “explainability” is not an abstract technological ideal, but a core procedural safeguard that ensures the survival of administrative decisions under judicial review.¹⁹³ When applying the hard look standard, courts will not be satisfied with a conclusory statement such as “minimal impact.” Rather, they require the full chain of reasoning that supports such a determination and assurance that this reasoning is grounded in a complete and verifiable record.¹⁹⁴

Consider, for example, a hypothetical in which a federal agency is preparing an EIS for a large offshore wind farm along the Atlantic Coast. The agency employs an AI model to predict the potential impacts of turbine operations on migratory bird flight paths. While the model's final output may label the risk as “minimal,” that bare assertion will not withstand judicial scrutiny.¹⁹⁵ To satisfy the court's expectations, the agency must reveal how the AI arrived at this conclusion—specifically, which environmental variables were considered, how their significance was quantified, and how the factors interacted within the model's reasoning process.¹⁹⁶

Technically, this can be accomplished through the use of Shapley Additive Explanations (SHAP), which assign

190. *See Marin Audubon Soc'y*, 121 F.4th at 908-15; *Loper Bright*, slip op. at 18-19 (overruling *Chevron* and holding that courts must exercise “independent judgment” in statutory interpretation).

191. Marci Harris, *Loper Bright* and the Changing Face of Administrative Law, WBA Energy et al., Perkins Coie LLP (Apr. 22, 2025) (on file with author).

192. *See* Coglianese & Lehr, *supra* note 2.

193. *Id.*

194. *See* *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (requiring agencies to articulate a rational connection between facts and conclusions).

195. *See* *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976) (emphasizing that agencies must retain full understanding of the basis for their decisions).

196. *See* *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351-52 (1989); *Burlington Truck Lines v. United States*, 371 U.S. 156, 168 (1962) (rejecting agency action where there was a lack of “findings and reasons” to support its decision); *Kleppe*, 427 U.S. at 410 n.21 (stating that agencies must maintain a full understanding of the factual and methodological basis of their decisions); *see* Coglianese & Lehr, *supra* note 2; Cynthia Rudin, *Stop Explaining Black Box Machine Learning Models for High Stakes Decisions and Use Interpretable Models Instead*, 1 NAT. MACH. INTEL. 206, 207-09 (2019).

a quantifiable “contribution score” to each input variable, illustrating its positive or negative influence on the model’s prediction.¹⁹⁷ For instance, in this hypothetical, turbine operations during the high-density autumn migration season might increase collision risk by +0.35 (assumed values, not presented as research findings in this Article), nighttime lighting intensity might add +0.22 (assumed values, not presented as research findings in this Article), while the installation of low-intensity flashing lights might reduce risk by -0.15 (assumed values, not presented as research findings in this Article).¹⁹⁸ These numerical values are not merely computational artifacts—they form part of the “reasoned basis” that can be cited in judicial review.¹⁹⁹

In addition, the agency could deploy visualization tools built on attention mechanisms—a deep learning technique that assigns varying weights to different portions of the input data, effectively placing a “spotlight” on the parts most relevant to the model’s prediction.²⁰⁰ These tools transform the model’s internal weighting into human-readable graphics, such as heat maps, variable-importance charts, or geospatial overlays, making clear which temporal, spatial, or variable-level data most heavily influenced the output.

For example, in an EIS evaluating collision risks for migratory birds, an attention-based visualization could reveal that autumn nighttime wind speeds in specific offshore grid cells received the highest weight, while summer daylight conditions were weighted minimally. By explicitly showing which “data segments” (e.g., seasonal weather patterns, radar-tracked migration routes, lighting intensity metrics) drove the model’s conclusion, the agency creates a transparent, record-based explanation for its decision. This form of “visualized explanation” directly supports NEPA’s requirement that agencies base their decisions on a reasoned evaluation of the record²⁰¹ and significantly reduces the likelihood that a reviewing court will find the decision “arbitrary and capricious” under the APA.²⁰²

In short, explainability in NEPA review is not merely a reflection of technological transparency; it functions as a legally embedded defensive strategy. By transforming abstract algorithmic computations into an administrative record that is understandable, reviewable, and citable in

court, explainability enables AI-generated EIS documents to withstand procedural challenges.

2. Auditability

Agencies must document model assumptions, data inputs, and algorithmic decisionmaking processes.

Within NEPA’s legal framework, “auditability” is the natural extension of explainability, but it possesses an independent and indispensable procedural value.²⁰³ Even if an AI model’s reasoning process has been rendered transparent through explainability tools, a conclusion may still falter under judicial review if the agency lacks a complete, traceable audit trail of the entire analytical process, secured through robust model audit-logging systems.²⁰⁴ When applying the hard look standard, courts assess not only the substantive rationality of the agency’s conclusion, but also whether the procedural chain behind it is complete, transparent, and capable of being reconstructed after the fact.²⁰⁵

Returning to the hypothetical Atlantic offshore wind farm, imagine that the agency used multiple iterations of an AI model to forecast the project’s impacts on migratory birds, adjusting parameters such as turbine rotation speeds, lighting intensity, and radar reflectivity coefficients.²⁰⁶ If the agency failed to preserve critical metadata for each model run—including the model architecture version, timestamps and sources of input data, preprocessing algorithms used, assumptions such as species-sensitivity thresholds, and decision-threshold settings—it would be unable to demonstrate to a court that its conclusion was derived from a documented and verifiable analytical process.²⁰⁷ The absence of such a record invites judicial findings that the agency’s decision lacks a “reasoned, record-based

197. See Scott M. Lundberg & Su-In Lee, *A Unified Approach to Interpreting Model Predictions*, PROC. 31ST INT’L CONF. ON NIPS 4765, 4766-69 (2017); see also Scott M. Lundberg et al., *From Local Explanations to Global Understanding With Explainable AI for Tree-Based Models*, 2 NAT. MACH. INTEL. 56, 56-60 (2020); Vikas Hassija et al., *Interpreting Black-Box Models: A Review on Explainable Artificial Intelligence*, 16 COGNITIVE COMPUTATION 45 (2024), <https://doi.org/10.1007/s12559-023-10179-8>.

198. See Wind Energy Technologies Office, *Exploring Wind Energy’s Impacts on Wildlife*, DOE (June 26, 2023), <https://www.energy.gov/eere/wind/articles/exploring-wind-energys-impacts-wildlife>; see also BOEM, DOI, GUIDELINES FOR LIGHTING AND MARKING OF STRUCTURES SUPPORTING RENEWABLE ENERGY DEVELOPMENT 2-5 (2021).

199. See *Robertson*, 490 U.S. at 350.

200. See generally Dzmitry Bahdanau et al., *Neural Machine Translation by Jointly Learning to Align and Translate*, Presentation at Third International Conference on Learning Representations (May 7-9, 2015), <https://arxiv.org/pdf/1409.0473>; see also Coglianese & Lehr, *supra* note 2.

201. See 42 U.S.C. §4332(2)(C); see also *Robertson*, 490 U.S. at 350.

202. See 5 U.S.C. §706(2)(A).

203. See Coglianese & Lehr, *supra* note 2.

204. See *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 378 (1989) (emphasizing that NEPA’s hard look standard requires agencies to maintain a reviewable record of their decisionmaking process); *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (requiring agencies to “articulate a satisfactory explanation for [their] action” with a rational connection between facts and conclusions); see also National Institute of Standards and Technology (NIST), *AI Risks and Trustworthiness*, <https://airc.nist.gov/airmf-resources/airmf/3-sec-characteristics/> (last visited Sept. 6, 2025).

205. See *Marsh*, 490 U.S. at 378.

206. See BOEM, SOUTH FORK WIND FARM AND EXPORT CABLE: BIOLOGICAL ASSESSMENT 23 (2019) (noting that 20% to 37.5% of target species fly at wind speeds ≤4 meters/second—below offshore turbine cut-in thresholds—highlighting the importance of rotor speed and cut-in settings in exposure and collision risk modeling); BOEM, *supra* note 197, at 2-5 (providing aviation and maritime safety lighting standards on intensity, frequency, and minimization, serving as a technical baseline for evaluating nocturnal lighting impacts on birds in EISs); BOEM, DOI, BOEM 2020-039, RADAR INTERFERENCE ANALYSIS FOR RENEWABLE ENERGY FACILITIES ON THE ATLANTIC OUTER CONTINENTAL SHELF 6, 9-10 (2020) (explaining turbine radar cross-section and revolutions-per-minute parameters and their relevance to interference modeling for multiple radar types, supporting inclusion of rotation and reflectivity in environmental analyses).

207. See Coglianese & Lehr, *supra* note 2 (arguing that agencies must preserve the analytical basis of automated decisionmaking to ensure judicial reviewability); Finale Doshi-Velez & Been Kim, *Towards a Rigorous Science of Interpretable Machine Learning* 4-5 (2017), <https://arxiv.org/pdf/1702.08608> (describing “model forensics” methods to record architecture versions, data sources, and assumptions for AI auditability).

rationale,”²⁰⁸ thereby increasing the risk of the action being set aside as “arbitrary and capricious.”²⁰⁹

Technically, such auditability can be secured through robust model audit-logging systems—that is, frameworks that automatically record, organize, and preserve all key artifacts generated during the AI model’s life cycle for later verification. For example, the agency could deploy version-control and experiment-tracking platforms such as MLflow—an open-source system for managing the machine-learning life cycle, including experiment tracking, model versioning, and reproducibility—or Weights & Biases, a widely used commercial tool offering similar capabilities.²¹⁰ Each AI inference run could be assigned a unique identifier, along with a comprehensive record containing a snapshot of the input data set, hyperparameter configurations, cryptographic hashes of model weight files, and details of the execution environment. This mechanism not only facilitates internal review, but also creates “digital evidence” that can be cross-verified in litigation. As Finale Doshi-Velez and Been Kim emphasize, maintaining this type of “model forensics” is a necessary prerequisite for treating AI outputs as credible and reviewable evidence in administrative decisionmaking.²¹¹

Building on the earlier discussion of robust model audit-logging systems and their role in creating “digital evidence,” auditability in AI-assisted NEPA review serves not only as an internal quality-control measure, but also as a bridge to public participation. If, during the subsequent public comment period, stakeholders allege that the AI system failed to account for data from a particular migration season, the agency must be able to retrieve the relevant audit records to confirm whether that datum was incorporated and, if so, how it was weighted within the model’s decisionmaking process.²¹² Without such a “model forensics” capability, the agency risks a finding that it “failed to consider an important aspect of the problem,”²¹³ a procedural deficiency that courts have repeatedly found fatal to administrative actions.²¹⁴

Accordingly, in AI-assisted NEPA review, auditability is not merely a matter of technical data management; it is an institutional safeguard that directly serves judicial reviewability.²¹⁵ It ensures that an EIS is not only explainable, but also reconstructable, thereby forming a complete and defensible administrative record.²¹⁶

3. Data Quality Assurance

Training data must be scientifically reliable, current, and sufficiently diverse.²¹⁷

Within NEPA’s legal context, “data quality assurance” is not merely a technical requirement; it is the foundational predicate upon which the survivability of an administrative decision under judicial review depends.²¹⁸ When applying the hard look standard, courts often begin by asking whether the scientific data on which the agency relied is reliable, up-to-date, and appropriately aligned with the project’s actual ecological context.²¹⁹ If the training data itself is flawed, even the most sophisticated AI algorithm will produce conclusions resting on “an unstable foundation,” rendering them vulnerable to being overturned.²²⁰

Continuing with the hypothetical Atlantic offshore wind farm example, suppose the agency’s AI model primarily relied on migratory bird data from the U.S. West Coast over the past decade to forecast ecological risks along the East Coast. Although some species overlap between the two regions, significant differences exist in migratory routes, climate conditions, and predator distributions.²²¹ Such data transfer could lead the model to underestimate collision risks for certain East Coast species—such as the black-capped petrel or the red knot—during peak migration periods.²²² If this flaw were revealed during public comment or litigation, a court could find that the agency

208. See 42 U.S.C. §4332(2)(C) (requiring a “detailed statement” based on the environmental impact and alternatives, which courts have interpreted to demand reasoned, record-based decisionmaking); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989).

209. See *State Farm*, 463 U.S. at 43; *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21 (1976) (requiring agencies to maintain and understand the basis for their environmental determinations); 5 U.S.C. §706(2)(A) (authorizing courts to set aside agency action found to be “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law”).

210. See MLflow Project, <https://mlflow.org> (last visited Sept. 6, 2025); Weights & Biases Documentation, <https://docs.wandb.ai> (last visited Sept. 6, 2025).

211. Doshi-Velez & Kim, *supra* note 207, at 4–5.

212. See 40 C.F.R. §1503.1(a)(3) (2023) (requiring agencies to assess and consider substantive comments and respond to significant issues raised); Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations, 46 Fed. Reg. 18026, 18031 (Mar. 23, 1981) (stating that agencies must address public comments that question the adequacy of the environmental analysis).

213. See *State Farm*, 463 U.S. at 43.

214. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) (emphasizing that NEPA’s purpose is to ensure that agencies consider relevant factors and provide a reasoned analysis); *Sierra Club v. U.S. Army Corps of Eng’rs*, 803 F.3d 31, 43 (D.C. Cir. 2015) (vacating agency action where critical environmental effects were not meaningfully addressed).

215. See *Coglianesi & Lehr*, *supra* note 2 (arguing that preserving the analytical basis of automated decisions is essential for legal scrutiny).

216. See *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 420 (1971) (noting that judicial review requires a contemporaneous and complete administrative record).

217. See NIST, ARTIFICIAL INTELLIGENCE RISK MANAGEMENT FRAMEWORK (AI RMF 1.0) 16 (2023) (“Maintaining the provenance of training data . . . can assist with both transparency and accountability.”).

218. See 40 C.F.R. §1502.24 (2023) (requiring agencies to ensure the professional and scientific integrity of discussions and analyses in an EIS); Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations, 46 Fed. Reg. 18026, 18031 (Mar. 23, 1981) (stating that agencies must evaluate and disclose the accuracy of scientific data).

219. See *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); *Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 105 (1983) (upholding agency action where it relied on reasonable predictive judgments grounded in sound science); *Sierra Club*, 803 F.3d at 43 (vacating agency action where the environmental analysis relied on outdated or incomplete data).

220. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) (holding that NEPA requires agencies to ensure the integrity of the information forming the basis of their decisions).

221. U.S. Fish and Wildlife Service, *Rufa Red Knot*, <https://www.fws.gov/species/rufa-red-knot-calidris-canutus-rufa> (last visited Sept. 6, 2025).

222. See *Endangered & Threatened Wildlife & Plants; Endangered Species Status for Black-Capped Petrel*, 88 Fed. Reg. 89611 (Dec. 28, 2023); *Endangered & Threatened Wildlife & Plants; Threatened Species Status for the Red Knot*, 79 Fed. Reg. 73706 (Dec. 11, 2014).

failed to “consider all relevant factors,” thereby violating the procedural obligations of the APA.²²³

From a technical perspective, data quality assurance requires agencies to take multiple steps to verify the scientific validity and applicability of training data. First, data must come from authoritative sources, such as long-term monitoring databases maintained by the U.S. Fish and Wildlife Service, rather than from unverified commercial data sets.²²⁴ Second, data must be current—within environmental impact analysis, meteorological or species-distribution data more than three years old will, in many cases, fail to capture present conditions.²²⁵ Third, data sets must exhibit geographic, temporal, and ecological representativeness to minimize regional or seasonal biases. Such biases not only undermine predictive accuracy, but also provide plaintiffs with a ready point of attack on the scientific basis of the agency’s decision.²²⁶

In NEPA litigation, challenges to data quality are often the most fertile ground for judicial intervention because they directly affect whether an EIS truthfully reflects the current state and risks of the affected ecosystem. Accordingly, in AI-assisted EIS preparation, data quality assurance is not merely a technical safeguard—it functions as a procedural defense mechanism, forming the agency’s first and strongest line of protection when facing hard look review.²²⁷

4. Public Engagement Integration

AI processes must explicitly incorporate and respond to public comments.²²⁸

Within the NEPA framework, “public participation” is not merely a procedural checkbox embedded in statutory text; it is a core mechanism for sustaining the legal legitimacy and social trust of environmental decisionmaking.²²⁹ When AI is introduced into the preparation of an EIS, this mechanism must be guaranteed in substance rather than in form.²³⁰ Otherwise, even if the process is technically efficient, the resulting decision may still be vacated in litigation due to procedural defects.²³¹

Returning to the hypothetical Atlantic offshore wind farm, suppose the agency employs EngageNEPA²³² or a similar AI tool to process tens of thousands of public comments.²³³ Such tools can use natural language processing²³⁴ to cluster and summarize submissions, rapidly identifying high-frequency concerns such as interference with commercial fisheries, maritime navigation safety, visual landscape impacts, and risks to migratory birds. While this process dramatically improves the efficiency of information management, if the agency merely stops at “categorizing” comments without showing how these public concerns concretely influenced the EIS’ analysis and conclusions, a reviewing court may find that the agency failed to provide “meaningful consideration” of public input.²³⁵

In judicial practice, plaintiffs often argue that agencies collected public comments but did not integrate them into the decisionmaking logic.²³⁶ For instance, if a fishing association submitted locally collected monitoring data showing declines in catch volume, yet the final EIS neither referenced that data nor explained why it was not adopted, this omission could be construed as a failure to “consider all relevant factors,” violating the procedural obligations of the APA.²³⁷ In the AI-assisted context, such risks are particularly acute, because algorithmic weighting mechanisms—if opaque²³⁸—may inadvertently downplay the concerns of minority or less-represented stakeholders,²³⁹ inviting allegations of “procedural marginalization.”²⁴⁰

To mitigate this legal risk, agencies should, after processing public comments with AI tools, develop a “comment traceability matrix” linking each category of public concern to specific EIS analysis sections or mitigation measures.²⁴¹ For example, if a bird conservation organization raised concerns about nighttime navigation lights disrupting migratory routes, the administrative record should explicitly show how the AI tool identified this concern, what data were analyzed (e.g., nighttime light pollution modeling results), and how it ultimately led to the design modification of using low-intensity flashing lights. This feedback loop not only aligns with NEPA’s procedural

223. See *State Farm*, 463 U.S. at 43; *Native Ecosystems Council v. Tidwell*, 599 F.3d 926, 932-33 (9th Cir. 2010) (finding NEPA analysis deficient where agency relied on incomplete or irrelevant data, failing to meet the “high quality” information standard); 40 C.F.R. §1502.24 (2023) (requiring environmental documents to be based on high-quality information and accurate scientific analysis).

224. See 40 C.F.R. §1502.24 (2023) (requiring EISs to be based on high-quality information and accurate scientific analysis).

225. See *Lands Council v. Powell*, 395 F.3d 1019, 1031 (9th Cir. 2005) (rejecting reliance on outdated forest inventory data); *Center for Biological Diversity v. U.S. Bureau of Land Mgmt.*, 698 F.3d 1101, 1125 (9th Cir. 2012) (holding that stale data failed to meet NEPA’s hard look standard).

226. See *Native Ecosystems Council*, 599 F.3d 926.

227. NIST, *supra* note 217, at 5.

228. Jasanoff, *supra* note 139, at 227.

229. Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations, 46 Fed. Reg. 18026, 18027 (Mar. 23, 1981); Karkkainen, *supra* note 33, at 921-25.

230. See Coglianese & Lehr, *supra* note 2; JODY FREEMAN & CHARLES KOLSTAD, MOVING TO MARKETS IN ENVIRONMENTAL REGULATION 14-18 (2007).

231. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) (holding that NEPA is primarily a procedural statute, and failure

to comply with EIS procedures can render agency decisions vulnerable to challenge); *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

232. News Release, PNNL, *supra* note 88.

233. See CEQ, CEQ REPORT TO CONGRESS ON USING DIGITAL TOOLS TO MODERNIZE ENVIRONMENTAL REVIEWS (2024).

234. DANIEL JURAFSKY & JAMES H. MARTIN, SPEECH AND LANGUAGE PROCESSING 1 (3d ed. 2023 draft).

235. See *Robertson*, 490 U.S. at 349-50 (holding that agencies must meaningfully consider public comments rather than merely acknowledge them); *State Farm*, 463 U.S. at 43; Coglianese & Lehr, *supra* note 2.

236. See *Robertson*, 490 U.S. at 350 (holding that NEPA requires agencies to consider, but not necessarily adopt, public comments); *Vermont Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 553-54 (1978) (emphasizing judicial restraint in imposing additional comment-response obligations).

237. See *State Farm*, 463 U.S. at 43.

238. See Coglianese & Lehr, *supra* note 2.

239. Solon Barocas & Andrew D. Selbst, *Big Data’s Disparate Impact*, 104 CALIF. L. REV. 671 (2016).

240. LUKE W. COLE & SHEILA R. FOSTER, FROM THE GROUND UP: ENVIRONMENTAL RACISM AND THE RISE OF THE ENVIRONMENTAL JUSTICE MOVEMENT (2001).

241. See Coglianese & Lehr, *supra* note 2; Wagner, *supra* note 7, at 1345-47.

spirit, but also reflects Sheila Jasanoff’s “technologies of humility” framework—acknowledging scientific and policy uncertainty and broadening the knowledge base of decisionmaking through public engagement.²⁴²

In the era of AI-assisted EIS preparation, the integration of public participation must transcend the traditional “collect-respond” model and instead establish a “verifiable participation chain.” Such an approach not only strengthens the agency’s defense against procedural challenges in litigation, but also enhances public acceptance of the project at both political and societal levels, ensuring that environmental decisionmaking is reinforced along both technological and democratic dimensions.²⁴³

5. Responsibility Retention

Within the NEPA framework, the principle of “responsibility retention,” also seen as nondelegable duty, directly addresses a growing risk in the age of AI—the institutional pressures to rely on automated processes in place of human judgment.²⁴⁴ While AI tools can deliver efficient and granular analyses in the preparation of an EIS, NEPA expressly requires that the ultimate conclusions of an environmental review be validated and adopted by human officials vested with lawful authority and professional competence.²⁴⁵ This is not merely a procedural formality; it reflects the administrative law doctrine of the “non-delegable duty” principle, which holds that ultimate decisionmaking authority cannot be delegated to private parties or automated systems that lack democratic accountability or statutory authorization.²⁴⁶

In the hypothetical case of the Atlantic offshore wind farm, suppose the AI model autonomously generates a complete assessment of the project’s impacts on migratory bird routes and recommends classifying the risk level as “low.” If the agency were to incorporate this conclusion directly into the EIS without human review and then approve the project on that basis, such “algorithmic adoption” would likely be deemed a procedural defect—and potentially unlawful—upon judicial review. A reviewing court would inquire whether the official signing the EIS understood and evaluated the AI model’s assumptions, data sources, and reasoning logic, as well as the extent to which its conclusions align with prevailing scientific consensus.²⁴⁷

To mitigate such legal risks, agencies should establish a “human-in-the-loop” decisionmaking process: after an AI model produces its preliminary conclusions, a multidisciplinary review team—comprising environmental scientists, data analysts, and NEPA legal counsel—should indepen-

dently evaluate the output and, where necessary, adjust the model parameters, data selections, or inferential results. Only the version subjected to such human discretion and legal compliance verification should be incorporated into the final administrative record.²⁴⁸ This approach not only satisfies judicial expectations for “informed discretion,”²⁴⁹ but also aligns with both the Organisation for Economic Co-operation and Development (OECD) Principles on Artificial Intelligence and DOE’s Generative Artificial Intelligence Reference Guide, which stress that high-risk domains must preserve ultimate human control.²⁵⁰

In litigation, the evidentiary chain for responsibility retention is equally critical. An agency should be able to demonstrate to the court, step by step, which human official made what determinations, based on which legal and scientific rationales, and how these determinations were documented in the record. Such transparency and accountability not only serve as powerful defenses against procedural challenges,²⁵¹ but also constitute the foundation for sustaining administrative legitimacy in the court of public opinion²⁵² and under the scrutiny of policy oversight.²⁵³

Legislative drafting could draw inspiration from frameworks such as the Algorithmic Accountability Act, the AI Bill of Rights Blueprint, and OMB’s M-24-10 memorandum.²⁵⁴ A cross-agency oversight mechanism, potentially housed within the U.S. Government Accountability Office or the Office of Science and Technology Policy, should be created to monitor AI compliance in environmental governance.

B. Pursue Administrative Guidance as an Alternative Path

Should legislative reform prove infeasible in the near term, CEQ should instead pursue administrative guidance as an interim pathway. Although *Marin Audubon* curtailed CEQ’s rulemaking authority,²⁵⁵ the council nonetheless retains the power to issue interpretive guidance under its statutory coordination mandate.²⁵⁶

Specifically, CEQ should amend 40 C.F.R. §1502.24 (scientific integrity) to explicitly address AI, requiring environmental data models to meet standards of transparency, validity, and traceability²⁵⁷; develop an “AI-EIS Compliance Framework” for federal agencies, modeled on DOE’s PolicyAI pilot, emphasizing human-in-the-loop review at

242. See Jasanoff, *supra* note 139, at 227.

243. See Coglianesi & Lehr, *supra* note 2.

244. *Id.*

245. See 42 U.S.C. §4332(2)(C); see also 40 C.F.R. §1506.5(a) (2023).

246. *Carter v. Carter Coal Co.*, 298 U.S. 238, 311 (1936) (striking down delegation of power to private parties without accountability).

247. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) (requiring agencies to take a “hard look” at environmental consequences); *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

248. See Coglianesi & Lehr, *supra* note 2.

249. *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 416 (1971).

250. OECD, *OECD PRINCIPLES ON ARTIFICIAL INTELLIGENCE* (2019); DOE, *supra* note 59, at 12-14.

251. See *State Farm*, 463 U.S. at 43.

252. See Coglianesi & Lehr, *supra* note 2.

253. Jody Freeman & Jim Rossi, *Agency Coordination in Shared Regulatory Space*, 125 HARV. L. REV. 1131, 1175-81 (2012).

254. Algorithmic Accountability Act of 2022, S. 3572, 117th Cong. (2022); OMB Memorandum M-24-10, *supra* note 59.

255. 121 F.4th 902, 908-15 (D.C. Cir. 2024).

256. 42 U.S.C. §§4342-4344.

257. Cary Coglianesi, *Transparency and Algorithmic Governance*, 71 ADMIN. L. REV. 1, 20-25 (2019); Coglianesi & Lehr, *supra* note 2, at 1180-83.

every critical decision point²⁵⁸; and establish a “NEPA-AI Oversight Committee” to advise agencies on best practices for AI deployment in EAs.²⁵⁹

Although such guidance would lack the force of law, it could nevertheless function as persuasive authority—both for agencies seeking compliance strategies and for courts grappling with the unsettled intersection of NEPA and AI. Yet, guidance alone cannot secure judicial acceptance: its success ultimately depends on whether agencies’ technical implementation—especially the adoption of explainable and auditable AI systems—meets judicial standards of transparency and reviewability.

C. Agencies Must Align Their Technical Implementation With the Principles of XAI

A central legal vulnerability of AI-generated EISs lies in whether courts will accept the outputs as sufficiently transparent and reviewable under NEPA’s hard look standard.²⁶⁰ If decisionmakers cannot understand how the AI reached its conclusions, judicial review may falter, exposing the process to challenges based on opacity and arbitrariness.²⁶¹ Scholars have emphasized that explainability is not a merely technical requirement, but a constitutional and administrative one: agencies must ensure that the reasoning underlying AI-assisted decisions is intelligible to human reviewers.²⁶²

Beyond explainability, courts will likely demand robust auditability. That means agencies must document the data inputs, assumptions, and algorithmic pathways behind an AI-generated EIS.²⁶³ Without such documentation, opponents of a project could argue that agencies abdicated their statutory duty by relying on inscrutable tools.²⁶⁴ This risk is heightened in NEPA litigation, where courts consistently scrutinize whether agencies have disclosed the basis for their decisions and allowed for meaningful public comment.²⁶⁵

Finally, data quality remains a foundational concern. If the AI is trained on incomplete, outdated, or biased data sets, the resulting EIS may fail NEPA’s mandate of scientific integrity.²⁶⁶ As Cary Coglianese and David Lehr note, “garbage in, garbage out” applies with particular force in administrative law, because deficient data directly translate into deficient decisionmaking.²⁶⁷ Agencies must therefore

adopt data quality assurance protocols—including peer review, validation, and disclosure of limitations—to withstand judicial scrutiny.²⁶⁸

These policy recommendations are necessarily preliminary. Given that the integration of AI into NEPA practice remains in its nascent stages, and no fully operational AI-generated EIS has yet been subjected to judicial review, future developments may warrant significant adjustments. The proposals outlined here are intended as a flexible and adaptive framework, offering an initial road map for regulatory design rather than a definitive or static solution. As technology evolves and practical challenges emerge, ongoing reassessment and iterative refinement of AI governance strategies in the NEPA context will be essential.

AI should be understood as a tool to enhance—not replace—human expertise in environmental decisionmaking. As Fatria Khairo and Firman Freaddy Busroh argue, any AI governance framework must be both technologically adaptive and ethically grounded, balancing rapid innovation with democratic values.²⁶⁹ The legitimacy of AI in environmental governance depends on inclusive design involving technologists, legal scholars, policymakers, and affected communities.

Historically, every major technological advancement has pressured institutions to adapt, and AI is no exception. While law is inherently conservative and lags behind innovation, the incorporation of AI into NEPA offers an opportunity to update environmental law for the data-driven era. This emerging field presents not only risks to manage, but also a frontier to shape—one that must remain anchored in NEPA’s enduring commitments to transparency and public participation.

V. Conclusion

The integration of AI into the NEPA framework marks a pivotal moment for environmental governance. AI holds the promise of streamlining environmental reviews, enhancing analytical depth, and improving agency efficiency. Yet, without robust safeguards, it also risks undermining NEPA’s core procedural mandates of transparency, informed decisionmaking, and meaningful public participation.

As this Article has demonstrated, regulatory uncertainty—exacerbated by the weakening of CEQ’s rulemaking authority and the courts’ evolving approach to administrative deference—poses serious challenges to the lawful deployment of AI-assisted EISs. Judicial standards such as the “hard look” doctrine and the “arbitrary and capricious” test will continue to impose stringent demands on agencies adopting new technologies. Technical innovation alone cannot insulate AI-generated outputs from judicial scrutiny; legal structures must adapt in parallel.

Accordingly, proactive governance is essential. Whether through legislative amendments, administrative guidance,

258. NAEP, *supra* note 59, at slide 13 (describing human-in-the-loop checkpoints).

259. See Wagner, *supra* note 7, at 1340-42.

260. See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989) (holding that NEPA requires agencies to take a “hard look” at environmental consequences).

261. See *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983).

262. See Coglianese & Lehr, *supra* note 2.

263. *Id.* at 1180-82.

264. *Id.* at 1152-54.

265. See *Robertson*, 490 U.S. 332, 350 (1989) (clarifying that NEPA requires agencies to take a “hard look” at environmental consequences).

266. See Calo, *supra* note 3 (describing the origins and normative justifications of the hard look doctrine).

267. See Coglianese & Lehr, *supra* note 2, at 1168.

268. *Id.* at 1185-87.

269. Fatria Khairo & Firman Freaddy Busroh, *Harnessing the Power of AI in Shaping Administrative Law Regulations*, 5 INT’L J. SCI. & SOC’Y 617, 623 (2023).

or agency best practices, the future of AI in NEPA must be shaped by principles of explainability, auditability, and human oversight. The choices made at this critical juncture

will determine whether AI serves as a tool to strengthen NEPA's legacy of environmental stewardship—or whether it erodes the very foundations it seeks to modernize.