FROM FEDERAL PERMITTING TO PRIMACY: BALANCING ENVIRONMENTAL PROTECTION AND CLIMATE POLICY OBJECTIVES

Qaraman M. Hasan[*†]

Abstract

During the Biden Administration, Congress enacted legislation and a climate policy framework that transformed environmental law in the U.S. to a new stage, requiring the rapid development of infrastructure projects related to renewables and carbon capture. In the Inflation Reduction Act (IRA), for example, priority was given to renewable energy infrastructure, Carbon Capture and Storage (CCS) from major stationary sources, and Carbon Dioxide Removal (CDR) from the atmosphere to prevent a climate catastrophe. Despite removing most of the tax incentives for renewables during the Trump administration, the support for both CCS and CDR was confirmed in the recently passed legislation, the One Big Beautiful Bill Act (OB3 Act). The permitting process is the starting point and the heart of major projects and investments that require federal support. Over the last decade, with unprecedented federal support and incentives, there have been strong calls for permitting reforms to accelerate renewable energy deployments and emissions reductions, including CCS and CDR. The potential economic and social benefits of accelerating the permitting process in the United States are well-known and massive. Despite recent changes to the permitting process, its speed and cost continue to be criticized for failing to meet the U.S. government's ambitious climate objectives.

Opponents of permitting reforms blame environmental legislation as a barrier to a rapid transition toward a low-carbon economy. Some claim that the permitting process still conflicts with national and global objectives and responses to climate issues. This is primarily due to the time-consuming and costly environmental assessment requirements from various federal, state, and local agencies. Environmental assessment is crucial for safeguarding the environment, but the permitting process should be

---

* Dr. Qaraman M. Hasan is a Research Scholar and teaches environmental law courses at the University of Houston Law Center (UHLC). In addition to working with the UH Energy team at the university level, he collaborates with the co-directors of the Environment, Energy, and Natural Resources Center (EENR) to manage the center. He practiced law, studied, and taught several courses in environmental and energy law across jurisdictions, including Australia, New Zealand, the United States, and Middle Eastern countries.

† The author would like to thank Professor Gina Warren and Professor Tracy Hester for their valuable comments and feedback on different versions of this article. He would also like to thank his hardworking research assistant, Rachel White. He is thankful for the Harvard Environmental Law Review editorial team, including Cameron Dehmlow Dunne, Kirsten Flinn, Kevin Williams, Delano Franklin, Aaron Salzman and Alex Siegenthaler, for their support, patience and excellent editorial work.

accelerated to achieve climate objectives. This article argues that the main issue is not permitting itself, but rather the procedures required for permitting. As such, the central question of this article is how a streamlined permitting process can be developed for CCS and CDR at the federal and state levels.

Despite claims that environmental legislation is a barrier to moving toward a low-carbon economy, the legislation can provide solutions for climate-related projects, including CCS and CDR, without compromising on environmental values and principles. More specifically, this article examines how the time and cost of the permitting process can be reduced without compromising public engagement and environmental assessments. This paper offers policy and legislative recommendations at both the federal and state levels in Texas to expedite permitting through robust public engagement and transparency.

Table of Contents

I. Introduction

The increase of global temperatures to 1.1 °C higher than the pre-industrial era has already resulted in unprecedented climatic and weather conditions, including frequent heatwaves, melting glaciers, and sea level rise.[1] Extreme climate conditions are predictable, and further global temperature increases are expected in the coming years. Despite this, movement toward a low-carbon future in the United States remains slow and does not meet Congress's ambitious objectives outlined in recent pro-environmental legislation, including the deployment of renewable energy.[2] In 2025, the solar capacity in the United States was 141 gigawatts (GW), and the wind capacity was 159 GW.[3] Those numbers are expected to increase to 209 GW for solar and 178 GW for wind by 2027.[4] However, the Trump administration's support for the fossil fuel industry and the enactment of the One Big Beautiful Bill Act (OB3 Act) is expected to hinder the deployment of renewable energy.[5]

During the Biden Administration, Congress and the White House succeeded in enacting legislation and developing long-term strategies to transition to a low-carbon economy. Enactment of the Infrastructure Investment and Jobs Act of 2021 (IIJA)[6] supports new energy infrastructure;

1. Intergovernmental Panel on Climate Change, Climate Change 2023 Synthesis Report: Summary for Policymakers 4–5 (Hoesung Lee et al. eds., 2023).

   The most recent report from the World Meteorological Organization indicates that global temperatures have risen above this level, particularly in recent years, including the hottest year in almost two centuries. *See* Press Release, World Meteorological Organization, 2025 Set to be Second or Third Warmest Year on Record, Continuing Exceptionally High Warming Trend (Nov. 6, 2025), https://perma.cc/ZZM6-A866.

2. The IRA, for example, aimed to reduce U.S. greenhouse gas emissions by 40% below 2005 levels by 2030. *See Inflation Reduction Act of 2022*, Int'l Energy Agency (Nov. 4, 2025), https://perma.cc/2EME-AC9Q. *But see* Josh Gabbatis & Ho Woo Nam, *Chart: Trump's "Big Beautiful Bill" Blows US Emissions Goal by 7bn Tonnes*, CarbonBrief (Apr. 7, 2025), https://perma.cc/UNE9-WTAL (stating that the One Big Beautiful Bill Act will cause U.S. emissions to drop only 3% below current levels by 2030).

3. U.S. Energy Info. Admin., Short-Term Energy Outlook (Mar. 10, 2026), https://perma.cc/TM9R-2GEQ.

4. *Id.*

5. *See* Mia Beams & Akkshath Subrahmanian, *Congress's "One Big Beautiful Bill" Will Shrink Renewable Energy Investments–Yet Some Technologies Are Preserved*, Council on Foreign Relations (Aug. 4, 2025), https://perma.cc/FZ56-WCSS ("The OBBBA pulls back billions of dollars in funding earmarked for climate and clean energy investment under the IRA, which experts say will likely shrink U.S. renewable energy investments and hamper decades-long efforts to reduce U.S. greenhouse gas emissions.").

6. Pub. L. No. 117-58, 135 Stat. 429 (2021). The IIJA was also introduced as the Bipartisan Infrastructure Act (BIL) due to the support of both parties for investment in U.S. infrastructure in general, including renewable energy infrastructure. *See* Joint Econ. Comm. Majority Staff, The Bipartisan Infrastructure Investment and Jobs Act Will Create Jobs, Strengthen the Economy and Reduce Inflationary Pressures 1 (2021), https://perma.cc/VD49-VAN5.

the Inflation Reduction Act (IRA)[7] incentivizes renewable energy and supports carbon capture technologies through tax credits; and the CHIPS and Science Act of 2022 (CHIPS)[8] supports technology and research. This unprecedented environmental legislation was paralleled with long-term strategic plans from the White House to create an environment for the rapid deployment of renewables to reduce CO_2 and non-CO_2 emissions.[9] The "Long-Term Strategy" of the United States was the central vision and set a trajectory to achieve net zero emissions by 2050. The legislation provides historic support for CCS and CDR.[10] The Long-Term Strategy also reaffirmed the crucial role of these technologies and aimed to position the United States as the global leader in these technological transformations.[11]

However, several sections and provisions of the IRA and IIJA related to decarbonization and renewables are being challenged by the new administration in the White House, as confirmed by the large number of executive orders issued by President Donald Trump. Internationally, the U.S. President's decision to withdraw from the Paris Agreement on January 20, 2025, has had a negative impact on the country's global climate leadership and profound implications for federal climate objectives.[12] To put America first, the President ordered agencies to "cease or revoke any purported financial commitment made by the United States under the United Nations Framework Convention on Climate Change."[13] Domestically, in another order on the same day, the President declared a "National Energy Emergency" and defined energy resources to include "crude oil, natural gas, lease condensates, natural gas liquids, refined petroleum products, uranium, coal, biofuels, geothermal heat, the kinetic movement of flowing water, and critical minerals" without considering wind and solar as sources of energy.[14]

7. Pub. L. No. 117-169, § 13102, 136 Stat. 1915, 1917 (2022); *see also* Genevieve A. Tokić, *Environmental Tax Incentives: Lessons from the U.S. Inflation Reduction Act (So Far)*, 43 Pace Env't. L. Rev. 57 (2025).
8. Pub. L. No. 117-167, 136 Stat. 1366 (2022).
9. U.S. Dep't of State & U.S. Exec. Off. of the President, The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050 5 (2021), https://perma.cc/DDE3-DFK7.
10. § 13104, 136 Stat. at 1921.
11. U.S. Dep't of State & U.S. Exec. Off. of the President, *supra* note 9, at 64–70.
12. Exec. Order No. 14162, 90 Fed. Reg. 8455 (Jan. 20, 2025). It has been argued that withdrawal from the Paris Agreement, whether recent or past, disrupts global climate objectives and allows other actors to take leadership. *See* Robert MacNeil, *The Case for a Permanent U.S. Withdrawal from the Paris Accord*, 79 Austl. J. Int'l Aff. 789, 789–90 (2025); *see also* John H. Knox et al., *The Trump Administration Steps Back from International Environmental Cooperation*, 119 Am. J. Int'l L. 767, 769 (2025).
13. Exec. Order No. 14162, 90 Fed. Reg. 8455 (Jan. 20, 2025).
14. Exec. Order No. 14156, 90 Fed. Reg. 8433 (Jan. 20, 2025).

These barriers to the deployment of renewable energy have created significant challenges for the renewable sector, as most tax incentives and support for renewables have been cancelled or frozen,[15] potentially hindering the adoption of renewable technology in the coming years. Yet, CCS and CDR have gained bipartisan support in recent years and have the potential to maintain that support for the coming decades.[16] These technologies are considered essential for the energy transition and carbon removal, not only in the United States but also in major international organizations.[17] For example, the International Energy Agency's (IEA) road map for net zero emissions relies heavily on carbon capture and removal. The road map requires an increase in investment in carbon capture and hydrogen to $40 billion annually by 2030.[18] This is due to the important role of CCS and CDR not only in capturing CO_2 from current sources of emissions but also in removing existing CO_2 and other greenhouse gas (GHG) emissions from the atmosphere. CCS is expected to capture hundreds of millions of tons of CO_2 emissions by 2030 and more than one billion tons of CO_2 by 2050.[19]

However, many have argued that environmental law and permitting are the primary and long-term barriers to building new infrastructure and moving toward a low-carbon economy.[20] According to Uma Outka, "law can also serve as a barrier to renewable energy, even where it does not directly burden or

15. Brad Plumer, *Energy Dept. Says It Is Canceling $30 Billion in Clean Energy Loans*, N.Y. Times (Jan. 22, 2026), https://perma.cc/VWN3-Z44M. For the specific section of OB3 Act, *see* Pub. L. No. 119-21, §§ 70505, 70506.

16. During the Biden Administration and in the IRA, tax incentives for these technologies increased to reach $85 per metric ton for CCS and up to $180 per metric ton for CDR. These incentives were updated and reiterated in the recent OB3 Act. *See* I.R.C. § 45Q(b). This is a clear sign that this technology has bipartisan support.

17. Int'l Energy Agency, Energy Technology Perspectives 2020: Special Report on Carbon Capture Utilisation and Storage: CCUS in Clean Energy Transitions 45 (Trevor Morgan ed., 2020), https://perma.cc/G3HP-V7FX.

18. Stéphanie Bouckaert et al., Int'l Energy Agency, Net Zero by 2050: A Roadmap for the Global Energy Sector, 21 (Edmund Hosker ed., 2021); *see also* Intergovernmental Panel on Climate Change, *supra* note 1.

19. Intergovernmental Panel on Climate Change, Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty 12–13 (Valérie Masson-Delmotte et al. eds., 2018), https://perma.cc/752Y-UPQ3. *See* the model pathways on page 12 and onward.

20. Zachary Liscow, *Getting Infrastructure Built: The Law and Economics of Permitting*, 39 J. Econ. Persps. 151, 151–53 (2025) (arguing that permitting is a major obstacle not only for the renewable industry, but for building infrastructure in general, as permitting in the U.S is slow, expensive and has achieved below-average substantial environmental outcomes).

prohibit the use of renewable resources."[21] The media similarly describes environmental law and regulation as a tool for blocking renewable energy projects.[22] Beyond this, the National Environmental Policy Act (NEPA) is described as an obstacle not only for renewable energy but also for broader progress.[23]

In response to these criticisms, Congress has reformed NEPA, including accelerating the permitting process and limiting page numbers for environmental assessments.[24] Still, these reforms are unsatisfactory for many as the language of the reforms was ambiguous.[25] It was better for states with high GHG emissions to have permitting within their borders, and several requested primacy for Class VI wells, which allow underground sequestration of CO_2.[26] Primacy is the authority for a state to run and enforce its own Class VI permitting program instead of the federal government.[27] Requests for primacy have great potential to accelerate the transition to a low-carbon economy and avoid the challenges of reforming environmental legislation. However, several legal ambiguities and gaps exist that require careful examination. This article aims to review and clarify these legal ambiguities in permitting reforms and provide several recommendations on granting primacy for Class VI wells to balance economic development and environmental protection with achieving national climate objectives.

The article's structure is as follows: Section II reviews regulations of CCS and CDR, which provide justifications for transferring the authority of permitting (primacy) from the Environmental Protection Agency (EPA) to states. Section III reviews the nature of federal permitting by examining current legislation and relevant cases on permitting. At the state level, it discusses the recent move by states to get primacy in order to permit CCS and CDR. Section IV focuses on primacy as an evolutionary mechanism by which states oversee the permitting process for CCS and CDR. Section V examines the pathway for streamlining the permitting process for CCS and CDR without compromising environmental protection.

---

21. Uma Outka, *Environmental Law and Fossil Fuels: Barriers to Renewable Energy*, 65 Vand. L. Rev. 1679, 1681 (2012).
22. *See, e.g.*, David Blackmon, *Manchin's Permitting Side Deal Highlights the Energy Transition's Central Conundrum*, Forbes (Aug. 22, 2022), https://perma.cc/8MH6-F3HD.
23. Rich Powell, *Why Regulatory Hurdles Need to Be Overcome for Clean Energy Expansion*, World. Econ. F. (Mar. 19, 2024), https://perma.cc/ZPN6-YENP ("[T]he unintended consequence of NEPA's provisions has been the empowerment of affluent stakeholders to employ litigation as a potent tool to stymie progress.").
24. For a detailed discussion on the changes, *see* Daniel A. Farber, *Rewriting NEPA: Statutory Continuity and Disruption in a Polarized Era*, 14 Mich. J. Env't & Admin. L. 75, 97–97-99 (2024).
25. *See, e.g.*, *id.* at 116–118.
26. U.S. Energy Ass'n, U.S. Class VI Permitting and State Primacy 1 (Sep. 2025), https://perma.cc/G58X-Q2NA.
27. *Id.*

II. Regulating Carbon Capture and Removal

States seek primacy for Class VI well permitting because the approval process for CCS or CDR within states with primacy would be more efficient and less costly. States argue that they can better handle the rapid growth in investment in these mitigation technologies and streamline the permitting process without undermining environmental values and principles.[28] Before discussing these issues at the state level, it is necessary to elaborate on CCS and CDR processes and determine whether the United States can reach its climate goals without them.

A. Carbon Capture and Storage Process

CCS can contribute significantly to the short-term and long-term achievement of climate goals. Two decades ago, the Intergovernmental Panel on Climate Change (IPCC) recommended CCS as an option for climate change mitigation.[29] Now, the IPCC warns of the negative consequences for achieving climate goals if CCS deployment is delayed.[30] Depending on various scenarios, the U.S. Department of Energy (DOE) estimates that reaching net-zero carbon emissions in the United States requires capturing and sequestering between 400 and 1,800 million tonnes (MT) each year until 2050.[31] As Robert Stavins, director of the Harvard Environmental Economics program, points out, limiting global warming to 2 °C would be challenging without CCS and CDR.[32]

28. *See, e.g.*, *Texas Granted Primacy over Class VI Wells*, R.R. Comm'n of Tex. (Nov. 12, 2025), https://perma.cc/5P4R-86D7; Press Release, U.S. Env't Prot. Agency, EPA Grants State of Texas Primacy to Protect Underground Water Resources (Nov. 12, 2025), https://perma.cc/T9G5-NPUQ. During the EPA announcement of the final approval of Texas's Class VI primacy application, Congressman Randy Weber said, "Texas' standards align with the Safe Drinking Water Act, and this decision helps streamline the permitting process to reduce unnecessary delays. It keeps projects moving, supports investment, and ensures decisions are made closer to home. This is a positive step for Texas and America's economic future."
29. Working Group III, Intergovernmental Panel on Climate Change, Special Report on Carbon Dioxide Capture and Storage 3 (Bert Metz et al. eds., 2005).
30. Working Group III, Intergovernmental Panel on Climate Change, Climate Change 2022: Mitigation of Climate Change 28 (Priyadarshi R. Shukla et al. eds., 2022).
31. Ramsey Fahs et al., U.S. Dep't of Energy, Pathways to Commercial Liftoff: Carbon Management 1 (2023), https://perma.cc/8VST-JRMZ.
32. Kevin Bullis, *The Cost of Limiting Climate Change Could Double Without Carbon Capture Technology*, MIT Tech. Rev. (Apr. 18, 2014), https://perma.cc/B6B9-BV63; *see supra* note 1; *see also* Lindsay Fendt, *Why Did the IPCC Choose the 2°C Goal for Limiting Global Warming?*, MIT Climate Portal (Aug. 8, 2025), https://perma.cc/79D2-E89D.

In one of its early reports, the IPCC defined CCS as "a process consisting of the separation of CO_2 from industrial and energy-related sources, transport to a storage location, and long-term isolation from the atmosphere."[33] Thus, CCS involves three primary steps, all of which require significant technical and legal support. The first is capturing CO_2 from primary sources, such as power plants, cement factories, and refineries. There are various methods for capturing CO_2, but four are used for capturing CO_2 from large power plants and industrial facilities: (1) direct air capture, (2) post-combustion capture, (3) pre-combustion capture, and (4) oxy-fuel combustion capture.[34] Once the carbon is captured from the source, CO_2 must be separated from other gases.

In the second step, the separated CO_2 requires transportation to the site to be used as part of Enhanced Oil Recovery (EOR)[35] or to be stored underground. In this process, CO_2 is mostly transported via pipeline to depleted oil fields underground to pump more oil or it is injected into suitable geological formations for permanent storage.[36] This is the third step: the injection of CO_2 into the ground where it is to be stored permanently.[37] As CCS grows, various technologies have been developed to reduce costs and improve efficiency, but the cost of storing CO_2 sustainably in the long term is quite significant.[38] A geological site must meet four criteria to be suitable to store CO_2: (1) exhibit sufficient porosity and permeability, (2) exhibit a reasonable depth of 800 meters or deeper, (3) have an "impermeable caprock" to trap CO_2 in the formation, and (4) be "thick and continuous over large areas" to store an enormous amount of CO_2.[39] After all these processes, the stored CO_2 requires monitoring and supervision by federal or state agencies in the storage location.[40]

The U.S. has a long history of developing CCS, primarily through EOR. Still, it was unclear for most of that history how to regulate CCS or whether the EPA had the authority to do so.

33. Working Group III, *supra* note 29.
34. Jose Antonio Garcia et al., *Technical Analysis of CO_2 Capture Pathways and Technologies*, 10 J. Env't. Chem. Eng'g 1, 13 (2022).
35. Enhanced Oil Recovery involves injecting carbon into oil fields to extract additional crude oil.
36. *Carbon Dioxide Capture and Sequestration: Overview*, U.S. Env't Prot. Agency, https://perma.cc/23Z4-3HSW.
37. Alessandro Lanza & Elena Verdolini, *The Role of R&D+i in the Energy Sector*, *in* Handbook of Sustainable Energy 470, 484 (Ibon Galarraga et al. eds., 2011).
38. Dennis Y.C. Leung et al., *An Overview of Current Status of Carbon Dioxide Capture and Storage Technologies*, 39 Renewable & Sustainable Energy Revs. 426, 427 (2014).
39. Howard J. Herzog, Carbon Capture 72–73 (2018).
40. *Id.* at 80.

The U.S. Supreme Court ruling in *Massachusetts v. EPA* gave the EPA the authority to regulate CO_2 emissions under the Clean Air Act (CAA).[41] Not long after that decision, Congress enacted the first federal law to support CCS technology in the Energy Improvement and Extension Act of 2008, but it promoted the technology only in limited circumstances, such as capturing CO_2 from ethanol processing stations.[42] The scope of Section 45Q was amended to include most CCS projects in the Bipartisan Budget Act of 2018.[43]

However, the 2018 and subsequent reforms to Section 45Q, including those in the IRA, have increased CCS investment. These developments have come in response to the changing market and evolving purpose of CCS, which has shifted from EOR to storing carbon in dedicated saline storage sites. According to the Clean Air Task Force, eighty-four projects have been announced since the reforms in 2018, with fifty-one CCS projects announced in 2021 alone.[44] More significantly, over 70% of these projects intend to store CO_2 in dedicated saline storage sites.[45] The percentage of projects designed for permanent CO_2 storage sites has increased since 2020 and will soon account for almost 90% of total CCS and CDR projects.[46] This is mainly due to unprecedented federal government support and greater tax credits for dedicated saline storage projects.[47]

The amended Section 45Q provides strong incentives that make the United States a lucrative destination for CCS and CDR investments. For example, tax credits are available for electricity generation facilities that capture at least 18,750 metric tons of CO_2 and other industrial facilities that capture 12,500 metric tons of CO_2 annually.[48] To achieve net-zero carbon emissions by 2050 as outlined in the Paris Agreement, an accelerated, straightforward permitting process for CCS is crucial.[49]

41. *Massachusetts v. EPA*, 549 U.S. 497 (2007).
42. Pub. L. No. 110-343, § 301, 122 Stat. 3765, 3842-43 (2008).
43. Bipartisan Budget Act of 2018, Pub. L. No. 115-123, § 41119, 132 Stat. 64, 125 (2018).
44. Clean Air Task Force, Overview of U.S. Carbon Management Projects 1 (2022), https://perma.cc/7ZJZ-4UDW.
45. *Id.*
46. *Id.* Other sources indicate greater potential for capture. *See* Int'l Energy Agency, *supra* note 17, at 55, 129–34.
47. *See supra* note 16; *see also* Clean Air Task Force, Carbon Capture and the Inflation Reduction Act 2 (2023), https://perma.cc/BVU9-GD9U.
48. Inflation Reduction Act of 2022, Pub. L. No. 117-169, § 13104, 136 Stat. 1818, 2047–49 (2022).
49. Paris Agreement to the United Nations Framework Convention on Climate Change art. 4, ¶ 1, Dec. 12, 2015, T.I.A.S. No. 16-1104, 3156 U.N.T.S. 79.

The recent increase in support for CCS and CDR, as part of legislation aimed at developing a comprehensive climate change response, is a positive development.[50] Before enacting major legislation in the last three years, the Biden Administration established a goal of achieving net-zero emissions by 2050 through five key strategies, including decarbonizing electricity and scaling up carbon removal.[51] CCS was crucial to those strategies, including establishing CCS for existing and new power plants as part of decarbonizing electricity and carbon sequestration.[52] The tax credits for CCS projects are quite ambitious and greatly support future projects. This contrasts with the European Union's failure to support CCS projects by setting the price too low. The EU's regulations offered a credit of approximately €5 per ton of CO_2 collected, and there was no significant legal support for these projects.[53]

B. Removal of CO_2 and Other Greenhouse Gases

CDR technology captures CO_2 and other gases directly from the air, unlike CCS, which captures pollutants at the source.[54] Still, both methods require sequestration, the injection of the gases underground or into other reservoirs.[55] Removing CO_2 and other GHGs from the atmosphere via CDR is crucial, as these gases persist in the atmosphere for a long time and contribute to global warming. Accumulated CO_2, for example, could stay in the atmosphere for centuries.[56] The importance of CDR goes beyond the current net-zero goal, as it is crucial for removing CO_2 and other GHGs to achieve negative emissions.[57] All countries need to cooperate to remove the remaining CO_2 and other GHGs that have been trapped in the atmosphere over the previous decades or centuries, after 2050.

---

50. Romany M. Webb et al., Implementing the Inflation Reduction Act: Progress to Date and Risks from a Changing Administration 3–4 (2024), https://perma.cc/FW2M-PEBR.
51. The White House, *FACT SHEET: President Biden Takes Executive Actions to Tackle the Climate Crisis at Home and Abroad, Create Jobs, and Restore Scientific Integrity Across Federal Government*, The American Presidency Project (Jan. 27, 2021), https://perma.cc/6BNU-DHAD; U.S. Dep't of State & U.S. Exec. Off. of the President, *supra* note 9, at 5–6.
52. *Id.* (The five key strategies are: decarbonize electricity, electrify end uses and switch to other clean fuels, cut energy waste, reduce methane, and other non- CO_2 emissions and scale up CO_2 removal).
53. Monica Lupion & Howard J. Herzog, *NER300: Lessons Learnt in Attempting to Secure CCS Projects in Europe*, 19 Int'l J. of Greenhouse Gas Control 19, 24 (2013).
54. Tracy Hester, *Carbon Capture and Sequestration and Carbon Removal*, *in* Global Climate Change and U.S. Law 485 (Michael B. Gerrard et al. eds., 2023).
55. *Id.*
56. Øivind Hodnebrog et al., *Updated Global Warming Potentials and Radiative Efficiencies of Halocarbons and Other Weak Atmospheric Absorbers*, 58 Rev. Geophys. 1, 1-3 (2020).
57. Intergovernmental Panel on Climate Change, *supra* note 1, at 19.

According to the IPCC, CDR includes

> [a]nthropogenic activities removing CO_2 from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical sinks and direct air capture and storage, but excludes natural CO_2 uptake not directly caused by human activities.[58]

This broad definition suggests that a diverse range of CDR solutions is expected in the coming years, which may require a diverse regulatory framework at both the federal and state levels. Scaling up carbon removal was considered one of the five key technological transformations to reach net-zero emissions and remove CO_2 before 2050.[59]

Previously and before the enactment of the IRA, there was little support for CDR from the federal government, which contributed to the limited adoption of widespread CDR.[60] The amendment of Section 45Q in the IRA incentivized the deployment of the technology in several unprecedented aspects. First, the tax credit for eligible CDR technology could reach $180 per metric ton of captured CO_2.[61] Second, the amended Section 45Q lowered the minimum capture threshold for tax credit-eligible CDR facilities from 100,000 to 1,000 metric tons annually.[62] Third, it extended the deadline for building eligible facilities from December 31, 2025, to December 31, 2032, which was crucial for long-term CDR investment.[63]

Over the last several years, the U.S. regulatory and policy framework has primarily focused on incentivizing CDR technology, but no federal law has been enacted beyond that as command-based to regulate CDR or CCS. There have been attempts to regulate CDR broader than just incentives at the federal level, such as the Carbon Dioxide Removal Investment Act (S. 5369), which was introduced in November 2024, but Congress has not acted on this initiative so far.[64] Increasing social support for CDR technology, with growing investment in both CCS and CDR in many states, may make new legislation to regulate this technology possible in the near future.

---

58. Intergovernmental Panel on Climate Change, Special Report: Global Warming of 1.5 °C Annex I: Glossary 544 (J.B. Robin Matthews et al. eds., 2018), https://perma.cc/9BSK-2SNW (emphasis omitted).
59. U.S. Dep't of State & U.S. Exec. Off. of the President, *supra* note 9, at 18.
60. Wim Carton et al., *Negative Emissions and the Long History of Carbon Removal*, 11 Wiley Interdisc. Revs.: Climate Change 1, 10 (2020).
61. Inflation Reduction Act of 2022, Pub. L. No. 117-169, § 13104, 136 Stat. 1818, 1924–29 (2022).
62. *Id.* § 13104(a)(1).
63. *Id*.
64. S. 5369, 118th Cong. (2024).

Before discussing the regulations of these technologies at the state level, it is essential to elaborate on the controversial debate surrounding carbon sequestration. The following subsection examines whether CCS and CDR are appropriate for climate change mitigation or for extending the life of the fossil fuel industry.

C. The Debate on CCS: A Vital Solution or a Controversial Measure?

The debate continues over the real impact of these technologies on the overall achievement of climate goals.[65] CCS and CDR are criticized for increasing oil production, thereby increasing long-term emissions.[66] In his 2020 book, co-authored with Noam Chomsky, Robert Pollin expresses two concerns about developing carbon capture, despite its important role in reducing greenhouse gas emissions.[67] First, it is not commercially proven.[68] Second, there is a risk of carbon leakage from geological sites in the future.[69] Due to these concerns, Pollin supports afforestation for capturing CO_2 instead of CCS; however, several studies have concluded that afforestation alone is insufficient to reduce carbon emissions and that it should be implemented in conjunction with other carbon capture methods.[70] The IPCC defined afforestation as "conversion to forest of land that historically has not contained forests."[71] In addition to its integration with CCS, its success depends on careful planning, strategies, and the type of trees selected.[72] In one modeled scenario in the United Kingdom, with "a commercial forest planting program involving 30,000 [hectares] planted

65. Wyatt G. Sassman, *Prioritizing Proximity in Phasing Out Oil and Gas Extraction*, 55 Conn. L. Rev. 749, 758 (2023). For broader discussion beyond legal analysis, *see generally* Muhammad Hammad Rasool & Syed Abdul Moiz Hashmi, *Carbon Capture and Storage: An Evidence-Based Review of its Limitations and Missed Promises*, 10 Petroleum Rsch. 175 (2026).
66. Sekera et al., *Carbon Dioxide Removal—What's Worth Doing? A Biophysical and Public Need Perspective*, 2 PLOS Climate 1, 6 (2023) (connecting captured CO_2's use in enhanced oil recovery to a greater net addition to atmospheric CO_2).
67. Noam Chomsky & Robert Pollin, Climate Crisis and the Global Green New Deal: The Political Economy of Saving the Planet, 83 (C.J. Polychroniou ed., 2020).
68. *Id.*
69. *Id.*
70. Maren H. Gvein et al., *Potential of Land-based Climate Change Mitigation Strategies on Abandoned Cropland*, 4 Communications Earth & Environment 11 (2023).
71. Intergovernmental Panel on Climate Change, Climate Change 2022: Mitigation of Climate Change Annex I: Glossary 1794 (van Diemen et al. eds., 2022), https://perma.cc/NHY7-5G66.
72. Tomoko Hasegawa et al., *Careful Selection of Forest Types in Afforestation Can Increase Carbon Sequestration by 25% Without Compromising Sustainability*, 5 Commc'ns Earth & Env't 1 (2024).

every year from 2020 until 2050, only 15% of the 100-year mitigation will be achieved by 2050."[73]

In addition to criticism of technical limitations, CCS has been criticized as too costly and "inefficient" compared to other methods like energy efficiency.[74] However, the reforms to Section 45Q in the last five years have significantly increased the efficiency and affordability of CCS, as discussed in the above section. CCS capacity and its contribution to emission reduction should not be ignored, as CCS can reduce CO_2 emissions from power plants and other industries by more than 90%.[75] CCS could contribute to up to "14 percent of the total greenhouse gas emissions reductions needed by 2025" and "is viewed as the only practical way" for emission reduction in these industries.[76] With the substantial technological development of CCS in recent years, concerns about CO_2 leakage from geological formations would be minimal or have no significant risks if the CO_2 is appropriately stored in suitable geological sites.[77]

CCS is essential for current power generation and the operation of heavy industries. CCS technology is strongly linked to CDR, which is undoubtedly vital for directly removing carbon emissions from the atmosphere. Its experience in underground carbon storage will be key in the final stage of the CDR process, as both methods require storage of the captured carbon underground.[78] This is because the CO_2 that has been emitted up to this point will remain in the atmosphere for millennia and accelerate the climate change process if it is not removed.[79]

Another crucial point is that the rush to adopt renewable energy may come at the expense of justice and human rights. Focusing solely on rapid renewable deployment may lead to the neglect of CCS and CDR technologies, placing greater pressure on future generations to remove carbon. In China, sales of electric vehicles (EVs) surpassed those of combustion engine vehicles for the first time in 2024,[80] with global sales estimates reaching

73. Jenna Y. C. Brown et al., *Commercial Afforestation and Mitigation Potential in the UK: A National Strategy for Carbon Sequestration*, 12 Nature Commc'ns 2 (2021).
74. Michael B. Gerrard, *Regulating in the Face of a Changing World: Legal Regulation of Climate Change*, *in* The Big Thaw: Policy, Governance, and Climate Change in the Circumpolar North, 141, 146 (Ezra B. W. Zubrow et al. eds., 2019).
75. Int'l Energy Agency, *supra* note 17.
76. *Carbon Capture*, Ctr. For Climate Change and Energy Solutions, https://perma.cc/6DLN-YG6B.
77. Herzog, *supra* note 39, at 78.
78. Sarah L. Nordahl et al., *Carbon Accounting for Carbon Dioxide Removal*, 7 One Earth 1494, 1494 (2024).
79. *Id*. at 1499.
80. Energy Technology Policy Division, Int'l Energy Agency, Global EV Outlook 2025: Expanding Sales in Diverse Markets 16 (2025), https://perma.cc/J3JZ-874X.

over thirteen million units, accounting for 16.2% of passenger vehicles sold globally.[81] China also produced more than three quarters of EV batteries worldwide in 2025.[82] Simultaneously, China has started construction on the largest amount of capacity from coal-fired power plants since 2015: 94.5 (GW).[83] In addition to energy resources for producing EVs, an enormous amount of critical minerals that are used for EV production in China come from regions that are linked with modern slavery and human rights violations.[84] It is not just EVs; a study found that 95% of photovoltaic solar panels contain critical minerals produced by forced labor, mainly in China's Xinjiang Uyghur Region.[85] The rejection of CCS technology should not favor coal-sourced energy or overlook justice and human rights violations.

Many scholars argue that CCS may increase carbon emissions, particularly under new legislation such as the IRA, because it serves as an incentive for fossil fuel companies to produce more carbon.[86] There is a logic behind this opposition to CCS projects, as the major fossil fuel companies utilize incentives and tax credits mainly to conduct EOR.[87] In the process, through advanced technology, captured CO_2 will be used to pump more oil from oil fields.[88] Until mid-2022 only one of the twelve major CCS operational projects, the Archer Daniels Midland (ADM) facility in Decatur, IL (Illinois Industrial Project), used CO_2 solely for geological sequestration; other facilities used the captured CO_2 for EOR.[89] However, the number of facilities capturing carbon from point sources

81. Mokter Hossain, *How Chinese Companies Are Dominating the Electric Vehicle Market Worldwide*, California Management Review (Mar. 25, 2024), https://perma.cc/YA58-VW74.
82. Teo Lombardo et al., *The Battery Industry Has Entered a New Phase* (2025), Int'l Energy Agency (Mar. 5, 2025), https://perma.cc/483K-MCZU.
83. Qi Qin & Christine Shearer, When Coal Won't Step Aside: The Challenge of Scaling Clean Energy in China 4 (2025), https://perma.cc/VY53-ZCL2.
84. Chloe Cranston et al., Respecting Rights in Renewable Energy: Investor Guidance to Mitigate Uyghur Forced Labour Risks in the Renewable Energy Sector 14 (2024), https://perma.cc/LC6S-G96Q.
85. Laura T. Murphy & Nyrola Elimä, In Broad Daylight: Uyghur Forced Labour and Global Solar Supply Chains 7 (2021), https://perma.cc/W3XH-FRZG. Other studies also provide more details on how China is using modern slavery and forced labor in producing both EV batteries and PV solar panels. *See* Cranston et al., *supra* note 84; James Cockayne et al., "The Energy of Freedom"? Solar Energy, Modern Slavery, and the Just Transition 6 (2022), https://perma.cc/PV2Y-VDLP.
86. Emily Grubert & Frances Sawyer, *US Power Sector Carbon Capture and Storage Under the Inflation Reduction Act Could Be Costly with Limited or Negative Abatement Potential*, 3 Env't Rsch: Infrastructure & Sustainability 1, 1 (2023).
87. *See* Sassman, *supra* note 65.
88. *Enhanced Oil Recovery*, U.S. Dep't of Energy, https://perma.cc/3C7E-E923.
89. Angela C. Jones & Ashley J. Lawson, Carbon Capture and Sequestration (CCS) in the United States 15 (2022) (current facilities and those under development in the U.S.

for geological sequestration increased to 15 by September 2023.[90] This makes the critiques weak, as most CCS projects store carbon underground rather than use it for EOR.

There has been an unprecedented increase in projects aimed at capturing carbon for pure geological storage over the last three years. According to recent data on all 226 CCS and CDR projects across all U.S. states, only a handful of recent projects aim to use CO_2 for EOR.[91] Of the 226 projects that are operating, in the development stage, or awaiting permits, roughly 10% are designed for EOR.[92] Examining hundreds of CCS and CDR projects developed over the last five years reveals a clear direction, as only five projects are designed for EOR, while the rest are dedicated to saline storage.[93]

Additionally, using CCS to develop or establish new coal power plants is neither economically nor technically feasible, as some have claimed.[94] This is not realistic in the case of the United States as U.S. coal production and consumption have fallen dramatically in the last few years with expectations to reduce further in the coming years; production is expected to decrease from 533 million tons in 2025 to 501 million tons in 2027.[95] Simultaneously, consumption is expected to decrease from 453 million tons in 2025 to 408 million tons in 2027.[96] This reduction in coal production and consumption, with the significant increase of cost of coal power plants,[97] indicates the low possibility of using CCS to support the coal industry.

The reality is that CCS is necessary for transitioning to a low-carbon economy. Even if we do not use it for carbon capture at point sources, such as natural gas power plants, at present, we may employ the technology to remove carbon from the atmosphere later. In the International Renewable Energy Agency (IRENA) scenarios modeling approaches to limiting global warming to 1.5˚C pre-industrial levels, CCS accounted for 6% of total emission reductions

---

are in five sectors: "chemical production, hydrogen production, fertilizer production, natural gas processing, and power generation").

90. Cong. Budget Off., Carbon Capture and Storage in the United States 1 (2023).
91. *US Carbon Capture and Storage and Project Map*, Clean Air Task Force, https://perma.cc/GFH6-EJRN.
92. *Id.*
93. *Id.*
94. Ctr. for Int'l Env't L., *Carbon Capture and Storage* (2023), https://perma.cc/Z2D8-USF7; *see also* Geoffrey P. Hammond & Jack Spargo, *The Prospects for Coal-Fired Power Plants with Carbon Capture and Storage: A UK Perspective*, 86 Energy Conversion & Mgmt. 476, 488 (2014).
95. U.S. Energy Info. Admin., *supra* note 3.
96. *Id.*
97. Lori Bird, David Widawsky & Alex Smith, *More Coal Won't Solve US Energy Woes*, World Res. Inst. (Feb. 2, 2026), https://perma.cc/MKY3-BCFQ.

by 2050 and bioenergy with carbon capture and storage (BECCS) accounted for 14%.[98]

Critics of CCS projects claim that the projects are not consistent with environmental justice principles and that these projects impose greater risks and hazards on communities already under a pollution burden.[99] However, if CCS projects are regulated, they could lead to better environmental justice outcomes and help in reducing pollution inequality in the United States.[100] The IEA states that reaching our global climate and energy goals would be "virtually impossible" without CCS technology.[101] According to the IPCC, carbon capture technologies like CCS are essential for accelerating decarbonization and meeting global climate objectives.[102]

The critical issue is that CCS is the victim of a lack of deep and adequate education between the two sides on the significance of this technology in mitigating climate change issues. CDR/CCS proponents underestimate the urgency and dangers of climate change issues and carelessly ignore the consequences.[103] CDR/CCS opponents do not consider the significance of the variety of climate change solutions to combat a problem of this magnitude.[104] Here, a realistic approach is required to develop CCS simultaneously with other renewable energy projects so as not to lose the race to achieve our universal climate goals. Importantly, developing CCS should not come at the expense of environmental and monitoring principles and standards.

The next two sections of the article address the main question, which is how to streamline federal and state authorization primacy in a balanced manner that maximizes efficiency in the permitting process without compromising environmental values. The following section examines the federal level, while the subsequent section delves into the state level, specifically the case of primacy in Texas.

98. Int'l Renewable Energy Agency, World Energy Transitions Outlook 2022: 1.5°C Pathway 16 (2022), https://perma.cc/97EB-32H8.

99. Ctr. for Int'l Env't L., *supra* note 94; *see also* Maya Batres et al., *Environmental and Climate Justice and Technological Carbon Removal*, 34 Elec. J. 1, 1 (2021).

100. Muriel Hague, *A Hitchhiker's Guide to Carbon Capture and Sequestration Regulation in Texas and Beyond*, 61 Hous. L. Rev. 827, 847–49 (2023).

101. Int'l Energy Agency, *supra* note 17, at 3.

102. Intergovernmental Panel on Climate Change, Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change 313 (H.O. Pörtner et al. eds., Cambridge University Press 2022).

103. *See supra* note 94.

104. Herzog, *supra* note 39, at 154–55.

III. Nature of the Federal Permitting Process in the United States

Following decades of environmental awareness and activism in the United States, modern environmental regulation started in the 1970s, transforming society and environmental law at the national and global levels.[105] The enactment of significant legislation during this period established the principles and foundations for modern environmental law.[106] The enactment of NEPA, the creation of the EPA, and the establishment of the Council on Environmental Quality (CEQ) in 1970 were major steps toward regulating the environment and institutionalizing environmental protection.[107] In particular, NEPA was enacted to consider the environmental impacts of projects and activities while creating a framework for cooperation between federal agencies and consultation with state, local, and tribal governments.[108] Not long after the passage of NEPA, Congress enacted the CAA in 1970[109] and the Clean Water Act (CWA) in 1972.[110]

This legislation has not only resulted in environmental awareness but has also empirically cleaned our atmosphere and rivers and protected species and the environment. An EPA study confirmed the remarkable influence of the CAA, estimating that more than 200,000 lives were saved and millions of respiratory illnesses were avoided between 1970 and 1990.[111] Another study found that the CAA amendments reduced pollution enough to prevent the early death of 230,000 individuals in 2020.[112] Independent studies have also confirmed the positive impact of the CWA in improving oxygen levels and reducing bacteria in U.S. waterways.[113] In addition to health benefits,

105. Cary Coglianese, *Social Movements, Law, and Society: The Institutionalization of the Environmental Movement*, 150 U. Pa. L. Rev. 85, 86–87 (2001). Environmental awareness has a long history; for example, the Sierra Club was founded in 1892. *See History*, Sierra Club Maryland Chapter, https://perma.cc/M63C-XDGZ.

106. *See* Richard J. Lazarus, The Making of Environmental Law 67 (2023).

107. *The Origins of EPA*, U.S. Env't Prot. Agency, https://perma.cc/A3Q5-F7KK. CEQ was established under NEPA, which was signed into law by President Richard Nixon in January 1970. *See also Nixon Promises an Urgent Fight to End Pollution*, N.Y. Times, Jan. 2, 1970, at 1.

108. Council on Env't Quality, Exec. Off. of the President, The National Environmental Policy Act: A Study of Its Effectiveness After Twenty-Five Years 1 (1997), https://perma.cc/U4PJ-85QL.

109. Clean Air Act (CAA), 42 U.S.C. §§ 7401–7671.

110. Clean Water Act (CWA), 33 U.S.C. §§ 1251–1387.

111. U.S. Env't Prot. Agency, The Benefits and Costs of the Clean Air Act, 1970 to 1990 37–38 (1997), https://perma.cc/72UT-KFPF.

112. *Id.* at 14.

113. David Keiser & Joseph S. Shapiro, *Consequences of the Clean Water Act and the Demand for Water Quality*, 134 Q.J. Econ. 349, 373 (2019). The CWA also has resulted in reducing industrial wastewater. *See* U.S. Env't Prot. Agency, Water Pollution Control: 25 Years of Progress and Challenges for the New Millennium 1–2 (1998), https://perma.cc/7GYC-322W.

the economic, social, and environmental benefits of U.S. environmental legislation are well-known.[114]

However, from another perspective, this legislation heightened requirements for permitting and conducting environmental impact assessments, particularly for activities on federal lands and waters.[115] It has been empirically proven that the permitting process contributes to the delay or cancellation of many large renewable projects. In a study of fifty-three solar, wind, and geothermal projects in the United States between 2008 and 2021, researchers found that more than one-third of these projects failed to secure permitting, were delayed by permitting or faced difficulties in obtaining permitting, while approximately half of these projects were canceled permanently.[116]

Due to regulatory complexity, the permitting process requires consideration of legislation and regulations at both the federal and state levels to ensure that a project will not lead to significant environmental degradation. In the case of CCS, for example, Title V of the CAA would be relevant for large stationary sources of emissions.[117] The permitter must consider the Safe Drinking Water Act (SDWA) to ensure the injection of CO_2 will not impact groundwater.[118] Other legislation may be implicated such as the Resource Conservation and Recovery Act (RCRA) for hazardous waste,[119] the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in the event of CO_2 leakage,[120] and the Pipeline Safety Laws for transporting CO_2 via pipeline.[121] Lastly, an environmental impact assessment is required under NEPA for federally funded CCS projects.[122]

The substantial legal requirements imposed on infrastructure and energy projects soon led to criticism of environmental legislation, particularly following

114. *See* Antoine Dechezleprêtre & Misato Sato, *The Impacts of Environmental Regulations on Competitiveness*, 11 Rev. Env't Econ. & Pol'y 183, 184 (2017); Onur G. Apul et al., *Protecting the Environment Pays Off for the USA Economy and Public Health*, 3 Nature Water 1336, 1336–37 (2025); *see also* Kenneth Y. Chay & Michael Greenstone, *Does Air Quality Matter? Evidence from the Housing Market*, 113 J. Pol. Econ. 376, 379 (2005); *cf.* Michael Greenstone, *Did the Clean Air Act Cause the Remarkable Decline in Sulfur Dioxide Concentrations?*, 47 J. Env't Econ. & Mgmt. 585, 609 (2004) (finding that nonattainment designation under the CAA does not empirically lead to lower SO2 concentrations, while the cause of an 80% decline in SO2 concentration over the prior thirty years remains unknown).

115. Craig n. Johnston & Victor B. Flatt, Legal Protection of the Environment 108 (5th ed. 2024).

116. Lawrence Susskind et al., *Sources of Opposition to Renewable Energy Projects in the United States*, 165 Energy Pol'y 112922, 112922 (2022).

117. *See* CAA, 42 U.S.C. § 7661a(a) .

118. *See* Safe Drinking Water Act (SDWA), 42 U.S.C. § 300h-2.

119. *See* Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6903.

120. *See* Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601–02.

121. Pipeline Safety Laws, 49 U.S.C. § 60102(i).

122. Seth Kerschner et al., How US Environmental Laws and Regulations Affect Carbon Capture and Storage 4 (2021), https://perma.cc/M2A7-4JQJ.

the oil crisis in the mid-1970s. President Richard Nixon was the leader in this regard, followed by his successors.[123] Although criticism to infrastructure projects initially came from locals who were concerned about environmental protection, [124] criticism continued, evolving into opposition to renewable energy adoption. This resistance reached a tipping point during President Trump's second term, as he issued an Executive Order asking CEQ to issue guidelines for simplifying and streamlining the permitting process and "propos[ing] to rescin[d] CEQ's NEPA regulations found at 40 CFR 1500 *et seq.*"[125] I will return to this point when discussing revisions of NEPA regulations and their amendments later, but it would be rational to first discuss the permitting process under NEPA, then examine the new reforms in the later sections.

A. National Environmental Policy Act (NEPA)

The enactment of NEPA in 1969 had profound implications at the domestic level, and, because it has been used as a model for legislation in countries across the world, some considered it "the Magna Carta of global environmental law."[126] The role of NEPA is not limited only to imposing environmental reviews for federal projects or activity. Instead, Congress's primary intention in enacting it was to foster democratic resilience and encourage public participation in decision-making processes.[127] This democratic practice and public engagement are essential for achieving environmental protection and economic development in the balance between man and nature, which Congress hoped would "fulfill the social, economic, and other requirements of present and future generations of Americans."[128] This holistic view is clarified by court interpretation and regulatory guidance. In *Robertson v. Methow Valley Citizens Council*, the Supreme Court indicated that NEPA does not impose specific "results"; it is procedural legislation rather than substantive.[129]

As a primarily procedural law, NEPA plays a crucial role in assessing the environmental impacts of any project, whether it is built on federal land, receives federal funding, or is required by federal legislation to undergo review. The review procedure has three types, depending on the nature of the project, its location, and its impact.[130] First, certain projects fall under a categorical exclusion (CE) if they do not significantly impact the environment. For these projects,

123. Lazarus, *supra* note 106, at 92–94, 116–22.
124. David E. Adelman, *Permitting Reform's False Choice*, 51 Ecology L.Q. 129, 132–33 (2024).
125. Exec. Order No. 14154, 90 Fed. Reg. 8353 (Jan. 20, 2025).
126. Robert L. Glicksman & Alejandro E. Camacho, *The Trump Card: Tarnishing Planning, Democracy, and the Environment*, 50 Env't L. Rep. 10281, 10281 (2020).
127. *Id.* at 10283.
128. National Environmental Policy Act of 1969 (NEPA), § 101(a), 42 U.S.C. § 4331(a).
129. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989).
130. NEPA, §§ 102, 106(b), 106e(1), 42 U.S.C. §§ 4332, 4336(b), 4336e(1).

the permitter does not require an environmental assessment.[131] Federal agencies typically update the list of activities considered Categorical Exclusions (CEs) and are subject to NEPA in consultation with the Council on Environmental Quality (CEQ).[132]

Second, in cases of unknown impacts of an activity on the environment, the federal agency requires an Environmental Assessment (EA).[133] It is meant to be a more concise, straightforward process compared to an Environmental Impact Statement (EIS), but this is not always the case, as EAs can exceed several thousand pages. For instance, when the congestion pricing scheme was passed in New York City in 2019 as a part of the state budget, several parties sued over the scheme, resulting in an EA that exceeded 4,000 pages.[134] The plan was aimed at reducing congestion and modernizing the New York subway by generating income through tolls.[135] The permitting process of the plan and the EA took more than four years, as the suing parties claimed that the EA was insufficient and violated environmental regulations.[136]

Third, suppose an activity or action is considered to "significantly" affect the environment. In that case, a federal agency, the project applicant, a consultant, or another relevant agency is required to prepare a "detailed statement," known as an EIS, for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment."[137] The EIS must also include: "(i) reasonably foreseeable environmental effects" of the proposal, "(ii) any reasonably foreseeable adverse environmental effects" which are not possible to avoid in case of implementing the project, "(iii) a reasonable range of alternatives to the proposed agency action, (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and (v) any irreversible and irretrievable commitments of Federal resources which would be involved in the proposed agency action should it be implemented."[138] Despite recent changes to NEPA regulations, as climate change worsens, EISs and the elements they should include will influence the permitting process.

131. *Id.* §§ 4336c, 4336e(1).
132. National Environmental Policy Act Implementing Regulations Revisions Phase 2, 89 Fed. Reg. 35442, 35443 (May 1, 2024) (to be codified at 40 C.F.R. pts. 1500–08).
133. *Id.* §§ 1501.4(b)–(e), 1508.9, 1508.13.
134. Liscow, *supra* note 20, at 153–54.
135. Erin Durkin & Lauren Aratani, *New York Becomes First City in US to Approve Congestion Pricing*, The Guardian (Apr. 1, 2019), https://perma.cc/2A3U-3BHW.
136. Liscow, *supra* note 20, at 153–54.
137. NEPA, 42 U.S.C. § 102(2)(C).
138. *Id.*

The permitting process for new renewable energy projects will become more complicated, costly, and time-consuming in the coming years and decades, as the nature of the new energy system incorporates renewables and CCS, which differ from traditional energy sources.[139] For instance, to build a traditional energy project (such as coal, oil and gas generators), a permit may require working with one or more of the following agencies: DOE, the EPA, U.S. Army Corps of Engineers (USACE), the Bureau of Land Management (BLM), Federal Energy Regulatory Commission (FERC), and the Federal Communications Commission (FCC).[140] For wind farms, particularly those located offshore, several other federal agencies may be involved, including the Federal Aviation Administration (FAA), the U.S. Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA).[141] Further, state and local agencies also have different requirements and permits.[142]

Following calls for reform from both the executive and legislative branches, as well as responses to public and media pressure, two major changes were introduced to NEPA: administrative changes to the regulations and a congressional amendment. These changes were implemented during the Trump Administration in 2020 and the Biden Administration in 2023, following decades of stability without major changes to NEPA.[143]

The first change involved a rewriting of CEQ's NEPA regulations. CEQ issued these regulations in 1978 to provide unified and centralized guidance on NEPA implementation and they remained largely unchanged until 2020.[144] Among the significant changes in 2020 was that agencies were no longer to consider the "cumulative or indirect effects" of a project when drafting an EIS for that project.[145] This change was inconsistent with a Ninth Circuit decision,

139. For a detailed discussion on the complexity of the permitting process for these projects and other projects within the energy transition, *see* James W. Coleman, *Permitting the Energy Transition*, 75 Case W. Rsrv. L. Rev. 69, 80–83 (2024).

140. For more on permitting and how various legislations would be involved, *see About EPA Permitting*, U.S. Env't Prot. Agency, https://perma.cc/VZ5U-DBFS.

141. Lindsey Shrodek, *Shifting Winds: The Offshore Wind Industry in the Context of Administrative Volatility*, U. Chi. Bus. L. Rev. Online Archive (2025), https://perma.cc/8YN9-AFEN.). For more information on NEPA and permitting from different perspectives, *see*, *e.g.*, 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, 1509–10 (2012); Daniel R. Mandelker, *The National Environmental Policy Act: A Review of Its Experience and Problems*, 32 Wash. U. J.L. & Pol'y 293, 293 (2010); Robert L. & Alejandro E. Camacho, *The Trump Card: Tarnishing Planning, Democracy, and the Environment*, 50 Env't L. Rep. 10281, 10281 (2020).

142. Ernest E. Smith, *Wind Energy: Siting Controversies and Rights in Wind*, 1 Env't & Energy L. & Pol'y J. 281, 284 (2007).

143. *See* Farber, *supra* note 24, at 92–93, 97–99.

144. *See* Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 43304, 43307 (July 16, 2020) (to be codified at 40 C.F.R pts. 1500–1508, 1515–1518).

145. *Id*.

which affirmed the agencies' responsibility in considering cumulative and indirect effects such as the impacts of climate change.[146] The new regulations state that "[e]ffects should generally not be considered if they are remote in time, geographically remote, or the product of a lengthy causal chain."[147] This statement significantly revised CEQ's 1978 regulations, which had previously clearly distinguished between direct, indirect, and cumulative effects in preparing EAs and EISs.[148] In addition to limiting the review time and page numbers of EAs and EISs, the 2020 amendments expanded the ability of private applicants "to prepare documents."[149] Some of these changes were reversed three years later under the Biden Administration.

The second reform was an amendment to NEPA. It was described as a "broad scale but often opaque rewrite of NEPA, passed in the name of permitting reform."[150] The most notable outcomes of NEPA's recent reforms were provisions related to setting deadlines for permitting and limiting the number of pages in environmental reviews.[151] According to many who called for rapid project approval, these reforms were essential for accelerating renewable energy and CCS projects.[152] However, other new provisions were considered to produce "seemingly nonsensical results."[153] The recent amendments to NEPA appear to be substantial in terms of deadlines and page limits with the aim of speeding up the permitting process. A careful examination of the language of the reforms reveals many ambiguities and contradictions. Section 107(g), for example, stipulates that the deadline for preparing an EA is limited to one year, and it is limited to two years for the EIS.[154] This was introduced in the 2020 changes to NEPA regulations and was adopted again in the 2023 NEPA reforms, allowing for flexibility in extending these limits. But the language of the amendments is still weak as it limits review time but then allows for extending these limits.

As discussed in the introduction, critiques of NEPA began a few years after its enactment; however, major revisions have not been introduced except for the two significant changes discussed above.[155] Professor Kalen believes that "a considerable waning of federal agency interest in environmental protection" contributed to a lack of legislative or regulatory reforms in the decades following

146. Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1217 (9th Cir. 2008).
147. 33 C.F.R. § 333.61(d)(2) (2025).
148. 1978 CEQ Regulations, 85 Fed. Reg. 43304 at 43374–75.
149. CEQ NEPA Regulations, 40 C.F.R. § 1508.1(g); *see* Council on Env't Quality, Exec. Off. of the President, A Citizen's Guide to NEPA Having Your Voice Heard 4 (2021), https://perma.cc/54JQ-LNSU.
150. Farber, *supra* note 24, at 77.
151. NEPA §§ 107(e), (g); 42 U.S.C. §§ 4336a(e), (g).
152. *See supra* notes 20–23 and accompanying text.
153. Farber, *supra* note 24, at 81.
154. NEPA § 107(g).
155. Farber, *supra* note 24, at 87–93.

the enactment of NEPA.[156] Another interesting point to consider is that the number of EISs and lawsuits involving NEPA dropped significantly, particularly in the late 1980s.[157] The practical steps for reforming or changing NEPA began under President George W. Bush, following CEQ's NEPA Task Force report, "Modernizing NEPA Implementation."[158]

These reforms continued in the following decades, but at the end of Bush's second term, Section 45Q of the U.S. Internal Revenue Code was introduced in 2008 to develop carbon capture and storage.[159] Section 45Q and its later amendments had a profound impact on investment in CCS and states' push to receive primacy from the federal government.

B. Recent Legislation and Section 45Q

Section 45Q is a major incentive under the U.S. Internal Revenue Code for developers and investors to claim a tax credit for capturing carbon and investing in CCS.[160] The amount of credit that can be claimed under Section 45Q is based on the amount of eligible carbon dioxide captured per metric ton.[161] When introduced in 2008, Section 45Q did not play a commercially significant role in incentivizing large investments. It provided only $10 per ton in tax credits for CCS projects that aimed to use carbon emissions for EOR or enhanced gas recovery.[162] The available tax credits for the injection and permanent storage of CO_2 emissions in geological sites were only $20 per metric ton, and there were no other incentives for reducing CO_2 emissions beyond these two methods.[163]

Section 45Q has been amended several times in the past few years in order to improve its effectiveness and make CCS a more attractive investment. It is considered to be among the few areas of environmental law with bipartisan support, and achieving greater investment in CCS is possible regardless

156. Sam Kalen, *NEPA's Trajectory: Our Waning Environmental Charter from Nixon to Trump?*, 50 Env't L. Rep. 10398, 10404 (2020).

157. Philip M. Ferester, *Revitalizing the National Environmental Policy Act: Substantive Law Adaptations From NEPA's Progeny*, 16 Harv. Envtl. L. Rev. 207, 225–26 (1992).

158. *Modernizing NEPA Implementation*, Council on Env't Quality, Exec. Off. of the President (2003), https://perma.cc/5HAW-T4HF.

159. I.R.C. § 45Q (2008).

160. I.R.C. § 45Q (2023).

161. Cong. Rsch. Serv., The Section 45Q Tax Credit For Carbon Sequestration (2023), https://perma.cc/K6TE-N76N.

162. I.R.C. § 45Q (2008).

163. *Id.* The full text of the original 45Q (part of the U.S. Internal Revenue Code 2008) is available at *26 U.S.C. § 45Q - Credit for carbon oxide sequestration*, Legal Info. Inst., https://perma.cc/6DAR-HAYG.

of political division.[164] The IRA increased the credit value for carbon capture, which could reach $85 per metric ton for capture from the point source and $180 per metric ton for direct capture.[165] In addition to providing direct pay for CCS investors, the amendments extended the construction deadline for CCS to 2033.[166]

According to optimistic scenarios, Section 45Q is a policy that increases the attractiveness of CCS in the U.S. The increased adoption of CCS is estimated to create between 390,000 and 1.8 million job opportunities across various sectors, including "the fields of raw materials, engineering and design, construction, operation, and maintenance."[167]

While the federal support for CCS in the recent legislation is unprecedented, it is clear that streamlining the process for approving CCS and CDR projects could promote their adoption. Even though the recent amendments to NEPA attempted to accelerate the process and minimize costs, they have not changed much for these projects. As both CCS and CDR are not eligible for CEs, an EIS is required to permit these projects. Preparing an EIS almost always leads to additional costs and lengthy delays.[168] As a result, several states advocate streamlining the permitting process by permitting these projects within states through Class VI well permits after receiving primacy from federal agencies.[169]

The amendments to Section 45Q and the increasing tax incentives for CCS have encouraged many states to seek primacy from the EPA to manage various classes of wells under the SDWA. Under the SDWA's Underground Injection Control (UIC) Program, the EPA has designed six classes of wells to regulate the injection and disposal of various fluids and wastes since 1981.[170] Class VI wells are the latest class introduced by the EPA for

164. *See generally* Jared Gilmour, *45Q: Toward a Stronger Federal Carbon Capture Tax Credit*, 35 Env't Claims J. 235, 235–53 (2023).

165. 26 U.S.C. §§ 45Q(b)(1)(A)(i), (b)(1)(B), (h).

166. Inflation Reduction Act of 2022, Pub. L. No. 117-169, 136 Stat. 1915 (2022) (codified at 26 U.S.C. § 13104(a)(1)).

167. U.S. Dep't of Energy, Carbon Capture, Transport, & Storage: Supply Chain Deep Dive Assessment 48 (2022), https://perma.cc/TB7Q-GHWR.

168. Liscow, *supra* note 21 at 156–59.

169. Graham Valenta & Zain Hassan, *Reining in the Wild West: A Survey of Carbon Capture Legislation in the United States*, 20 Tex. J. Oil Gas & Energy L. 91, 93–94, 106–31 (2025).

170. *Underground Injection Control Regulations and Safe Drinking Water Act Provisions*, U.S. Env't. Prot. Agency, https://perma.cc/99HW-FKMF.

The six classes of wells are: Class I Wells are designed to inject hazardous and non-hazardous wastes of industrial and municipals, Class II Wells are developed to regulate oil and gas related activity wells, Class III Wells regulate injection activities related to solution mining, Class IV Wells are used to regulate hazardous and radioactive injection, Class V Wells are designed for non-hazardous fluids injection, and Class VI Wells are the latest one which regulate injecting CO_2 underground. *Id.*

CO_2 sequestration, but they were not very attractive for states until federal support for CCS increased significantly in the last five years. North Dakota was the only state to have Class VI primacy by mid-2020, but delays in permitting and federal incentives for CCS have since encouraged more states to submit applications for primacy.

C. Class VI Well Permits

Class VI Well permits were established by the EPA in 2010 to allow for the underground injection and storage of carbon within a geological site. Class VI permits were designed to introduce minimum requirements for protecting underground drinking water during the permanent storage of CO_2 at all stages, including permitting, well construction, operation, monitoring, and site closure.[171] This class is designed to meet the minimum standards essential to protect underground water in CO_2 sequestration.[172] As of June 2022, there were only two active Class VI Permits in the United States, as compared to more than a hundred thousand in certain other classes.[173] However, the number of applications for Class VI permits over the last three years has grown from both the EPA and state permitting authorities. As of March 2024, the EPA permitted eight wells, four of which had already begun operating.[174] North Dakota and Wyoming issued eight and three Class VI well permits, respectively.[175] In total, as of March 2024, nineteen Class VI well permits were issued for carbon sequestration in the United States.

Due to environmental reviews, risks of leaking, and monitoring permanent storage sites, Class VI permitting takes longer than other infrastructure or renewable energy projects. In February 2025, 161 Class VI well applications were under review by the EPA, and many have been

171. *Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO_2) Geologic Sequestration (GS) Wells Final Rule*, U.S. Env't. Prot. Agency, https://perma.cc/J4PT-ZFCS.

172. *Class VI – Wells Used for Geologic Sequestration of Carbon Dioxide*, U.S. Env't Prot. Agency, https://perma.cc/GG8X-UJPU.

173. Philip K. Lau et al., *Carbon Capture, Utilization, and Storage: Class VI Wells and US State Primacy*, Mayer Brown (June 9, 2022), https://perma.cc/N43X-Y35L.

174. Cong. Rsch. Serv., R48033, Class VI Carbon Sequestration Wells: Permitting and State Program Primacy 7 (2024), https://perma.cc/49P2-HM2V.

175. *Class VI Injection Wells*, N.D. Dep't Min. Res., Oil & Gas Div, https://perma.cc/TN86-LA3S. For Wyoming, *see Class VI Injection Wells*, Wyo. Dep't Env. Quality, Water Quality Div., https://perma.cc/4FEV-EQNM.

pending for over two years.[176] The EPA has twenty-four months to review and complete permitting for Class VI applications, but this framework is not compulsory, as the complexity of the project and completeness of required documents may change this timeframe.[177]

Class VI Permit Primary Enforcement Responsibility (primacy) allows states, territories, and tribes to manage the UIC program within their boundaries. Primacy is outlined under sections 1422 and 1425 of the SDWA.[178] Under Section 1422, which covers all well classes, the applicant for primacy needs to meet the minimum requirements for the EPA's UIC program in order to receive primacy.[179] Class VI well applications are regulated between the EPA and states that have received primacy under Section 1422 of the SDWA.

Currently, only six states have received primacy for Class VI wells, but several others have submitted their applications or will apply for primacy in the future.[180] North Dakota was the first state to submit an application for Class VI permitting primacy in June 2013, and it was granted authorization approximately five years later in April 2018. Wyoming received authorization in September 2020.[181] The EPA also granted Class VI primacy to Louisiana in February 2024.[182] West Virginia was the fourth state to have the EPA's approval, granted on February 18, 2025.[183] Arizona and Texas are the most recent states to receive the authorization for Class VI primacy in September and November 2025, respectively.

Several other states have submitted applications for Class VI permitting primacy in recent years, including Alabama, Alaska, Colorado, Mississippi, Oklahoma, and Utah. These states are in the early stages of the primacy application process.[184]

176. Tony Bennett et al., Unleashing American Energy with Carbon Capture and Storage in Texas (2025), https://perma.cc/KG36-R9CW.

177. *Current Class VI Projects Under Review*, U.S. Env't Prot. Agency, https://perma.cc/T3Z8-RA72.

178. *Primary Enforcement Authority for the Underground Injection Control Program*, U.S. Env't Prot. Agency [hereinafter *Primary Enforcement Authority*], https://perma.cc/8NHL-CTN5.

179. SDWA § 1422, 42 U.S.C. § 300h (2018).

180. Daniel Elizalde et al., *EPA Expansion of Class VI State Primacy Gives Carbon Storage A Boost*, Bipartisan Pol'y Ctr. (Nov. 13, 2025), https://perma.cc/4JPY-LT9R.

181. *Class VI – Geologic Sequestration Wells*, N.D. Dep't Min. Res., https://perma.cc/D9NR-TEXV; *Class VI*, Wyo. Dep't Env't Quality, https://perma. cc/UNW4-2SDN.

182. *Class VI Carbon Sequestration Program,* La. Dep't Nat. Res., https://perma.cc/D49G-RTM7.

183. Press Release, U.S. Env't Prot. Agency, Administrator Zeldin Approves West Virginia's Class VI Primacy Application (Feb. 18, 2025), https://perma.cc/42K6-PRD2.

184. Nikki Buffa et al., *EPA Proposes Granting West Virginia Primacy for Class VI Wells*, Env't, Land & Res. Blog (Dec. 10, 2024), https://perma.cc/M7HY-BAE9.

IV. Pathway: Reforming Federal Permitting

As discussed in the preceding sections, the NEPA amendments and regulatory changes over the last five years have reduced the time and cost of the permitting process. However, they may not be sufficient to significantly alter the permitting processes, as the new changes and amendments introduce several vague terms, which may force courts to elaborate on their meaning.[185] Not long after these amendments, the judicial branch questioned the NEPA regulations in several recent cases.

If the legislative branch attempts to change NEPA regulations, the judicial branch has significantly challenged agencies' interpretations of statutes, including those related to NEPA. In *Loper Bright Enterprises v. Raimondo*,[186] the Supreme Court overruled *Chevron*,[187] holding that"[c]ourts must exercise their independent judgment in deciding whether an agency has acted within its statutory authority, as the APA requires."[188] After this case, it is not easy for CEQ, EPA, and other agencies to issue regulations or binding rules because they may be less likely to survive challenges in court.[189] In addition, a number of courts have recently held that CEQ lacks statutory authority to issue binding rules.[190]

This legal battle may continue, and the number of cases increases due to the language of the new amendments. Recently, in *Seven County Infrastructure Coalition v. Eagle County, Colorado*[191], the Supreme Court also restricted the scope of NEPA.[192] Given *Loper Bright*, which makes it difficult for federal agencies to implement their regulations by limiting judicial deference,[193] *Seven County* strikes a balance by "afford[ing] substantial deference" to agencies but not considering "other future or geographically separate" effects of the project in EIS.[194] The case concerns a railroad from the oil-rich region in the Uinta Basin, Utah, connecting to the national railroad network and transporting oil to Gulf Coast refineries.[195] Environmental groups and Colorado County challenged the federal Surface Transportation Board (STB) in the U.S. Circuit Court for the District of Columbia, arguing that the federal agency had not adequately considered the climate and other impacts of the proposed project.[196] The Circuit

185. Exec. Order No. 14154, 90 Fed. Reg. 8353 (Jan. 20, 2025).
186. 603 U.S. 369 (2024).
187. Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, 467 U.S. 837 (1984).
188. *Loper Bright*, 603 U.S. at 412.
189. *See* Farber, *supra* note 25, at 139–40.
190. Marin Audubon Soc'y v. FAA, 121 F.4th 902, 908 (D.C. Cir. 2024); *see also* Iowa v. Council on Env't Quality, 765 F.Supp.3d 859, 884 (D.N.D. 2025).
191. 605 U.S. 168 (2025).
192. *Id.* at 187–88 (citing 42 U.S.C. § 4332(2)(C)).
193. *Loper Bright*, 603 U.S. at 412.
194. *Seven Cnty.*, 605 U.S. at 186–87.
195. *Id.* at 174–75.
196. Eagle Cnty., Colo. v. Surface Transp. Bd., 82 F.4th 1152, 1168–69 (D.C. Cir. 2023).

Court ruled in their favor.[197] The Supreme Court reversed the ruling and found that the lower court failed to give deference to the STB as a federal agency,[198] which has left significant implications for NEPA.

Thus, it was not legally difficult for President Trump to revoke CEQ regulations. With the changing administration and an executive order to revoke CEQ regulations in Executive Order 14085, "Unleashing American Energy,"[199] it is unclear what the new direction of federal permitting will be. EO 14085 aims to streamline the process by "propos[ing to] rescin[d] CEQ's NEPA regulations." Following the Order, CEQ revoked its NEPA regulation on February 25, 2025, but it took effect on April 11.[200] After guiding federal agencies for almost half a century, unified CEQ regulations no longer exist; therefore, federal agencies must rely on their own regulations to permit projects and proposals under NEPA. This Order and the decision in *Seven County*, which limits agencies' decisions related to the scope of future EISs, could lead to streamlining the permitting process in general and for CCS and CDR in particular.

However, the absence of CEQ guidelines might lead to even more cases surrounding NEPA implementation withwith more judicial interpretation. The significance of CEQ was not limited to its role in coordinating between agencies for the implementation of NEPA; its regulations have also served as valuable sources for the courts, which frequently cited CEQ regulations.[201] The second Trump administration may think that the lack of CEQ regulations will expedite NEPA and accelerate permitting, but given the ambiguous language of 2023 NEPA amendments and the agencies' reduced authority to interpret law related to their work after *Loper Bright*, the outcome could be the opposite.

The new statutory and regulatory changes to NEPA and CEQ regulations may also affect CCS and CDR projects at the federal level. These changes may lead to streamlining these projects as it would be easier for agencies to permit without CEQ requirements and regulations.[202] They may also reduce bureaucratic obstacles to producing less detailed EISs and EAs. However, there is potential that removing CEQ regulations undermines public trust in the permitting process, with increasing opposition to these CCS and CDR projects. This is so because the public and environmental organizations increasingly find that EISs and EAs do not sufficiently consider the environmental impacts of these projects. Thus, these organizations will challenge these projects. The following subsection attempts to address these concerns.

---

197. *Id.*

198. *Seven Cnty.*, 605 U.S. at 179.

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

200. Removal of National Environmental Policy Act Implementing Regulations, 90 Fed. Reg. 10610 (Feb. 25, 2025).

201. Sarah Langberg, *A "Full and Fair" Discussion of Environmental Impacts in NEPA EISs: The Case for Addressing the Impact of Substantive Regulatory Regimes*, 124 Yale L.J. 716, 729 (2014).

202. *See supra* note 212 and accompanying text.

A. Public Engagement and Transparency

As demonstrated in the above sections, environmental laws, such as NEPA, are not the primary obstacle to CCS and CDR projects; rather, the issue is primarily related to NEPA's permitting process. Recently, critics have called for narrowing the scope of litigation and limiting standing only to those with a direct connection to the project or issues related to the public interest.[203] Limiting who can bring suit under environmental statutes has precedent in the Supreme Court, demonstrated by the court's increased reliance on standingto dismiss environmental cases over the last few decade, beginning with *Lujan v. Defenders of Wildlife*.[204] The data also demonstrates that the number of environmental law cases at the federal level challenging decarbonization projects is not large. For example, only twenty-eight lawsuits challenging wind power projects, fourteen for transmission line projects, and eight for solar projects were recorded between 2010 and 2021.[205] These cases, which are concentrated in specific geographical areas, [206] could be mitigated through consultation at early stages and strong public participation.

Strong public participation has significant potential to improve transparency in the permitting process for Class VI wells and decrease litigation related to carbon capture projects. The permitting process for Class VI wells contains five major steps.[207] In the first step, the permitter starts with a "Completeness Review," assessing whether it has received the required documentation for an application. This step takes approximately thirty days. [208] If the application is complete, the permitting agency undertakes a "Technical Review," (second step) during which the permitting agency engages with the applicant to understand all aspects of the proposal.[209] In this step, the permitting authority can submit a Request for Additional Information (RAI), ask questions about the proposal, and debate whether these technologies are essential or meet the requirements.[210] At the third step, the permitting agency prepares a draft permit if the application meets the requirements.[211] The fourth step is the public comment period, which allows the public to comment and raise their concerns about the drafted permit. The fifth and final step of the permitting process is to prepare the final

203. *See* Anna Mance, *The Real Story of NEPA Litigation in Clean Energy Permitting*, 56 Seton Hall L. Rev. 557, 585–87 (2025) (summarizing this critique); *but see id.* at 607–10 (arguing that government capacity, not excessive litigation, is a major driver of NEPA-related delay).
204. 504 U.S. 555, 591 (1992) (citation modified).
205. Adelman, *supra* note 129, at 148.
206. *Id.* at 150–53.
207. *Class VI – Wells Used for Geologic Sequestration of Carbon Dioxide*, *supra* note 178.
208. *Id.*
209. *Id.*
210. *Id.*
211. *Id.*

permit after modifying and responding to public comments. After receiving the final permit, the applicant can start the project and inject CO_2 underground.[212]

As explained above, public participation can lead to litigation, so active participation may reduce this risk in CCS or any other climate-related projects. Here, suggestions for removing or weakening environmental reviews may obscure the permitting process for CCS and CDR projects, potentially leading to legal disputes and litigation risks.[213] In a study on carbon capture in several U.S. cities, including Houston, Texas, most respondents considered justice, including allowing their voices to be heard, in these projects to be essential.[214]

Strengthening public participation in the early stages of a CCS or CDR project is crucial for identifying public concerns and understanding their origins. Discussing these concerns will create constructive dialogue and improve transparency.[215] An independent monitoring committee to involve various stakeholders and oversee the entire lifecycle of the carbon project can also be useful if needed. Instead of hearing about the project from a third party or the media, the public can learn of new applications from the developers themselves and monitoring committees can communicate with stakeholders to find solutions that benefit the public and the environment while prioritizing climate goals. This assists in accelerating the process, particularly in the second step of the permitting process, the Technical Review, which takes significantly longer than other steps.[216] All procedures enhance public trust and help avoid lawsuits that could delay or halt these projects.[217]

B. Establishment of the Consultation Team

Increasing the capacity of the Federal Permitting Improvement Steering Council (Permitting Council) could play a significant role in accelerating the permitting process; however, this may not be feasible under current circumstances, particularly with the Trump Administration working to reduce federal staff. The Permitting Council has a decade of experience and was made permanent by the IIJA.[218] However, the main issue is that the Permitting Council currently

212. *Id.*

213. Council on Env't Quality, Exec. Off. of the President, NEPA: A Study of its Effectiveness After 25 Years 17–19 (1997), https://perma.cc/2YA7-TA7J.

214. Celina Scott-Buechler et al., *Communities Conditionally Support Deployment of Direct Air Capture for Carbon Dioxide Removal in the United States*, Commc'ns Earth & Env't, Apr. 3, 2024, at 1, 5, https://perma.cc/4ED6-3Y8T.

215. Council on Env't Quality, Exec. Off. of the President, *supra* note 213.

216. Council on Env't Quality, Exec. Off. of the President, Environmental Impact Statement Timelines (2010-2024) 2–4 (2025), https://perma.cc/9P2Y-EHBJ.

217. Council on Env't Quality, Exec. Off. of the President, *supra* note 223.

218. Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429 (2021). Division D, Title IX, Section 70801 of IIJA amended Title 41 of the Fixing America's Surface Transportation (FAST) Act (2015) and changed the termination date to permanent.

has sixteen council members with a budget of $10 million for 2026.[219] Such a small staff and limited budget restricts the Council's capacity to coordinate with various federal agencies and stakeholders,[220] particularly as CCS and renewable energy projects become more common.

Another major step in permitting reforms at the state level would be establishing a consultation team between the state agency and the developer of a potential CCS project before submitting permitting applications. In this case, agencies and developers can focus on the planning at the first step, treating the NEPA process mostly as a legal obligation to navigate rather than as an integral part of project development.[221] The team can create an environment for cooperation between the developer and the agency responsible for permitting.

C. Smart Permitting: AI for Streamlining the Permitting Process

The first step is essential, as public engagement will enhance public trust in CCS projects. The second step would allow better communication channels between the developer and the agency. The third step utilizes technology and innovation, which have undergone rapid development in recent years to support effective and efficient permitting processes.

The rapid development of technology can play a crucial role in reducing the time and cost of environmental reviews using artificial intelligence (AI). Thousands of EA and EIS documents, comprising millions of pages, can be collected in databases and accessed by permitting officers and federal agencies within seconds. Instead of using various platforms from different agencies, AI tools have the capacity to integrate millions of documents into a single platform, providing easy access and efficiency in decision-making.[222] Using these tools would reduce the time and resources necessary for permitting, and, more importantly, enable the prediction of environmental outcomes for the project or proposal.

AI has garnered significant bipartisan support in recent years, resulting in the enactment of the CHIPS Act in 2022.[223] Following the CHIPS Act, support continued through an executive order and other initiatives aimed at streamlining the permitting process for AI infrastructure and data centers.[224] There is a strong connection between AI and the permitting process, as AI improves efficiency in the permitting process and vice versa. Even though AI models have many issues related to hallucination and bias, improving model

219. Federal Permitting Improvement Steering Council, Fiscal Year 2026 Budget Request 1 (2026), https://perma.cc/2TAQ-GJ93.

220. *Id*. at 1–3.

221. Liscow, *supra* note 21, at 175.

222. Karyn Hede, *Faster, More Informed Environmental Permitting with AI-Guided Support*, Pacific Northwest Nat'l Lab. (Aug. 24, 2023), https://perma.cc/44HU-6EAK.

223. CHIPS and Science Act, Pub. L. No. 117-167, 136 Stat. 1375 (2022).

224. The White House, AI Assessment: Power and Permitting 2 (2025), https://perma.cc/LAV9-GQR4.

training to reduce bias and enhance public engagement could help streamline the public comment process and strengthen democratic engagement.

Because most resistance to, and lawsuits against, renewable and CCS projects are at the local and state level, critically analyzing CCS and CDR at the state level would be valuable for a deep understanding of the permitting and primacy process. The next section contains this analysis.

V. Toward Primacy: States as the Permitters for CCS Projects

Despite several attempts to reform federal permitting, as discussed, the process is slow. As the reform is difficult, a better solution is for states to seek primacy and approve their own projects in the short term. Increasing federal capacity for planning and permitting CCS projects is crucial for developing this technology. Simultaneously, allowing states to permit CCS projects within their jurisdictions would also be a practical step in streamlining the permitting process and achieving U.S. climate objectives, if CCS and CDR are still regulated according to federal standards. Regulating this technology at both levels drives the industry's future and investment in other aspects of its implementation, including transportation and pipelines for CCS infrastructure.[225]

Introducing the UIC program and increasing Section 45Q tax credits through several amendments encouraged states to seek primacy from the EPA.[226] Almost all major energy-producing states in the United States have granted primacy for Class VI applications, or they have already submitted applications for primacy. North Dakota in 2018; Wyoming in 2020; Louisiana in 2024; and West Virginia, Arizona and Texas in 2025 have received primacy and authorization to regulate Class VI wells within their states.[227] As discussed in Section III, almost all new CCS projects that have submitted a permitting application aim to store CO_2 solely for geological sites and not for EOR, which should reduce the environmental groups' concerns that CCS will be used to expand the fossil fuel industry. These projects will reduce emissions from power plants and other industries that are difficult to operate with renewable energy resources.

This section discusses how states can collaborate with federal agencies to manage the CCS and CDR permitting process without compromising national environmental standards. Texas will be the focus of the following discussion, as it is the leading state in this technology both nationally and potentially globally, with the most suitable geological sites for permanent carbon storage.[228]

225. Congr. Budget Off., Carbon Capture and Storage in the United States 2 (2023), https://perma.cc/GJ62-D9H4.

226. Valenta & Hassan, *supra* note 169.

227. U.S. Env't Prot. Agency, *Class VI – Wells Used for Geologic Sequestration of Carbon Dioxide*, *supra* note 172.

228. Sheran Munasinghe et al., *Capturing the $100 Billion Carbon Management Opportunity in Texas*, Rocky Mountain Institute (Oct. 15, 2025), https://perma.cc/4BP6-S5M7.

A. The Case of Texas: The Push for Primacy

Texas is the most suitable case for analyzing permitting in CCS and CDR because it has the highest record of carbon emissions among all U.S. states, with 670 million metric tons accounting for 14% of total national emissions in the U.S. in 2023.[229] It is the largest energy hub in the U.S., producing one-fourth of total domestic production, including 43% of the U.S. oil production and 27% of natural gas production in 2023.[230] In addition to producing the largest share of electricity among U.S. states, with 13% of the total U.S. electricity generation, most U.S. refineries are located in Texas and the state can process approximately 6.3 million barrels of crude oil per day.[231]

Texas, like other states, has received primacy for several well injection classes; however, it has only recently applied this primacy to Class VI wells through the Railroad Commission of Texas (RRC) as of December 19, 2022. Texas received primacy for Class VI wells in November, 2025, which went into effect on December 15, 2025.[232] The state has the largest potential carbon storage capacity in the United States, estimated at 1,505.79 gigatons (Gt).[233] Louisiana ranks second in total storage capacity, at 734.55 Gt.[234] Of the 237 Class VI well permit applications under review by the EPA in August 2025, more than a quarter, or sixty-two wells, were located in Texas.[235]

Texas's primacy application took longer than those of other states. As the EPA must consider a Class VI permit application within two years, Texas was expected to receive primacy within that timeframe. Texas's primacy application was pending for over two years until June 9, 2025, when the EPA announced that it proposed approval of the primacy application.[236] The Trump Administration and new EPA Administrator Lee Zeldin accelerated the primacy application to align with the primacy applications of other states. Arizona submitted its application for primacy for Class VI on February 16, 2024, more than a year after Texas, but received primacy on September 10, 2025. Following Arizona, Texas also received final approval of the primacy on November 7, 2025.[237]

---

229. *Texas: Overview*, U.S. Energy Info. Admin., https://perma.cc/9X2D-YQ7W.
230. *Texas: Texas Electricity Data*, U.S. Energy Info. Admin., https://perma.cc/48ZU-FCP7.
231. *Texas: Overview*, *supra* note 229.
232. *Texas Underground Injection Control (UIC) Program; Class VI Primacy Application*, 90 Fed. Reg. 51021 (Nov. 14, 2025).
233. *CCS Class VI Wells Map*, Clean Air Task Force, https://perma.cc/JS5K-QC26.
234. *Id*.
235. *Current Class VI Projects*, *supra* note 177.
236. Press Release, U.S. Env't Prot. Agency, EPA Proposes to Approve Texas' Application to Administer Class VI Underground Injection Well Program (June 9, 2025), https://perma.cc/5K44-H58Y.
237. *What States, Territories, and Tribes have Recently Completed the Primacy Application or Program Revision Process?*, U.S. Env't Prot. Agency, https://perma.cc/7MDM-GC5H.

Texas's primacy application process was somewhat slower than other states' applications due to a significant number of regulatory changes required and large Class VI applications within the state. Following numerous calls from industry and relevant stakeholders in Texas,[238] the Trump Administration and the Administrator Zeldin agreed to advance Texas's primacy application and grant primacy in late 2025. This advancement in Texas's primacy application was achieved after the EPA signed a Memorandum of Agreement (MOA) with the RRC to move forward with the primacy application and prepare a proposal for approval of Texas's application in late April 2025.[239] However, the large number of applications as discussed above in CCS and CDR in Texas presents several legal and policy challenges that necessitate an appropriate response to streamline the process and protect the environment.

B. Can the RRC Keep Pace? Old Regulator with New Responsibility

One of the major steps that contributed significantly to accelerating the preparation of Texas's primacy application was identifying a single entity to regulate CCS and CDR. Texas House Bill (H.B.) 1284 was enacted in mid-2021, designating the RRC as the sole and primary agency responsible for regulating CCS at the state level.[240]

Making one entity responsible for permitting CCS in Texas was a strategic decision aimed at enhancing efficiency and streamlining the process.[241] However, whether the RRC can balance the industry's needs with strong calls for environmental protection is a major question. The RRC regulates Class II wells related to oil and gas and Class VI for regulating CCS simultaneously.[242] Some, including members of Congress, believe that the RRC is not in a position to protect the environment and have called for denying the primacy application.[243] They note that the Commission's structure and its central role in regulating oil and gas limit its ability to regulate carbon capture in ways that benefit the community and the environment.[244]

238. Press Release, Tex. Oil & Gas Ass'n., EPA Hearing on Texas Class VI Primacy Highlights Broad Support for Economic Growth and Job Creation (July 24, 2025), https://perma.cc/K4YA-YBNM.

239. Press Release, U.S. Env't Prot. Agency, EPA and Texas Railroad Commission Sign Memorandum of Agreement on Geologic Storage of Carbon Dioxide (Apr. 29, 2025), https://perma.cc/9DXV-KZPP.

240. H.B. 1284, 87th Leg., Reg. Sess. (Tex. 2021).

241. *Id.*

242. *Geologic Storage of Carbon Dioxide (CO_2)*, R.R. Comm'n of Tex. (Dec. 15, 2025), https://perma.cc/K56M-JTMN.

243. Michael Marks, *Texas Should Not Regulate Carbon Storage, Say Two Texas Congressmen*, Texas Standard (July 24, 2023), https://perma.cc/L72C-V7DK.

244. *Id.*

As the EPA and the federal government have finally approved Texas's primacy application, the RRC has an opportunity to enhance public trust and transparency in the permitting review process by providing data and ensuring the safety of CCS and CDR projects. Regular inspections of future projects, along with robust monitoring and reporting, contribute significantly to reducing concerns regarding the RRC's ability to regulate these projects. Thus, the regulator would be in a position to balance energy production, reduce emissions, and ensure public safety regarding carbon sequestration.

C. Long-Term Liability for CO_2

After waiting almost three years after submitting three Class VI well applications to the EPA, Oxy Low Carbon Ventures LLC received a permit to inject CO_2 underground in Ector County, in West Texas in April 2025.[245] This was the first Class VI permit issued in Texas, and more would soon follow. ExxonMobil's permit application for three Class VI wells was approved by the EPA in October 2025.[246] Another eighteen projects, including more than sixty wells, are pending permit approval. These projects may not receive the permit soon, but most will receive it in 2026 and 2027. Despite their benefits, these wells store CO_2 permanently, creating long-term liabilities.

Texas law indicates that the operator or injector of a Class VI well is responsible for the stored gas. The Natural Resources Code explicitly states that liability belongs to the operator.[247] Prior to this legislation, the Texas Court of Appeals, in *Lone Star Gas Co. v. Murchison*, established the concept.[248] Changing the liability from the operator or owner to the state, similar to North Dakota and Wyoming, although it is against judicial precedent in Texas, could be considered. The State of Texas could require some insurance before relaxing liability for stored CO_2.

This step should not be viewed solely as an incentive for promoting CCS and CDR investment in Texas, but rather as a fundamental method for avoiding legal uncertainty and gaining public support for these projects. Addressing long-term liabilities is not just about liability for several years or decades; the liabilities for the stored carbon extend to several centuries and thousands of years. For example, who would be liable if the firm were dissolved or liquidated and, after several decades, the stored carbon leaked? As states submit their applications for primacy, they should also clearly address their long-term liabilities. Regulations

245. *EPA Issues Final Permits for Geologic Sequestration of Carbon Dioxide in Texas*, U.S. Env't Prot. Agency (Apr. 7, 2025), https://perma.cc/U33E-EXX6.

246. Press Release, U.S. Env't Prot. Agency, EPA Issues Three Class VI Permits to ExxonMobil in Jefferson County, Texas (Oct. 21, 2025), https://perma.cc/P9V3-TJJ3.

247. Tex. Nat. Res. Code Ann. § 121.002(b) (2025).

248. Lone Star Gas Co. v. Murchison, 353 S.W.2d 870, 879 (Tex. App. 1962, writ ref'd n.r.e.).

should be specific regarding when, how, and under what circumstances states would be ready to take liability for the stored carbon underground.

D. The Issue of Induced Seismicity Risks in CO_2 Injection Areas

Although seismic activity is relatively low in Texas,[249] the CCS project will continue for an extended period, necessitating particular attention to this matter. The RRC can prepare a clear and detailed plan for any potential risk related to seismic activity or leaks in these projects. The plan should include guidance for emergency responses and procedures to mitigate the risk of future incidents.

The SDWA and the EPA's UIC program are the most relevant regulatory frameworks for protecting underground water from risks, including seismicity risks, but they have not comprehensively addressed the issue regarding CCS. Texas and other states that are waiting for primacy need to fill the gap by providing policies and regulations to address this matter, for example, by requiring investors to conduct seismicity risk assessments for specific regions and locations.

E. The Ownership of the Pore Space

The responsibility for the pore space and determining its ownership is another crucial area of legal uncertainty that impacts the environmental risks associated with a CCS or CDR project. The state needs to clarify whether a surface owner is the owner of pore space or whether pore space ownership is associated with the mineral estate. In contrast to other states, which clarified the ownership of the pore space, Texas legislators did not address the issue until recently. In North Dakota, for instance, the surface owner owns the pore space of a CCS project.

Finally, the Texas Supreme Court addressed the issue in the case of *Myers-Woodward, LLC v. Underground Services Markham, LLC*, the court concluded that the surface owner is the owner of the pore space.[250] This decision has significant implications for Section 45Q tax credits and CCS investment in Texas, as the investor must have a legal right to store the carbon underground to be eligible for the tax credit under Section 45Q.

249. *See generally* Alexandros Savvaidis et al., 2024 Biennial Report on Seismic Monitoring and Research in Texas (2024), https://perma.cc/KNM2-3D55; *see also* J. David Goodman, *In Texas Oil Country, an Unfamiliar Threat: Earthquakes*, N.Y. Times (Jan. 28, 2023), https://perma.cc/KXS6-Q3WG.

250. Myers-Woodward, LLC v. Underground Services Markham, LLC, 716 S.W.3d 461, 463-64 (Tex. 2025).

VI. Conclusion

In her famous book *Silent Spring*, Rachel Carson stated, "The choice, after all, is ours to make."[251] These words were a result of the mismanagement of natural resources in the United States. Not long after publishing this book, several environmental laws were enacted to manage resources more sustainably, including NEPA, the CWA, the CAA, and the SDWA. These statutes have significantly improved preservation of the United States' natural resources in the last five decades.[252] However, some of these statutes could be considered a barrier to projects necessary for a rapid shift toward a low-carbon economy.[253]

CCS and CDR projects are key to reducing emissions, with unprecedented bipartisan support from the White House and Congress. Contrary to a large body of literature blaming environmental laws for slowing down energy and infrastructure projects,[254] including CCS and CDR, this article argues that environmental legislation such as NEPA can still contribute to democracy and public participation. The issue is not about NEPA as a statute; it is more about the permitting process. The time and cost of the permitting process can be reduced without weakening our environmental values.

After discussing the significance of CCS and CDR in diversifying climate change responses and why these technologies are essential to mitigation strategies, this article recommends several initiatives to streamline the permitting process at both the national and state levels. Public engagement and transparency should be enhanced at the federal level to reduce public concerns about most CCS and CDR projects. The government also ought to establish a consultation committee between permitting agencies and project developers to further streamline the permitting process. Incorporating AI into the permitting process will significantly reduce the cost and time required for permitting. With several states obtaining or applying for primacy to permit projects within their borders, many fundamental legal concerns require clarification, including long-term liabilities for stored CO_2, seismicity risks, and the ownership of pore space.

Ultimately, the choice still lies with us to decide whether to adopt technology such as CCS and CDR and diversify our options in climate change responses. Congress and the White House chose to support CCS and CDR, enabling states to utilize this technology and regulate it through primacy. In this uncertain time of withdrawal from the Paris Agreement and the revocation

251. Rachel L. Carson, Silent Spring 144 (1962).
252. *See supra* notes 111–114.
253. *See supra* notes 20 and 21.
254. *See supra* notes 20–23.

of many environmental regulations,[255] these technologies are among the few options that the United States may have to continue progressing toward a low-carbon economy in the coming years. Supporting and regulating these technologies ultimately reduces emissions, and resistance to them may lead to failure in achieving national climate targets.

255. In Executive Order 14162, President Trump directed the United States ambassador to the United Nations to withdraw from the Paris Agreement. The withdrawal procedure was completed, and since January 2026, the United States has been officially out of the agreement. *See* Exec. Order No. 14162, 90 Fed. Reg. 8455 (Jan. 20, 2025).