

This document has been prepared as part of the implementation project of Legal Pathways to Deep Decarbonization (Michael B. Gerrard and John C. Dernbach, eds. Environmental Law Institute (2019)) (LPDD). For background information on the project, see <https://lpdd.org>

1.0 Recommendation

The Bureau of Land Management can prioritize sequestration on some federal lands.

The above recommendation appears in *Carbon Capture and Sequestration* by Wendy B. Jacobs and Michael Craig, in Michael B. Gerrard and John C. Dernbach, eds., *Legal Pathways to Deep Decarbonization in the United States* (Environmental Law Institute 2019).¹

2.0 Introduction

The recent Intergovernmental Panel on Climate Change (IPCC) report, *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* affirms that “[g]lobal net anthropogenic emissions have continued to rise across all major groups of greenhouse gases,² including carbon dioxide from fossil fuel combustion and industrial processes.³ The mitigation report makes clear that, “global net zero CO₂ emissions are a prerequisite for stabilizing warming at any level.”⁴ This necessitates “deep emissions cuts across all sectors and regions”⁵ together with “active removal of CO₂ from the atmosphere to balance remaining emissions that may be too difficult, too costly or impossible to abate at that time.”⁶

In the 2021 infrastructure bill, Congress declared that “large-scale deployment of carbon capture, removal, utilization, transport, and storage is critical for achieving mid-century climate goals.”⁷ The needed deployment includes carbon capture and storage technologies for reduction in industrial sector emissions,⁸ and carbon removal and storage technologies (such as direct air capture) that remove carbon from the atmosphere.⁹ Congress also noted barriers to these

¹ Wendy B. Jacobs and Michael Craig, *Carbon Capture and Sequestration* in Michael B. Gerrard and John C. Dernbach, eds., *Legal Pathways to Deep Decarbonization in the United States* (Environmental Law Institute 2019) (*Legal Pathways*) 713. The memorandum, along with notes in annotated version of the model guidance, supplement the *Carbon Capture and Sequestration* chapter. This legal memorandum is current through February 2022.

² Intergovernmental Panel on Climate Change, *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (April 2022) (IPCC Mitigation Report) <<https://www.ipcc.ch/report/ar6/wg3/>> *Summary for Policymakers* (Summary for Policymakers), Figure SPM.1, SPM-6 <https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_SummaryForPolicymakers.pdf>

³ Summary for Policymakers, SPM-6 (cited in note 2).

⁴ IPCC Mitigation Report 3-117 (cited in note 2) <https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_Chapter03.pdf>

⁵ Id. at 3-118.

⁶ Id. The International Energy Agency provides related scenarios to achieve net-zero by 2050. International Energy Agency, *World Energy Outlook* (Oct 2021) 264–265, § 6.2.3. <<https://www.iea.org/reports/world-energy-outlook-2021>> See also id. at 172. (“Carbon capture, utilization and storage (CCUS) provides a way to tackle remaining emissions in both the power and industry sectors, especially beyond 2030.”)

⁷ HR 3684, 117th Cong, 1st Sess. (June 4, 2021) at 558, § 40301(4)(A).

⁸ Id. § 40301(2).

⁹ Id. § 40301(3).

technologies “such as high capital costs and chicken-and-egg challenges, that require Federal and State support, in combination with private investment, to be overcome.”¹⁰

One avenue for federal support for permanent storage of carbon dioxide (also known as geologic carbon sequestration, or CO₂ GS) is in the utilization of public lands. Public lands are lands or interest in lands administered by the Bureau of Land Management (BLM) of the Department of Interior (DOI).¹¹ A decade ago, BLM instituted a temporary policy pertaining to CO₂ GS, through a temporary instruction memorandum (temporary IM).¹²

The BLM describes a temporary IM as offering “operational, incident-specific, project-related or one-time policy or guidance for evolving activities.”¹³ As temporary IMs pertain to evolving issues, they expire at the conclusion of the third fiscal year since issuance,¹⁴ and can be followed by subsequent temporary IMs.¹⁵ The temporary instruction memorandum for CO₂ GS (CO₂ GS IM), although prioritizing oil and gas production, was solely limited to information gathering,¹⁶ and expired in 2013.¹⁷

Jacobs and Craig, in their *Carbon Capture and Sequestration* chapter, seek “a reordering of land use priorities by BLM” in order to facilitate consideration of CO₂ GS on public lands.¹⁸ The authors point to possible revision of the CO₂ GS IM.¹⁹

The model document proposes language to be included in a draft revision of the CO₂ GS IM. The proposed language would expand the scope to include both CO₂ GS characterization (by permit) and CO₂ GS implementation (by lease), and revise the IM to incorporate more recent policy direction. This Model IM language could allow BLM to immediately begin efforts to prioritize geologic carbon sequestration on some federal lands.

The Model IM language can be viewed as complementary to the following model law: *State Legislation for the Geologic Storage of Carbon Dioxide*, which provides model state legislation

¹⁰ Id. at 559, § 40301(7). In this matter, the infrastructure bill primarily provided funding. Id. at 558, Title III, Subtitle A.

¹¹ 43 USC § 1702(e). (“The term ‘public lands’ means any land and interest in land owned by the United States within the several States and administered by the Secretary of the Interior through the Bureau of Land Management, without regard to how the United States acquired ownership, except— (1) lands located on the Outer Continental Shelf; and (2) lands held for the benefit of Indians, Aleuts, and Eskimos.”) Federal offshore energy and mineral resources are managed by the Bureau of Ocean Energy Management (BOEM). U.S. Department of Interior, *Bureau of Ocean Energy Management* <<https://www.boem.gov>> Tribes work with the Division of Energy and Mineral Development (DEMD). U.S. Department of Interior, Bureau of Indian Affairs, Division of Energy and Mineral Development <<https://www.bia.gov/bia/ots/demd>>

¹² U.S. Department of Interior, Bureau of Land Management, *Interim Guidance on Exploration and Site Characterization for Potential Carbon Dioxide Geologic Sequestration*, Instruction Memorandum No. 2012-035 (Dec 1, 2011, expired Sept 30, 2013) (CO₂ GS IM) <<https://www.blm.gov/policy/im-2012-035>>

¹³ U.S. Department of Interior, Bureau of Land Management, *Instruction Memorandum* <<https://www.blm.gov/policy/instruction-memorandum>>

¹⁴ Id.

¹⁵ See e.g., note 101.

¹⁶ CO₂ GS IM at 1 (cited in note 12).

¹⁷ Id.

¹⁸ Jacobs and Craig, *Carbon Capture* at 747 (cited in note 1).

¹⁹ Id.

which could be applicable in the private and state lands sphere, as opposed to regulation of public lands.²⁰

3.0 Geologic Carbon Sequestration Defined

3.1 Carbon Dioxide Capture

Carbon dioxide is captured aboveground in two ways. It can be captured as a partitioned gas stream resulting from an industrial or energy-related process,²¹ or it can be captured directly from the air.²²

Carbon dioxide captured directly from the air is commonly referred to as carbon dioxide removal (CDR).²³ This includes Direct Air Capture (DAC) and storage (DACCS).²⁴ Conversely, capturing carbon dioxide as a partitioned gas stream (e.g., from an industrial plant or power plant) is a component of carbon capture and storage (CCS).²⁵ Reference to CCS is sometimes termed CCUS with the inclusion of the letter “U” for “utilization” (use of the carbon dioxide in industrial processes or in products).²⁶

Carbon dioxide can also be captured below ground in gaseous form as a natural gas.²⁷ As such, it is a leasable mineral under the Mineral Leasing Act.²⁸

²⁰ Sabin Center for Climate Change Law at Columbia Law School, Legal Pathways to Deep Decarbonization, *LPDD Model Law: State Legislation for the Geologic Storage of Carbon Dioxide* (Sept 2021) (principally drafted by Michael Cline of Gaffney, Cline & Associates) (LPDD State model law) <https://lpdd.org/resources/lpdd-model-law-state-legislation-for-the-geologic-storage-of-carbon-dioxide/?mc_cid=750c6ac791&mc_eid=5fe7992f80> See also the Carbon Dioxide Removal Law database, which provides an extensive source of information on law and CDR. Columbia Law School, Sabin Center for Climate Change Law, Columbia School of International and Public Affairs, *Carbon Dioxide Removal Law* <https://cdrlaw.org/?mc_cid=6c673d5689&mc_eid=5fe7992f80> See also Michael B. Gerrard and Tracy Hester, eds, *Climate Engineering and the Law: Regulation and Liability for Solar Radiation Management and Carbon Dioxide Removal* (Cambridge 2018).

²¹ IPCC 2022 Mitigation Report (cited in note 2), *Glossary* (IPCC Glossary), *Carbon dioxide capture and storage (CCS)* <https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_Annex-I.pdf>

²² Id., *Direct air carbon dioxide capture and storage (DACCS)*.

²³ Id., *Carbon dioxide removal (CDR)*.

²⁴ Id. There also exists bioenergy with carbon dioxide capture and storage (BECCS), which is CCS technology applied to a facility which burns non-geological organic matter. Id., *Bioenergy with carbon dioxide capture and storage (BECCS)*. For public lands, the U.S. is focused on biologic carbon sequestration through land management rather than coupled with CCS. See, e.g., U.S. Department of Interior, United States Geological Survey, Land Change Science Program, LandCarbon <https://www.usgs.gov/ecosystems/land-change-science-program/science/landcarbon?qt-science_center_objects=0#qt-science_center_objects> See also U.S. Department of Interior, U.S. Fish & Wildlife Service, Initiatives, *Climate Change, Mitigation* <<https://www.fws.gov/initiative/mitigation>> See also IPCC BECCS concerns. Mitigation Report at 3-36, § 3.2.2.2 (cited in note 2). See also Jacobs and Craig, *Carbon Capture* at 728, note 151 (cited in note 1).

²⁵ Id., *Carbon dioxide capture and storage (CCS)*.

²⁶ Council on Environmental Quality, *Council on Environmental Quality Report to Congress on Carbon Capture, Utilization, and Sequestration* (June 2021) (CEQ CCUS Report) 10 <<https://www.whitehouse.gov/wp-content/uploads/2021/06/CEQ-CCUS-Permitting-Report.pdf>> Council on Environmental Quality, *Carbon Capture, Utilization, and Sequestration Guidance*, 87 Fed Reg. 8808, 8808 (Feb 16, 2022) (CEQ CCUS Guidance). The CEQ report and guidance additionally includes atmospheric capture within CCUS. CEQ CCUS Report at 10, n. 13. CEQ CCUS Guidance at 8809.

²⁷ See *Aulston v. U.S.*, 915 F.2d 584, 585 (10th Cir. 1990).

²⁸ Id. at 599.

3.2 Carbon Dioxide Sequestration

Carbon sequestration is the process of storing carbon in a reservoir,²⁹ including geologic sequestration (placement into deep rock formations) or biologic sequestration (such as through photosynthesis of a grove of trees).³⁰ Geologic carbon sequestration is meant to be the end of the carbon cycle: a permanent (at least 1,000 years) isolation of the carbon dioxide. The deep rock formations of geologic sequestration can be onshore or offshore, and need to be situated beneath a caprock.³¹

Geologic carbon sequestration can be the end point in three situations. First is CCS, which is the focus of Professors Jacobs and Craig's chapter, *Carbon Capture and Sequestration*.³² The sequestration can also be the endpoint of CDR, such as DAC.³³ Lastly, carbon dioxide can be sequestered as an incidental result of enhanced oil production.³⁴ Because the purpose of the wells is oil production, with sequestration an after effect, the wells are regulated separately from geologic carbon sequestration wells.³⁵

3.2.1 Enhanced Oil Recovery

Injection of carbon dioxide occurs as part of oil production in depleted oil fields, known as enhanced oil recovery (CO₂-EOR).³⁶ There are approximately 144,000 EOR wells presently operating in the United States, predominantly in Oklahoma, Kansas, Texas, and California.³⁷ In CO₂-EOR, carbon dioxide is injected into the oil reservoir, thereby thinning or displacing remaining oil, which is then recovered.³⁸ The oil producers will recover as much carbon dioxide as feasible for further CO₂-EOR use, yet a portion is sequestered.³⁹ The 1970s energy crisis

²⁹ IPCC Glossary, *Sequestration* (cited in note 20). See also 40 CFR 144.3, *Geologic sequestration*.

³⁰ United States Geological Survey, *What's the difference between geologic and biologic carbon sequestration?* <https://www.usgs.gov/faqs/what-s-difference-between-geologic-and-biologic-carbon-sequestration?qt-news_science_products=0#qt-news_science_products>

³¹ Intergovernmental Panel on Climate Change, *Special Report on Carbon Dioxide Capture and Storage* (2018) (IPCC CCS Report) 6 <https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_wholereport-1.pdf> A caprock is "rock of very low permeability that acts as an upper seal to prevent fluid flow out of a reservoir." Id. at note 10.

³² Jacobs and Craig, *Carbon Capture* (cited in note 1). The IPCC estimates that a power plant with CCS would use between 10–40% more energy than one without, depending on the type of power plant. IPCC CCS Report (cited in note 31) 4. A typical CCS process will capture around 80–90% of a facility's direct carbon dioxide emissions. Id.

³³ See note 24.

³⁴ CEQ CCUS Report at 16 (cited in note 26).

³⁵ U.S. Environmental Protection Agency, Underground Injection Control (UIC), General Information About Injection Wells, *UIC well classes* <https://www.epa.gov/uic/general-information-about-injection-wells#wells#well_classes>

³⁶ U.S. Environmental Protection Agency, Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO₂) Geologic Sequestration (GS) Wells, Final rule, 75 Fed Reg 77230, 77244 (Dec 10, 2010).

³⁷ U.S. Environmental Protection Agency, Underground Injection Control (UIC), Class II Oil and Gas Related Injection Wells (EPA UIC Class II), *Enhanced recovery wells* <<https://www.epa.gov/uic/class-ii-oil-and-gas-related-injection-wells>>

³⁸ Id.

³⁹ 75 Fed Reg. at 77244 (cited in note 36).

brought about the rapid development of EOR.⁴⁰ The multi-decade use of CO₂-EOR has led to substantial experience with CO₂ injection.⁴¹

3.2.1.1 Carbon Dioxide Pipelines for Enhanced Oil Recovery

Utilization of CO₂-EOR has led to continuing development of CO₂ pipeline networks and infrastructure.⁴² The State of Wyoming, in a successful proposal for an 1104-mile carbon dioxide pipeline network which crossed BLM lands, described CO₂-EOR as “a bridge to a reduced carbon emissions future.”⁴³

4.0 Potential for Geologic Carbon Sequestration on Public Lands

4.1 Geologic Carbon Sequestration as part of Carbon Capture and Storage

At present, injection of carbon dioxide for the purpose of geologic carbon sequestration does not occur on public lands. In fact, there is presently only one operating carbon sequestration well in the United States, operated by the Archer Daniels Midland Company (ADM) on ADM property in Decatur, Illinois.⁴⁴ There, ADM converts corn into ethanol, which produces carbon dioxide as a byproduct. The industrial carbon dioxide is then sequestered underground.⁴⁵

Offshore, Exxon was recently the sole bidder on 94 U.S. oil leases in shallow waters off the coast of Texas,⁴⁶ though the leases were recently invalidated.⁴⁷ It was anticipated that Exxon would

⁴⁰ *Aulston*, 915 F.2d at 585.

⁴¹ IPCC CCS Report at 6 (cited in note 31).

⁴² *Id.* at 5.

⁴³ State of Wyoming, *Wyoming Pipeline Corridor Initiative: State of Wyoming Proposal* (July 2019) 6 <https://eplanning.blm.gov/public_projects/lup/1502028/20008211/250009722/Wyoming_Pipeline_Corridor_Initiative_State_of_Wyoming_Proposal_July_2019.pdf>

⁴⁴ U.S. Environmental Protection Agency, Underground Injection Control (UIC), *Class VI Wells Permitted by EPA* (EPA Class VI Wells) <<https://www.epa.gov/uic/class-vi-wells-permitted-epa>> U.S. Department of Energy, Office of Fossil Energy and Carbon Management, *Archer Daniels Midland Company* <<https://www.energy.gov/fecm/archer-daniels-midland-company>> For the role of Department of Energy funding in the ADM well and other CCS projects, see Congressional Research Service, *Injection and Geologic Sequestration of Carbon Dioxide: Federal Role and Issues for Congress*, R46192 (Jan 24, 2020) (CRS Geologic Sequestration Report) 6 and Appendix B. <<https://crsreports.congress.gov/product/pdf/R/R46192>> The report views discussion of regulation of geologic sequestration on public lands as beyond the scope of the report. *Id.* at 2.

⁴⁵ See also the recent Government Accountability Office (GAO) report which strongly criticized DOE funding administration and oversight of coal CCS demonstration projects, and compared it to industrial CCS demonstration projects. U.S. Government Accountability Office, *Carbon Capture and Storage: Actions Needed to Improve DOE Management of Demonstration Projects*, GAO-22-105111 (Dec 2021). <<https://www.gao.gov/assets/gao-22-105111.pdf>>

⁴⁶ Jennifer A Dlouhy and Kevin Crowley, *Exxon Bids for Gulf of Mexico Leases Ahead of Carbon-Capture Plans* (Nov 17, 2021) <<https://www.bloomberg.com/news/articles/2021-11-17/exxon-bids-for-gulf-drilling-leases-ahead-of-carbon-capture-plan>> The Gulf of Mexico lease sale was offered by the BOEM. See note 6.

⁴⁷ *Friends of the Earth v. Haaland*, No. 21-2317 (D.D.C. Jan. 27, 2022). <<https://int.nyt.com/data/documenttools/78-memorandum-opinion-1-27/b0903c94e57b0cb5/full.pdf>> The United States is not joining in the appeal. Anna Phillips, *Biden administration won't appeal judge's ruling revoking Gulf of Mexico drilling leases*, Washington Post (Feb 28, 2022) <<https://www.washingtonpost.com/climate-environment/2022/02/28/biden-administration-wont-appeal-judges-ruling-revoking-gulf-mexico-drilling-leases/>>

utilize the leases as part of a massive carbon sequestration and storage hub for the Houston industrial corridor.⁴⁸

4.1.1 Carbon Capture and Storage with Enhanced Oil Recovery

The forthcoming CalCapture project, presently in the design phase, will utilize CCS coupled with CO₂-EOR.⁴⁹ The CO₂ produced by the existing power plant will be separated out and piped to an adjacent oil field to increase the amount of oil recovered, resulting in CO₂-EOR sequestration.⁵⁰ The State of California presently allows carbon credit for CO₂-EOR under its Low Carbon Fuel Standard Regulation.⁵¹ The CalCapture project is located on former federal property transferred to an oil and gas company in the late 1990s as part of a federal privatization effort.⁵²

4.2 Geologic Carbon Sequestration as part of Direct Air Capture

A 2009 report by the U.S. Department of Energy (DOE), entitled *Storage of Captured Carbon Dioxide Beneath Federal Lands*, determined that two-thirds of CO₂ emissions (within a 100-mile radius of public lands) occurred east of the Mississippi, though the vast majority of CO₂ storage capacity on public lands is located in the western United States (like public lands in general).⁵³

⁴⁸ Id. Exxon had indicated it would expect significant federal funding. Id. Companies such as Calpine, Chevron, and Dow are in discussions with Exxon regarding the proposed hub. David Blackmon, *Exxon-Led Carbon Capture Project Is Key To Sustained U.S. Economic Growth*, *Forbes* (Sept 18, 2021) <<https://www.forbes.com/sites/davidblackmon/2021/09/18/exxon-led-carbon-capture-project-is-key-to-sustained-us-economic-growth/?sh=531e7f8c9232>>

⁴⁹ EPA Class VI Wells (cited in note 44).

⁵⁰ California Resources Corporation, *Elk Hills Field* (CRC Elk Hills Field) (“...this project would capture carbon dioxide (CO₂) from the Elk Hills Power Plant and inject that CO₂ into underground oil formations, displacing remaining oil and permanently trapping CO₂ deep underground – all while significantly extending the productive life of the Elk Hills Field.”) <<https://crc.com/our-business/where-we-operate/san-joaquin-basin/elk-hills-field>> The power plant is a gas-fired cogeneration power plant. California Energy Commission, *Elk Hills Power Project* <<https://www.energy.ca.gov/powerplant/combined-cycle/elk-hills-power-project>>

⁵¹ 17 Cal Code of Reg. § 95490 and the California Carbon Capture and Sequestration Protocol under the Low Carbon Fuel Standard, 7, § A.1. (Applicability includes “CCS projects that capture carbon dioxide (CO₂) and sequester it onshore, in either saline or depleted oil and gas reservoirs, or oil and gas reservoirs used for CO₂-enhanced oil recovery (CO₂-EOR).”) <<https://ww2.arb.ca.gov/resources/documents/carbon-capture-and-sequestration-protocol-under-low-carbon-fuel-standard>>

⁵² CRC Elk Hills Field (cited in note 50). See also U.S. Department of Energy, Office of Fossil Energy and Carbon Management, *Sale of the Elk Hills Naval Petroleum Reserve* <<https://www.energy.gov/fecm/sale-elk-hills-naval-petroleum-reserve>> The location is Kern County, California. EPA Class VI Wells (cited in note 44). The DOE recently awarded Kern County one of the first Energy Communities LEAP technical assistance grants, as Kern County “has been identified as a prime geologic CO₂ storage resource.” U.S. Department of Energy, LEAP Communities <<https://www.energy.gov/communitiesLEAP/leap-communities>> Kern County plans to develop a Clean Energy and Carbon Management Business Park, involving DAC and green hydrogen. Kern County, County News, *Kern County awarded U.S. Department of Energy Communities LEAP technical assistance grant for development of Clean Energy & Carbon Management Business Park* (Mar 29, 2022) <<https://www.kerncounty.com/Home/Components/News/News/660/34810>>

⁵³ U.S. Department of Energy, National Energy Technology Laboratory, *Storage of Captured Carbon Dioxide Beneath Federal Lands*, DOE/NETL-2009/1358 (May 8, 2009) (DOE Beneath Federal Lands) ES-3, table ES-1, 7 – 9. <https://www.netl.doe.gov/sites/default/files/netl-file/Fed-Land_403-01-02_050809.pdf> The report estimates 65% of these emissions are east of the Mississippi River, and 83% – 86% of storage capacity is west of it. Id. The main source of CO₂ emissions is power plants. Id. at 7. See also id. at 42 (“The presence of significant storage

Given the comparative distance between emission source and storage capacity, public lands may offer a better overall opportunity for DAC than for CCS.⁵⁴

4.2.1 Direct Air Capture with Enhanced Oil Recovery

Texas is anticipated to become home to the world's largest direct air capture facility in 2024, capturing a million tons of CO₂ annually at full operation.⁵⁵ The operation, backed by Occidental Petroleum Corporation, will capture CO₂ from the air and inject it into the subsurface as part of its enhanced oil recovery. The company states that “[d]epending on the production cycle, this process can produce low, neutral or even carbon negative oil by sequestering an amount of CO₂ equal to or greater than that which is emitted.”⁵⁶

5.0 Statutory Authority for Geologic Carbon Sequestration on Public Lands

5.1 General Authority of the Bureau of Land Management

The BLM regulates public lands under its organic act: the Federal Land Policy and Management Act (FLPMA), enacted in 1976.⁵⁷ The BLM often regulates in tandem with other acts. For instance, BLM regulates the leasing of fossil fuels, such as oil, gas, and coal, under the Mineral Leasing Act (MLA) as well as FLPMA.⁵⁸ The BLM regulates renewable energy resources such as geothermal under FLPMA and the Geothermal Steam Act of 1970.⁵⁹

For some public land purposes, statutory authority is evident. For example, MLA expressly addresses oil and gas leases.⁶⁰ FLPMA specifically refers to certain public land uses such as “recreation, range, timber, and minerals.”⁶¹ And though not referenced by name, solar and wind

potential in Wyoming, Montana and the western Dakotas, in conjunction with a CO₂ pipeline network provides two significant links of the CCS chain. Oil and gas reservoir storage potential in these states represent about 30 percent of the onshore capacity in the United States, providing opportunity for CO₂-EOR projects.”)

⁵⁴ See notes 41 and 42 regarding CO₂ GS potential of offshore federal lands.

⁵⁵ *Occidental-backed company will build new U.S. CO₂ removal plant*, Reuters (Aug 19, 2020)

<<https://www.reuters.com/article/us-usa-carboncapture-dac/occidental-backed-company-will-build-new-u-s-co2-removal-plant-idUSKCN25F1VN>> An operating carbon capture plant in Iceland will remove 4,000 metric tons annually. Michael Birnbaum, *The world's biggest plant to capture CO₂ from the air just opened in Iceland*, Washington Post (Sept 8, 2021) <<https://www.washingtonpost.com/climate-solutions/2021/09/08/co2-capture-plant-iceland-climeworks/>>

⁵⁶ Oxy Low Carbon Ventures, *The Net Zero Energy Cycle* <<https://www.oxy-lowcarbon.com/carbon-capture-technology/projects>>

⁵⁷ Federal Land Policy and Management Act of 1976, 43 USC 1701, et seq. See also U.S. Department of the Interior, Bureau of Land Management (ed), *The Federal Land Policy and Management Act of 1976, as amended* (2016) i. (“[FLPMA] is the Bureau of Land Management’s ‘organic act’ ...”) <https://www.blm.gov/sites/blm.gov/files/AboutUs_LawsandRegs_FLPMA.pdf>

⁵⁸ 43 CFR 3100.0-3(a). Mineral Leasing Act of 1920, 30 USC 181 et seq. See e.g., 30 USC § 352. See generally U.S. Department of the Interior, Bureau of Land Management, *Oil and Gas* <<https://www.blm.gov/programs/energy-and-minerals/oil-and-gas>>

⁵⁹ Geothermal Steam Act of 1970, 30 USC § 1001 et seq. See e.g., 30 USC § 1002. See also U.S. Department of the Interior, Bureau of Land Management, Energy and Minerals, *Sustainable Development* <<https://www.blm.gov/programs/energy-and-minerals>>

⁶⁰ 30 USC Subchapter IV.

⁶¹ FLPMA § 103(c), 43 USC 1702(c).

energy are authorized under FLPMA as “systems for generation, transmission, and distribution of electric energy...”⁶²

5.2 Authority for Geologic Carbon Sequestration

There is a lack of express statutory authority for geologic carbon sequestration on public lands.⁶³ However, a number of existing authorities could be referenced under various circumstances to authorize sequestration.⁶⁴ Additionally, FLPMA instructs the BLM to manage public lands “...in a manner that will protect the quality of... air and atmospheric values.”⁶⁵ The CO₂ GS IM specifies FLPMA § 302(b) as its sole authority.⁶⁶ Section 302(b) states:

In managing the public lands, the Secretary shall, subject to this Act and other applicable law and under such terms and conditions as are consistent with such law, regulate, through easements, permits, leases, licenses, published rules, or other instruments as the Secretary deems appropriate, the use, occupancy, and development of the public lands ...⁶⁷

The implementing regulations for FLPMA § 302(b) are found at 43 CFR Part 2920. The regulations provide a catchall for land uses “not specifically authorized under other laws or regulations and not specifically forbidden by law.”⁶⁸ In its Part 2920 regulations, BLM sought to “take full advantage of the possibilities for flexible land use authorization provided in section 302 of [FLPMA].”⁶⁹ The type of covered land uses include “permanent facilities for commercial purposes (other than mining claims),” ski resorts, apiaries, oil rig stacking sites, advertising displays, and irrigation well pumps, among others.⁷⁰ Part 2920 regulations, provide a “procedure for determining the appropriateness of a proposed use.”⁷¹

⁶² FLPMA § 501(a)(4), 43 USC § 1761(a)(4).

⁶³ U.S. Department of the Interior, *Framework for Geological Carbon Sequestration on Public Land* (2007) (DOI Framework Report) 7.
<https://ia803404.us.archive.org/21/items/reporttocongress00prep/Framework_Geo_Carbon_Sequest_Public_Land_2007.pdf>

⁶⁴ Different U.S. reports reference different statutory authorities. For instance, the DOI Framework Report pointed to MLA provisions allowing for underground storage of gas, noting that the statutory language is not limited solely to temporary storage. *Id.* at 8 –9. The Interagency CCS Report indicated that FLPMA pipeline authority could be used for CO₂ GS since the authority includes “storage and terminal facilities in connection therewith.” Interagency Task Force on Carbon Capture and Storage, Report of the Interagency Task Force on Carbon Capture and Storage (Aug 2010) (Interagency CCS Report) 65.

<https://www.energy.gov/sites/default/files/2013/04/f0/CCSTaskForceReport2010_0.pdf> FLPMA § 501(a)(2), 43 USC 1761(a)(2).

⁶⁵ FLPMA § 102(a)(8), 43 U.S.C. 1701(a)(8).

⁶⁶ CO₂ GS IM at 4, *Application Procedure* (cited in note 12).

⁶⁷ FLPMA § 302(b), 43 USC 1732(b). The DOI Framework Report and the Interagency CCS Report also include FLPMA § 302(b) as CO₂ GS authority. DOI Framework Report at 9 (cited in note 63). Interagency CCS Report at 65 (cited in note 64).

⁶⁸ 43 CFR 2920.1-1.

⁶⁹ U.S. Department of Interior, Bureau of Land Management, Leases, Permits and Easements; Land Use Authorizations Under the Federal Land Policy and Management Act, 46 Fed Reg. 5772, 5772 (Jan 19, 1981)

⁷⁰ Office of Management and Budget, Land Use Application and Permit (43 CFR part 2920), OMB Control Number 1004-0009, ICR 201905-1004-001(Mar 18, 2020) Supporting Statement A <<https://omb.report/icr/201905-1004-001>> <<https://omb.report/icr/201905-1004-001/doc/99550301>>

⁷¹ 46 Fed Reg. at 5773 (cited in note 69).

The regulations' flexibility is especially helpful for CO₂ GS, given its unique attributes. For example, the time anticipated for CO₂ GS operation will vary depending on factors such as the size of the reservoir. The Part 2920 regulations do not include a specified time limit applicable to all leases,⁷² and BLM rejected mandating a 30-year limit.⁷³ 2920 authorizations also possess commonality. For example, no authorization can be issued that does not reflect fair market value at a minimum.⁷⁴

Due to their adaptability, the regulations can also permit early application of the high-level recommendations contained in the recent *Report on the Federal Oil and Gas Leasing Program: Prepared in Response to Executive Order 14008* (Oil and Gas Leasing Program report), for those recommendations which are also relevant to CO₂ GS activities.⁷⁵ Pertinent recommendations have been incorporated into the Model IM language pertaining to bond amount,⁷⁶ stakeholder involvement,⁷⁷ ending prioritization of oil and gas over other uses,⁷⁸ a focus on areas with moderate or high potential for CO₂ GS,⁷⁹ qualification of bidders,⁸⁰ and greater inclusivity of community, including Tribes in the permitting and leasing process.⁸¹

However, relevant activities, such as (1) utilization of CO₂ GS pipelines, and (2) CO₂ sequestration as part of EOR are not regulated under Part 2920.⁸² Instead, the regulations relevant to the placement of pipelines on public lands for CO₂ GS activities are found at 43 CFR Part 2800.⁸³ Sequestering CO₂ as part of EOR is regulated under the oil and gas provisions of MLA, with regulations found at 43 CFR Part 3100.⁸⁴

⁷² 43 CFR 2920.1-1(a).

⁷³ 46 Fed Reg. at 5773 (cited in note 69).

⁷⁴ 43 CFR 2920.0-6(a). 43 CFR 2920.5-4(a) and (b). 46 Fed Reg. at 5772 (cited in note 69).

⁷⁵ U.S. Department of the Interior, *Report on the Federal Oil and Gas Leasing Program: Prepared in Response to Executive Order 14008* (Nov 2021) (DOI Leasing Report) 6. ("What follows is a high-level blueprint to begin to modernize the onshore and offshore oil and gas leasing programs in order to better restore balance and transparency to public land and ocean management and deliver a fair and equitable return to American taxpayers.") <<https://www.doi.gov/sites/doi.gov/files/report-on-the-federal-oil-and-gas-leasing-program-doi-eo-14008.pdf>>

⁷⁶ Id. at 10. See Model IM language, [12], Administration of Authorized Uses, Performance and Reclamation Bond, and Attachment 5.

⁷⁷ DOI Leasing Report at 12 (cited in note 75). See Model IM language at [12] Administration of Authorized Uses, Performance and Reclamation Bond, and Attachment 5.

⁷⁸ DOI Leasing Report at 12 (cited in note 75). See Model IM language at [12] Administration of Authorized Uses, Performance and Reclamation Bond, and Attachment 5.

⁷⁹ DOI Leasing Report at 13 (cited in note 75). See Model IM language at [12] Administration of Authorized Uses, Performance and Reclamation Bond, and Attachment 5.

⁸⁰ DOI Leasing Report at 13 (cited in note 75). See Model IM language at [12] Administration of Authorized Uses, Performance and Reclamation Bond, and Attachment 5.

⁸¹ DOI Leasing Report at 14 (cited in note 75). See Model IM language at [12] Administration of Authorized Uses, Performance and Reclamation Bond, and Attachment 5.

⁸² Part 2920 regulations apply where a use is "not specifically authorized under other laws or regulations and not specifically forbidden by law" 43 CFR 2920.1-1. See text at note 68.

⁸³ FLPMA § 501(a)(2), 43 U.S.C. 1761(a)(2). See also CEQ CCUS Report at 25, § 4 (cited in note 26).

See also 46 Fed Reg. at 5772 (cited in note 69). ("If an applicant for a land use authorization needs access across public lands, that access will be obtained through a request for a right-of-way under the provision of Part 2800 of this title.")

⁸⁴ See also U.S. Department of Interior, Bureau of Land Management, Enhanced Oil and Natural Gas Production Through Carbon Dioxide Injection, Advance notice of proposed rulemaking, 45 Fed Reg. 11577 (Mar 8, 2006).

5.3 Commencement of the Public Lands Process

5.3.1 Resource Management Plans

A basic building block of FLPMA is its land-use plans, also known as Resource Management Plans (RMPs)⁸⁵ – which BLM refers to as its “land management blueprints.”⁸⁶ Under FLPMA, BLM pursues a “multiple-use and sustained yield mission.”⁸⁷ Each RMP must be consistent with the principles set forth in FLPMA,⁸⁸ such as observing the principles of multiple use and sustained yield,⁸⁹ consideration of present and potential uses of the public lands,⁹⁰ and the weighing of long-term benefits to the public against short-term benefits.⁹¹ Additionally, consideration must be given of the impacts on local economies, uses of nearby private lands and uses of privately owned surface over federally owned minerals.⁹² Each phase of an RMP is to provide public involvement.⁹³

Importantly, FLPMA must proceed in conjunction with the National Environmental Policy Act (NEPA).⁹⁴ Each RMP must be accompanied by an environmental impact statement.⁹⁵ The processes of FLPMA and NEPA work jointly and concurrently, with the majority of NEPA requirements achieved as part of the resource management planning process.⁹⁶

5.3.2 Interim Development Policy and Programmatic Response

Relying on FLPMA § 302(b) and 43 CFR Part 2920, BLM can proceed to authorize CO₂ GS activities on an RMP-by-RMP basis.⁹⁷ However, if the goal is to prioritize commencement of CO₂ GS activities on public lands (in the absence of federal legislation), BLM should instead develop a geologic carbon sequestration program, similar to its processes for establishment of

⁸⁵ FLPMA § 202, 43 USC 1712. 43 CFR 1601.0-5(n) and 43 CFR Subpart 1610. See also U.S. Department of the Interior, Bureau of Land Management, A Landscape Approach, *How We Manage* <<https://www.blm.gov/about/how-we-manage>>

⁸⁶ U.S. Department of the Interior, Bureau of Land Management, *Types of Plans* <<https://www.blm.gov/programs/planning-and-nepa/planning-101/types-of-plans>> See also U.S. Department of the Interior, Bureau of Land Management, *BLM Land Use Plans Under Review or Development as of April, 2021* <<https://www.blm.gov/sites/blm.gov/files/docs/2021-05/lup-approved-list.pdf>>

⁸⁷ U.S. Department of Interior, Bureau of Land Management, *Who We Are, What We Do* <<https://www.blm.gov/about/our-mission>>

⁸⁸ FLPMA § 202, 43 USC 1712. 43 CFR 1601.0-8.

⁸⁹ FLPMA § 202(c)(1), 43 USC 1712(c)(1).

⁹⁰ Id. at 202(c)(5), 43 USC 1712(c)(5).

⁹¹ Id. at 202(c)(7), 43 USC 1712(c)(7).

⁹² 43 CFR 1601.0-8.

⁹³ 43 CFR 1610.2.

⁹⁴ National Environmental Policy Act, 42 USC 4321 et seq.

⁹⁵ 43 CFR 1601.0-6.

⁹⁶ Id. See also U.S. Department of the Treasury, Internal Revenue Service, Credit for Carbon Oxide Sequestration, 86 Fed Reg. 4728, 4728 (Jan 15, 2021).

⁹⁷ See U.S. Department of the Interior, Bureau of Land Management, *How Plans are Developed* <<https://www.blm.gov/programs/planning-and-nepa/planning-101/how-plans-are-developed>>

programs for solar energy⁹⁸ and wind energy⁹⁹ on public lands. Such a path is particularly encouraged by the Council of Environmental Quality (CEQ) in its recently issued NEPA interim guidance for CCUS. The guidance states:

...agencies should consider developing programmatic environmental reviews, such as tiered documents or programmatic environmental impact statements (PEISs) under NEPA, or programmatic biological opinions under the ESA, where such analyses can facilitate more efficient and effective environmental reviews of multiple projects while maintaining strong community engagement.¹⁰⁰

For its example, the CEQ guidance cites to BLM's programmatic efforts related to solar energy development.¹⁰¹ The guidance continues, "Agencies could apply a similar approach in the CCUS context, preparing programmatic analyses assessing impacts associated with the deployment of CCUS, such as to help identify appropriate areas for CCUS project deployment."¹⁰²

Both wind and solar independently began with BLM's issuance of a temporary IM containing its interim development policy, and commencement of a programmatic environmental impact statement (PEIS).¹⁰³

In 2002, BLM issued a temporary IM containing its interim wind energy development policy.¹⁰⁴ The following year, BLM initiated its wind energy PEIS, in cooperation with DOE.¹⁰⁵ In its PEIS, BLM stated:

The BLM has determined that the establishment of a Wind Energy Development Program would be a major federal action as defined by [NEPA]. Thus, the BLM has prepared this [PEIS]. The objectives of the PEIS are to (1) assess the environmental, social, and economic impacts associated with wind energy development on BLM-administered land, and (2) evaluate a number of alternatives to address the question of whether the proposed

⁹⁸ U.S. Department of the Interior, Bureau of Land Management, *Solar Energy* <<https://www.blm.gov/programs/energy-and-minerals/renewable-energy/solar-energy>>

⁹⁹ U.S. Department of the Interior, Bureau of Land Management, *Wind Energy* <<https://www.blm.gov/programs/energy-and-minerals/renewable-energy/wind-energy>>

¹⁰⁰ CEQ CCUS Guidance at 8809 (citations omitted) (cited in 26). The interagency task force in 2010 had recommended a similar approach, stating, "...agencies should consider development of [PEISs] for use in tiered NEPA analysis and initiate this process." Interagency CCS Report at 13 (cited in note 64). Members of the public may submit comments on the CEQ CCUS Guidance until March 18, 2022. CEQ CCUS Guidance at 8808.

¹⁰¹ CEQ CCUS Guidance at 8809–8810 (cited in note 26).

¹⁰² *Id.* at 8810.

¹⁰³ U.S. Department of the Interior, Bureau of Land Management, *Wind Energy Development Programmatic EIS Information Center* <<https://windeis.anl.gov>> U.S. Department of the Interior, Bureau of Land Management, *Solar PEIS* <<https://www.blm.gov/programs/energy-and-minerals/renewable-energy/solar-energy/permitting-and-development/land-use-planning>>

¹⁰⁴ U.S. Department of Interior, Bureau of Land Management, *Interim Wind Energy Development Policy*, Instruction Memorandum No 2003-020 (Oct 16, 2002, expired Sept 30, 2004) <<https://windeis.anl.gov/documents/docs/IM2003-020,InterimWindEnergyDevelopmentPolicy.htm>>

¹⁰⁵ U.S. Department of Interior, Bureau of Land Management, Notice of Intent to Prepare a Programmatic Environmental Impact Statement (EIS) to Evaluate Wind Energy Development on Western Public Lands Administered by the Bureau of Land Management, 68 Fed Reg. 201 (Oct 17, 2003).

action presents the best management approach for the BLM to adopt, in terms of mitigating potential impacts and facilitating wind energy development.¹⁰⁶

The Record of Decision was issued two years later, in December 2005, along with 52 associated land use plan amendments adopting the wind energy program in nine states.¹⁰⁷ For solar energy, BLM issued a temporary IM containing its interim development policy in 2004.¹⁰⁸ The solar energy PEIS was initiated in 2008,¹⁰⁹ with a Record of Decision issued in 2012, along with associated land use plan amendments adopting the solar energy program in six states.¹¹⁰

An interagency task force on CCS in 2010 had recommended a similar approach, stating, “...agencies should consider development of [PEISs] for use in tiered NEPA analysis and initiate this process.”¹¹¹ The Model IM language broadens the CO₂ GS IM to provide for an interim CO₂ GS development policy. The Model IM language additionally includes language from the CEQ NEPACCUS guidance. The Model IM language, together with BLM proceeding with FLPMA land use planning and a PEIS, will provide the quickest route to a BLM CO₂ GS program, absent federal legislation.¹¹²

6.0 Existing Components of a Geologic Carbon Sequestration Framework for Public Lands

6.1 Incentives

The stated purpose of the CO₂ GS IM was to assess the feasibility of geologic carbon sequestration as a use on public lands.¹¹³ The IM’s background section indicated a basic

¹⁰⁶ U.S. Department of Interior, Bureau of Land Management, *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Land in the Western United States* (June 2005) ES-1 <<https://windeis.anl.gov/documents/fpeis/index.cfm>> See also id at 1-1, § 1.1.1.

¹⁰⁷ U.S. Department of Interior, Bureau of Land Management, Notice of Availability of the Record of Decision for the Wind Energy Development Programmatic Environmental Impact Statement (PEIS) and Associated Land Use Plan Amendments, 71 Fed Reg. 1768, 1768 (Jan 11, 2006).

¹⁰⁸ U.S. Department of Interior, Bureau of Land Management, Solar Energy Development Policy, Instruction Memorandum No 2005-006 (Oct 20, 2004, expired Sept 30, 2006). The policy has had several updates.

¹⁰⁹ U.S. Department of Interior, Bureau of Land Management, Notice of Intent To Prepare a Programmatic Environmental Impact Statement To Evaluate Solar Energy Development, Develop and Implement Agency-Specific Programs, Conduct Public Scoping Meetings, Amend Relevant Agency Land Use Plans, and Provide Notice of Proposed Planning Criteria, 73 Fed Reg. 30908 (May 29, 2008). See also U.S. Department of Interior, Bureau of Land Management and Department of Energy, *Final Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States* (July 2012) <<https://solareis.anl.gov>> <<https://solareis.anl.gov/documents/fpeis/index.cfm>>

¹¹⁰ U.S. Department of Interior, Bureau of Land Management, *Approved Resource Management Plan Amendments/Record of Decision (ROD) for Solar Energy Development in Six Southwestern States* (Oct 2012) <https://solareis.anl.gov/documents/docs/Solar_PEIS_ROD.pdf>

¹¹¹ Interagency CCS Report at 13 (cited in note 64).

¹¹² See also Model IM language, [11] Authorizations, regarding Fixing America's Surface Transportation Act (FAST-41) <<https://www.permits.performance.gov/fpisc-content/federal-permitting-improvement-steering-council>> See also Romany M. Webb, et al, *Evaluating Climate Risk in NEPA Reviews: Current Practices and Recommendations for Reform*, Sabin Center for Climate Change Law, Columbia Law School & Environmental Defense Fund (Feb 2022) <https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1185&context=sabin_climate_change>

¹¹³ CO₂ GS IM at 2 (cited in note 12).

connection between feasibility and establishment of greenhouse gas emissions restrictions, stating:

Climate change legislation was previously introduced in Congress to establish a cap-and-trade system in order to restrict greenhouse gas emissions, especially CO₂. Enactment would encourage widespread adoption of CO₂ capture and sequestration technology.¹¹⁴

Instead, the United States still lacks a strong comprehensive legal impetus to restrict and eliminate greenhouse gas emissions nationally.¹¹⁵ Congress has however, offered financial incentives for CO₂ GS activities.¹¹⁶ The most prominent is the Section 45Q tax incentive, which affords a gradual increase up to \$50 per metric ton tax credit annually for CO₂ GS equipment over a 12-year period,¹¹⁷ and an increase up to \$35 annual tax credit per metric ton for CO₂-EOR.¹¹⁸ These Section 45Q tax credits equally apply to operations on public lands.¹¹⁹ However, Congress sought to encourage swift implementation of nationwide carbon capture and sequestration projects, and therefore requires construction to begin before January 1, 2026 in order to qualify for the tax credit.¹²⁰

6.2 Environmental Regulation

6.2.1 Underground Injection Control Program

Congress and the executive branch each regard CO₂ GS as proven and safe technology with “an existing regulatory framework that is capable of safeguarding the environment, public health, and safety.”¹²¹ The overarching regulations are part of the underground injection control (UIC) program under the Safe Drinking Water Act administered by the U.S. Environmental Protection Agency (EPA), or a state where there is primacy.¹²² The purpose of the law is to prevent endangerment of underground sources of drinking water (USDWs).¹²³ Two well categories are pertinent to geologic carbon sequestration. The CO₂-EOR wells are regulated as Class II wells (oil and gas related injection wells),¹²⁴ and CO₂ GS wells are regulated by the more stringent

¹¹⁴ Id. at 10.

¹¹⁵ But compare e.g., Regional Greenhouse Gas Initiative. *The Regional Greenhouse Gas Initiative: an initiative of Eastern States of the US* <<https://www.rggi.org>> Compare e.g., California Low Carbon Fuel Standard. California Air Resources Board, *Low Carbon Fuel Standard* <<https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard>> See also Jacobs and Craig, *Carbon Capture* at 717 (cited in note 1). (“Existing federal and state financial incentives are not adequate to drive full (i.e., 90%) or partial capture of carbon dioxide from coal plants or gas plants.”)

¹¹⁶ CEQ CCUS Report 44, § 7 *Incentives* (cited in note 26).

¹¹⁷ 26 USC § 45Q(b)(1)(A)(i)(I). 26 CFR 1.45Q-1(d)(1). See also CEQ CCUS Report at 47, § 7.4 (cited in note 26).

¹¹⁸ 26 USC § 45Q(b)(1)(A)(i)(II). 26 CFR 1.45Q-1(d)(3).

¹¹⁹ Section 45Q qualifications include secure geological storage “located onshore or offshore under submerged lands within the territorial jurisdiction of States or federal waters.” 26 CFR 1.45Q-3(b)(1)(i) and 1.45Q-3(b)(2)(i).

¹²⁰ 26 USC § 45Q(d)(1).

¹²¹ CEQ CCUS Report at 56 (cited in note 26). See also HR 3684 at 559, § 40301(6) (cited in note 7).

¹²² Safe Drinking Water Act, 42 USC §300f et seq. See also U.S. Environmental Protection Agency, *Protecting Underground Sources of Drinking Water from Underground Injection (UIC)* <<https://www.epa.gov/uic>>

¹²³ 42 USC §300h(b).

¹²⁴ 40 CFR 144.6(b)(2). See also U.S. Environmental Protection Agency, *Underground Injection Control (UIC), Class II Oil and Gas Related Injection Wells (EPA UIC Class II), Enhanced recovery wells*

Class VI wells (wells used for geologic sequestration of CO₂).¹²⁵ There are also regulations for wells transitioning from Class II to Class VI. A Class II well must be regulated and permitted instead under Class VI regulations where the primary purpose of the CO₂ injection is long-term storage and there is an increased risk to USDWs compared to Class II operations.¹²⁶ The regulation identifies relevant risk factors.¹²⁷

6.2.2 Greenhouse Gas Reporting Program

The CO₂ reporting requirements found in EPA's Greenhouse Gas Reporting Program (GHGRP) apply to CO₂-EOR wells¹²⁸ and CO₂ GS wells.¹²⁹

6.2.3 Hazardous Wastes and Hazardous Substances

The Resource Conservation and Recovery Act (RCRA) regulations provide that CO₂ and other substances added to aid the injection process are excluded from regulation as a hazardous waste if injected for CO₂ GS and the process complies with the UIC regulations and other conditions.¹³⁰ However, the sequestered CO₂ remains classified as a solid waste, since it is deemed a "discarded material."¹³¹ EPA has also stated that sequestered CO₂ is not a hazardous substance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).¹³²

7.0 Present Gaps and Anticipated Legal Issues

7.1 Subsurface Mineral Estate and Ownership and Leasing of Pore Space

One of the most conspicuous issues with CO₂ GS on public lands is ownership of pore space. Pore space is the open spaces in subsurface rock and soil.¹³³ Those spaces can be filled with

<<https://www.epa.gov/uic/class-ii-oil-and-gas-related-injection-wells>> Class II EOR wells are authorized by rule for the life of the well or project. 40 CFR 144.22(a).

¹²⁵ 40 CFR 144.6(f). See also U.S. Environmental Protection Agency, Underground Injection Control (UIC), *Class VI - Wells used for Geologic Sequestration of CO₂* <<https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-co2>> Class VI wells are authorized by permit. 40 CFR 144.31 (a).

¹²⁶ 40 CFR 144.19(a). See generally, Ken Allinson, et al, *Best Practice for Transitioning from Carbon Dioxide (CO₂) Enhanced Oil Recovery EOR to CO₂ Storage*, 114 Energy Procedia 6950 (2017) <<https://cdrlaw.org/wp-content/uploads/2020/10/1-s2.0-S1876610217320398-main.pdf>>

¹²⁷ Id. at 144.19(b).

¹²⁸ 40 CFR 98, Subpart UU.

¹²⁹ Id. at Subpart RR.

¹³⁰ 40 CFR 261.4(h). ("Carbon dioxide streams that are captured and transported for purposes of injection into an underground injection well ... are not a hazardous waste, provided the following conditions are met...")

¹³¹ U.S. Environmental Protection Agency, *Hazardous Waste Management System: Conditional Exclusion for Carbon Dioxide (CO₂) Streams in Geologic Sequestration Activities*, Final rule, 79 Fed Reg 350, 355 (Jan 3, 2014).

¹³² Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC 9601 et seq. 75 Fed Reg at 77260 (cited in note 36). Additionally, EPA has stated that sequestered CO₂ including hazardous substances, which complies with the UIC Class VI permit requirements would be considered a federally permitted release, not subject to CERCLA. Id. at 77260.

¹³³ Id at 77232.

fluids such as water or brine,¹³⁴ and the fluids displaced by CO₂ injection.¹³⁵ There is not a set rule as to whether pore space is part of the surface estate or subsurface.¹³⁶ Pore space ownership is generally a property law issue, which can be addressed and clarified under state law.¹³⁷ However, property law on public lands is instead controlled by the Property Clause of the U.S. Constitution.¹³⁸ Where both the ownership and any potential impact on surface estate and subsurface estate rests with the United States, the distinction regarding pore space ownership does not play a role. For the vast majority of its public lands, the BLM controls both the surface rights and the subsurface mineral rights,¹³⁹ leading to “a unique advantage over those that are privately owned: single ownership of large, continuous acreage tracts.”¹⁴⁰

However, in split estates (with BLM holding subsurface mineral rights, and a private party owning surface rights), the issue of pore space ownership becomes quite germane.¹⁴¹ The DOI tends to follow the common law “American rule,” which considers subsurface pore space as part of the surface estate.¹⁴² Under the American rule, the right to the pore space for geologic carbon sequestration beneath a property would therefore belong to the surface owner. The DOI’s Interior Board of Land Appeals (IBLA) has referenced the American rule in several instances.¹⁴³

But for lands where BLM holds subsurface mineral rights, “the mineral rights often take precedence over other rights,” regardless of surface ownership.¹⁴⁴ As a DOE report describes it:

Federal leases are designed for mineral extraction. Oil and gas leases provide for production of hydrocarbons that occupy the subsurface pore space. Injecting CO₂ for EOR is one method of production... Sequestration of CO₂, although similar in many respects to oil and gas operations, is not a production process.”¹⁴⁵

¹³⁴ Id.

¹³⁵ Id.

¹³⁶ See LPDD State model law at 6 (cited in note 20).

¹³⁷ Id.

¹³⁸ US Const Art IV, § 3, cl 2. (“The Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States...”.) See Tara Righetti, et al., *The Carbon Storage Future of Public Lands*, 38 Pace Envir L Rev 181, 199 (2021)

¹³⁹ U.S. Department of Interior, Bureau of Land Management, *Public Land Statistics 2020*, BLM/OC/ST-21/001+1165, P-108-10 (June 2021) (Public Land Statistics) 7, table 1-3 <<https://www.blm.gov/sites/blm.gov/files/docs/2021-08/PublicLandStatistics2020.pdf>>

¹⁴⁰ Split estates represent approximately 8% of the mineral estate administered by BLM. Id, notes b and d. DOE Beneath Federal Lands at ES-1 (cited in note 53).

¹⁴¹ Righetti, et al., 38 Pace Envir L Rev at 191, § II.A (cited in note 138).

¹⁴² DOI Framework Report at 12 (cited in note 63). The American rule has generally been adopted in states. Id. See LPDD State model law at 6 (cited in note 20).

¹⁴³ DOI Framework Report at 12 (cited in note 63). The IBLA is DOI’s administrative appellate review body. The decisions are appealable to U.S. district court. U.S. Department of Interior, Office of Hearings and Appeals, *About the Interior Board of Land Appeals* <<https://www.doi.gov/oha/organization/ibla>>

¹⁴⁴ U.S. Department of the Interior, Bureau of Land Management, *Leasing and Development of Split Estate* <<https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/split-estate>>

¹⁴⁵ DOE Beneath Federal Lands at 41 (cited in note 53). The rationale for the rule “stems from the general interpretation of a mineral grant as giving the grantee the right to explore for, produce, and reduce to possession if found, the minerals granted, but not the stratum of rock containing the minerals.” *Mallon Oil Co.*, 104 IBLA 145, 150 (1988) <<https://www.oha.doi.gov/IBLA/Ibladecisions/104IBLA/104IBLA145.pdf>> In 8% of public lands, the BLM land ownership occurs as subsurface mineral rights. Public Land Statistics at 7, table 1-3 (cited in note 139).

Accordingly, the general rule is that the rights to the pore space resides with the surface owner. However, if CO₂-EOR is being performed, the rights of the surface owner and the subsurface owner are effectively reversed. In that case the pore space rights of the owner of the subsurface mineral estate overrides the pore space rights of the surface owner.¹⁴⁶

This issue becomes particularly complicated for a split estate where the operator is transitioning from CO₂-EOR (where the subsurface mineral owner right to the pore space prevails) to CO₂ GS (where the surface owner maintains the pore space right). In that situation, BLM, along with EPA under the UIC regulations, would need to have a direct role in the transition.

The CO₂ GS IM largely tried to sidestep the split estate issue by applying the IM “only to the BLM-administered surface estate with or without the mineral estate,”¹⁴⁷ coupled with a prioritization of mineral extraction, and an added requirement to avoid interference.¹⁴⁸ In that way, BLM can exercise property rights under the American rule, while at the same time either avoiding or greatly limiting the possibility of opposing demands.

However, the issue remains problematic. The CEQ has noted a “need to clarify ownership, as well as the process for leasing pore space,” and cautioned that “new regulations would likely be required.”¹⁴⁹ The CEQ has suggested potential use of royalty rate reduction credits, “but a number of legal, procedural, and long-term monitoring guidance questions still need to be clarified.”¹⁵⁰ Utilization of a programmatic process could provide a valuable forum to consider these pore space issues.¹⁵¹ For example, the solar and wind energy programmatic processes, BLM included discussion of potential regulations specific to solar and wind energy development competitive leasing.¹⁵²

¹⁴⁶ Sequestration related to oil recovery is a right of the subsurface mineral estate holder, rather than the surface owner. See, e.g., 43 CFR 3101.1-2 (“A lessee shall have the right to use so much of the leased lands as is necessary to explore for, drill for, mine, extract, remove and dispose of all the leased resource in a leasehold subject to...”). The surface owner, however, remains involved. See, e.g., U.S. Department of the Interior and U.S. Department of Agriculture, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, BLM/WO/ST-06/021+3071/REV 07 (2007) 6 and 12 <<https://www.blm.gov/sites/blm.gov/files/uploads/The%20Gold%20Book%20-%204th%20Ed%20-%20Revised%202007.pdf>>

¹⁴⁷ See Model IM language at [5] Policy/Action, Applicability.

¹⁴⁸ CO₂ GS IM at 2 (cited in note 12). (“All BLM land use permits for CO₂ GS exploration and site characterization studies will contain stipulations requiring permittees [sic] to avoid interference with operations authorized under the Mineral Leasing Act, as amended, and other applicable state and Federal laws, and to prevent damage to potentially recoverable mineral resources and other surface and subsurface authorized uses.”)

¹⁴⁹ CEQ CCUS Report at 42 (cited in note 26). The CEQ report also notes that the Interagency CCS Report (cited in note 58) recommended the agencies develop a strategy and regulatory frameworks to address the issues. “The strategy remains under development.” Id.

¹⁵⁰ Id.

¹⁵¹ See § 5.3.2.

¹⁵² 81 Fed Reg. 92122, 91222 (Dec 19, 2016). 43 CFR Subpart 2809.

7.2 Conflict with other Subsurface Uses, Surface Uses and Programs

As noted, the CO₂ GS IM prioritized mineral extraction over CO₂ GS, and required noninterference with the mineral estate,¹⁵³ which seems in conformance with BLM's preferred treatment of mineral rights.¹⁵⁴ A year prior to issuance of the CO₂ GS IM, the interagency CCS task force described the concern:

...authorizing the use of onshore Federal lands for geologic CO₂ sequestration may potentially conflict with other subsurface uses, including existing and future mines, oil and gas fields, coal resources, geothermal fields, and drinking water sources. CO₂ sequestration could also have potential impacts on other surface land uses and programs such as recreation, grazing, cultural resource protection, and community growth and development.¹⁵⁵

To this point, authors Jacobs and Craig advocate that "...this prohibition should be reversed to prioritize geologic sequestration over other, conflicting subsurface land uses."¹⁵⁶ The authors also point out that CO₂ GS activities would likely not conflict with noninvasive surface land uses (e.g., grazing) since CCS (and it would seem all CO₂ GS) utilizes a small surface area (approximately an acre).¹⁵⁷

Yet FLPMA possesses a "multiple-use and sustained yield mission,"¹⁵⁸ and neither a prioritization of mineral rights nor a prioritization of CO₂ GS seems valid under FLPMA's statutory scheme.¹⁵⁹ Instead, BLM is to evaluate land use authorizations with regard to conformance with BLM "plans, policy, objectives and resource management programs,"¹⁶⁰ BLM determines conformance through its planning processes.¹⁶¹ The FLPMA regulations allow further land uses to be authorized which are "in any way compatible or consistent" with authorized uses.¹⁶² The BLM views its management as follows:

Except in areas specifically set aside for conservation purposes, the BLM must multitask to manage the myriad land uses ... some of which may appear to conflict with other uses or resources. That makes the BLM's stewardship mission both complex and challenging, which is exactly what Congress recognized when it passed FLPMA. Thus the Bureau cannot narrowly focus on a single activity at the expense of other authorized

¹⁵³ See text at note 145.

¹⁵⁴ See note 139.

¹⁵⁵ Interagency CCS Report at 67 (cited in note 64).

¹⁵⁶ Jacobs and Craig, *Carbon Capture* at 747 (cited in note 1).

¹⁵⁷ *Id.*

¹⁵⁸ See note 82.

¹⁵⁹ But compare the FLPMA § 302(b) savings clause pertaining to the Mining Law of 1872, but with the exception to "take any action necessary to prevent unnecessary or undue degradation of the lands."

¹⁶⁰ 43 CFR 2920.0-6(a).

¹⁶¹ *Id.* See e.g., 43 CFR § 1610.3-2 and 43 CFR 1610.5-3(a). See also 43 CFR 2920.7(a) – (d).

¹⁶² 43 CFR 2920.7(a). ("In all land use authorizations the United States reserves the right to use the public lands ... in any way compatible or consistent with the authorized land use ...")

uses of the public land. Nevertheless, consistent with the BLM's goal of good stewardship, "multiple use" does not mean every use on every acre.¹⁶³

Indeed, DOI's Oil and Gas Leasing Program report states, "As an overarching policy, BLM will ensure that oil and gas is not prioritized over other land uses, consistent with BLM's mandate of multiple-use and sustained yield."¹⁶⁴ This language has been incorporated into the Model IM language.¹⁶⁵

7.3 Stakeholder Engagement

Meaningful stakeholder engagement plays a particularly important role in CO₂ GS. There is, for example, "... the perceived imbalance between (negative) local impacts and national or global benefits..."¹⁶⁶ It is the recommendation of the CEQ that:

...agencies undertake measures to facilitate a transparent process and meaningful public engagement. In addition to developing robust Tribal consultation and stakeholder engagement plans and conducting regular engagement, agencies should prioritize the development and application of environmental justice best practices for CCUS effort.¹⁶⁷

In addition, the CEQ CCUS Report references the Recommended Best Practices Report published yearly by the Federal Permitting Improvement Steering Council.¹⁶⁸ The Best Practices Report advocates early and proactive stakeholder engagement,¹⁶⁹ as well as establishment and

¹⁶³ U.S. Department of Interior, Bureau of Land Management, What We Manage, BLM National <<https://www.blm.gov/about/what-we-manage/national>>

¹⁶⁴ DOI Leasing Report at 12 (cited in note 75).

¹⁶⁵ See Model IM language at [5] Policy/Action, Uses and Other Laws. See also memorandum subsection 5.2.

¹⁶⁶ See Christine Boomsma, et al, *Community compensation in the context of Carbon Capture and Storage: Current debates and practices*, 101 Intl J of Greenhouse Gas Control 103128 at 1 (August 2020). ("Effective public engagement will be key for successful CCS implementation, with this comes a need for further in-sights into how to most effectively engage with local publics.")

<<https://www.sciencedirect.com/science/article/pii/S1750583620305533>> See also Fiona Jane Coyle, 'Best practice' community dialogue: The promise of a small-scale deliberative engagement around the siting of a carbon dioxide capture and storage (CCS) facility, 45 Intl J of Greenhouse Gas Control 233 (2016)

<https://www.researchgate.net/publication/290510121_%27Best_practice%27_community_dialogue_The_promise_of_a_small-scale_deliberative_engagement_around_the_siting_of_a_carbon_dioxide_capture_and_storage_CCS_facility>

¹⁶⁷ CEQ CCUS Guidance at 8811 (cited in note 26).

¹⁶⁸ CEQ CCUS Report at 35 (cited in note 26). Federal Permitting Improvement Steering Council, *Title 41, Fixing America's Surface Transportation Act (FAST-41): Fiscal Year 2021 Recommended Best Practices for Project Review and Permitting for Infrastructure Projects* (April 2021) (Best Practices Report)

<<https://www.permits.performance.gov/documentation/fy-2021-recommended-best-practices-report>> The Federal Permitting Improvement Steering Council includes councilmembers from relevant federal agencies, including DOI, and is charged with "improving the transparency, predictability, and outcomes of the Federal environmental review and authorization process for certain large-scale critical infrastructure projects." Permitting Dashboard: Federal Infrastructure Projects, *The Federal Permitting Improvement Steering Council* <<https://www.permits.performance.gov/fpisc-content/federal-permitting-improvement-steering-council>> See generally 42 USC. § 4370m et seq.

¹⁶⁹ Best Practices Report at 5 (cited in note 168).

implementation of a pre-review process with pertinent federal, state, Tribal, and local government entities.¹⁷⁰ The Model IM language incorporates these recommended measures.¹⁷¹

7.4 Long-Term Liability and Financial Responsibility

In 2007, DOI framed the liability issue for CO₂ GS in this way:

The scope of liability and term of stewardship will be among the longest ever attempted, lasting up to thousands of years or more. This may prove to be a potential limiting factor for siting, transportation, processing, and storage on Federal lands given [BLM's] multiple-use mission for long-term management of the public lands.¹⁷²

Section 302(b) of FLPMA does not discuss liability, though FLPMA elsewhere addresses liability with regards to rights-of-way.¹⁷³ There, Congress directs BLM to specify the extent of liability through regulation.¹⁷⁴ Instead, regulations promulgated under § 302(b) are less definite, with liability to be as DOI “deems appropriate.”¹⁷⁵ And FLPMA’s regulatory authority is “to carry out the purposes” of FLPMA and other laws applicable to public lands.¹⁷⁶

As part of BLM’s rulemaking for Part 2920, several commenters requested liability provisions be stricken or lessened.¹⁷⁷ Commenters raised concerns regarding the requirement of payment of damages to the United States or to third parties if injury was caused by the holder or its agents.¹⁷⁸ Commenters also objected to the possible imposition of strict liability where DOI determines an activity presents a foreseeable hazard of risk of danger to the public lands.¹⁷⁹

However, BLM deemed its own liability concerns valid, as well as necessary to protect public lands, its users, taxpayers, and the United States.¹⁸⁰ The regulations make the extent of liability clear: it is applied to holders of the land use authorization as well as “all owners of any interest in, and all affiliates or subsidiaries of any holder of a land use authorization.”¹⁸¹ Land use authorization parties carry all liability, including full value of injuries and damage to public lands

¹⁷⁰ Id.

¹⁷¹ See also Model IM language at [7] Discussion of Proposals, Early Stakeholder Coordination. There exist ongoing discussions as to the appropriateness of community compensation for CCS projects. See e.g., Boomsma, et al (cited in note 166). See also Peter Daniels, *Siting Renewable Energy on Public Lands: Existing Regulations and Recommendations*, Harvard Law School Environmental & Energy Law Program, Publication at 8 (May 13, 2021) (“When [ecological or social] concerns arise, BLM should take a proactive, collaborative approach to work with the developers and other stakeholders to determine whether compensatory mitigation, relocation, or other strategies might enable the project to continue.”) <http://eelp.law.harvard.edu/wp-content/uploads/PDaniels_EELP_Renewables-Siting_Final.pdf>

¹⁷² DOI Framework Report (cited in note 63) 1. See also id. at 9.

¹⁷³ FLPMA § 504(h)(1), 43 USC 1764(h)(1).

¹⁷⁴ Id.

¹⁷⁵ FLPMA § 302(b), 43 USC 1732(b).

¹⁷⁶ FLPMA § 310, 43 USC 1740.

¹⁷⁷ 46 Fed Reg. at 5776 (cited in note 69).

¹⁷⁸ Id.

¹⁷⁹ Id.

¹⁸⁰ Id.

¹⁸¹ 43 CFR 2920.7(f).

(which may include strict liability),¹⁸² and injuries and damage to life, person or property of third parties.¹⁸³ In addition, the land use authorization parties must indemnify and hold harmless the United States for liabilities arising “from the authorized occupancy or use of the public lands.”¹⁸⁴ Similarly, EPA declined to take on long-term liability under its UIC Class VI regulations:

Many commenters suggested that, after a GS site is closed, liability should be transferred to the State or Federal government or to a publicly- or industry-funded entity based on a series of rationales (e.g., the need for certainty; the potential for high cost; insurance and legal concerns).¹⁸⁵

EPA however noted that liability for SDWA enforcement remains with the operator throughout the operation, including in certain circumstances after approved site closure, also noting that the operator may remain liable under tort law or other statutes.¹⁸⁶ EPA concluded that “under current SDWA provisions EPA does not have authority to transfer liability from one entity (i.e., owner or operator) to another.”¹⁸⁷

The DOI Framework report,¹⁸⁸ Interagency CCS report,¹⁸⁹ and CEQ CCUS report¹⁹⁰ each discuss the CO₂ GS liability status and policy implications. The CEQ CCUS report identifies certain states that have sought to address the liability issues,¹⁹¹ and notes the “substantial evidence that sequestered CO₂ will remain in place for extended periods of time (centuries, millennia, or longer),” concluding that “risks associated with geologic sequestration of CO₂ are expected to be highest during the operational phase of the project and then decrease over time through post-closure.”¹⁹² The Model IM language remains consistent with the UIC and Part 2920 regulations. Related to long-term liability is financial responsibility.¹⁹³ The Part 2920 regulations do not mandate bonding, making it discretionary as to whether the BLM authorized officer deems it required “to insure the fulfillment of the terms and conditions of the land use authorization.”¹⁹⁴

¹⁸² Id. at 2920.7(f)(1).

¹⁸³ Id. at 2920.7(f)(2).

¹⁸⁴ Id. at 2920.7(f)(3).

¹⁸⁵ 75 Fed Reg. at 77271 (cited in note 36). See also id. at 77272. (“Additionally, many commenters encouraged EPA to consider other State or Federal laws under which liability transfers may be accomplished as models for GS liability transfer.”)

¹⁸⁶ Id. at 77272.

¹⁸⁷ Id.

¹⁸⁸ DOI Framework Report at 9, § B (cited in note 63).

¹⁸⁹ Interagency CCS Report at 73, § IV.C.2 (cited in note 64). See e.g., id. at 75. (“As has been explained in this report, Federal involvement in CCS liabilities has the potential to raise moral hazard and equity issues.”)

¹⁹⁰ CEQ CCUS Report at 43 (cited in note 26).

¹⁹¹ Id.

¹⁹² Id.

¹⁹³ DOI Framework Report at 9 (cited in note 63). (“For how many years are any agreements, leases, permits, or rights-of-way granted and maintained? What amount and type of bonding or other financial considerations are incorporated into the authorization and their regulation, and for what period of time?”) Also see Interagency CCS Report at 75 (cited in note 64).

¹⁹⁴ 43 CFR 2920.7(g).

In its Part 2920 rulemaking, BLM stated that “The bonding provision will be used rarely since the holder will, in most instances, have the clearly demonstrated financial and technical ability to carry out the terms and conditions of the land use authorization.”¹⁹⁵

Given the breadth of the land uses covered by Part 2920, this direction generally has some merit.¹⁹⁶ However, since risks associated with CO₂ GS resemble those of oil and gas leases and geothermal leases, rather than most other identified Part 2920 land uses,¹⁹⁷ plus the need for legal certainty and equal access to the land use authorization process, the Model IM language instead tracks the bonding requirements for oil and gas leasing and geothermal leasing.¹⁹⁸ And further, the Model IM language includes bonding recommendation language from the Oil and Gas Leasing Program Report.¹⁹⁹

7.5 Potential Human Health and Environmental Impacts

The UIC program focuses on the risk of geologic carbon sequestration to underground sources of drinking water. There are, however, other risks aside from aquifer-related ones, including risks related to human health, and the environment, such as surface water and ecosystems.²⁰⁰ The CEQ CCUS Report identifies concerns related to air quality, such as increased ammonia emissions resulting from use of certain CO₂ separation methods, and the need for further study pertaining to the ambient air quality of criteria air pollutants²⁰¹ as well as pollutants emitted from retrofitted industrial facilities.²⁰²

As explained by the Intergovernmental Panel on Climate Change (IPCC):

There are two different types of leakage scenarios: (1) abrupt leakage, through injection well failure or leakage up an abandoned well, and (2) gradual leakage, through undetected faults, fractures or wells. Impacts of elevated CO₂ concentrations in the shallow subsurface could include lethal effects on plants and subsoil animals and the contamination of groundwater. High fluxes in conjunction with stable atmospheric conditions could lead to local high CO₂ concentrations in the air that could harm animals or people. Pressure build-up caused by CO₂ injection could trigger small seismic event.²⁰³

To lessen the gap between the UIC requirements for protection of drinking water and other risks to human health and the environment, the CEQ CCUS Report recommends ongoing research and

¹⁹⁵ 46 Fed Reg. at 5776 (cited in note 69).

¹⁹⁶ See memorandum subsection 5.2.

¹⁹⁷ Id.

¹⁹⁸ See 43 CFR 3104 (oil and gas) and 43 CFR 3214.15 (geothermal).

¹⁹⁹ See memorandum subsection 5.2. For a discussion of financial security for CCS, see Manuel Wifling, *Financial precautions, carbon dioxide leakage, and the European Directive 2009/31/EC on carbon capture and storage (CCS)*, 163 Climatic Change 787 (2020) <<https://link.springer.com/article/10.1007/s10584-020-02904-1#Sec9>>

²⁰⁰ IPCC CCS Report at 43, 71-73 (cited in note 31).

²⁰¹ Criteria air pollutants are particulate matter, ground-level ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. 40 CFR Part 50.

²⁰² CEQ CCUS Report at 40 (cited in note 26).

²⁰³ IPCC CCS Report at 12 (cited in note 31). (“If leakage occurs at a storage site, remediation to stop the leakage could involve standard well repair techniques or the interception and extraction of the CO₂ before it would leak into a shallow groundwater aquifer.”)

data collection “to enable more robust environmental impact analyses and decision-making...”²⁰⁴ The European Union’s CO₂ GS directive states that CO₂ GS sites may only be established if “there is no significant risk of leakage, and if no significant environmental or health risks exist.”²⁰⁵

7.6 Preference for Congressional Action and Further Interim Options

In 2007, DOI reasoned that existing authorities were unlikely “to address all the unique issues that carbon sequestration presents, and specific statutory authority may be preferred.”²⁰⁶ Authors Jacobs and Craig echo these concerns.²⁰⁷

The 2021 infrastructure bill explicitly connects CO₂ GS and federal lands, albeit offshore lands – the outer continental shelf. The act amends the Outer Continental Shelf Lands Act to give DOI the ability to grant a lease, easement, or right-of-way for activities which “provide for, support, or are directly related to the injection of a carbon dioxide stream into sub-seabed geologic formations for the purpose of long-term carbon sequestration.”²⁰⁸ In addition, the act requires DOI to promulgate related regulations within a year.²⁰⁹ This provision and its process will aid development of an onshore CO₂ GS program.²¹⁰

Though a current criticism of direct air capture is that it remains too energy intensive,²¹¹ the longer the United States prolongs those gratifications which are tied to producing carbon dioxide

²⁰⁴ CEQ CCUS Report at 40-41 (cited in note 26). The report views it as “critical to address potential cumulative effects and other environmental justice concerns.” Id at 41.

²⁰⁵ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 [2009] L 140/114 at art 4(4). <<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0031&from=EN>> The European Union finalized this directive in 2009. See also European Commission, *A legal framework for the safe geological storage of carbon dioxide* <https://ec.europa.eu/clima/eu-action/carbon-capture-and-geological-storage/legal-framework-safe-geological-storage-carbon-dioxide_en#ecl-inpage-1452> See Model IM language at [11] Authorizations.

²⁰⁶ DOI Framework Report at 8 (cited in note 63).

²⁰⁷ See Jacobs and Craig, *Carbon Capture* at 742, § V, particularly at 744, §§ V.D.1 and V.D.2, and at 747, § D.6 (cited in note 1).

²⁰⁸ HR 3684 at 574, § 40307(b) (cited in note 7). Outer Continental Shelf Lands Act § 8, 43 USC 1337. See text at notes 42 and 43 pertaining to the proposed Houston industrial corridor CO₂ GS hub. See also Romany M. Webb and Michael B. Gerrard, *Overcoming Impediments to Offshore Carbon Dioxide Storage: Legal Issues in the U.S. and Canada*, Columbia Law School, Sabin Center for Climate Change Law (March 2019) <<http://columbiaclimatelaw.com/files/2019/03/Webb-Gerrard-2019-03-Offshore-Carbon-Dioxide-Storage.pdf>>

²⁰⁹ HR 3684 at 574, § 40307(d) (cited in note 7).

²¹⁰ The Interagency CCS task force had concluded that DOI, EPA, and U.S. Department of Agriculture (for the Forest Service), “should immediately formalize coordination and prepare a strategy to develop regulatory frameworks for onshore and offshore Federal lands.” Interagency CCS Report at 125 (cited in note 64).

²¹¹ See e.g., IPCC Mitigation Report at 3-36, § 3.3.2.2 (cited in notes 2 and 4). The IPCC Mitigation Report utilizes DAC in “relatively few” pathway scenarios. Id at 3-19, § 3.24. However, the report notes:

While many technologies do not fit into the solar model [of systemic transformation], some, including micro nuclear reactors and direct air capture, also have modular characteristics that make them suitable for following solar’s path and benefit from solar’s drivers. However, [photovoltaics] took solar 60 years to become cheap, which is too slow for addressing climate change if a technology is now still at the lab scale.

emissions, the more necessary CO₂ GS will become.²¹² Absent congressional action, the best course for CO₂ GS on public lands at present would be issuance of an interim CO₂ GS development policy, in line with the Model IM language, together with BLM proceeding with FLPMA land use planning and a PEIS.²¹³

In the meantime, BLM should consider limiting any oil lease sales to those which will adequately employ CO₂-EOR, in an effort to eliminate or lessen the carbon footprint of public lands, and aid that of the United States in general.²¹⁴ Public lands themselves are a significant producer of greenhouse gas (GHG). The BLM estimates annual GHG contributions resulting from fossil fuel production on public lands to be over 918 metric tons of carbon dioxide equivalent (Mt CO₂e).²¹⁵ Carbon dioxide represents almost 80% of U.S. GHG.²¹⁶

Limiting production to CO₂-EOR deployment does not seem contrary to the recent district court decision in *Louisiana v. Biden*, where the court barred the administration from pausing new oil and natural gas leases on public lands or offshore.²¹⁷ Indeed, the BLM has previously concluded

A challenge in learning from the solar model is therefore to how to use public policy to speed up innovation over much shorter time frames, e.g. 15 or less years.

Id at 16-44, § 16.3.4 <https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_Chapter16.pdf>

²¹² See, e.g., Michael B. Gerrard, *Direct air capture: An emerging necessity to fight climate change*, 51 American Bar Association Trends (March/April 2020)

<https://www.americanbar.org/groups/environment_energy_resources/publications/trends/2019-2020/march-april-2020/direct-air-capture/> It is possible that CO₂ GS could also aid in reduction of methane. Several Stanford faculty members have proposed the large-scale conversion of atmospheric methane to CO₂. R.B. Jackson, et al, *Methane Removal and Atmospheric Restoration*, 2 Nature Sustainability 436 (June 2019)

<https://www.nature.com/articles/s41893-019-0299-x.epdf?sharing_token=7XdG7xUZBlD0qiisuKi3-tRgN0jAjWel9jnR3ZoTv0P2FKQ9EyOaUpfrOqr1Rfve_LZQEkwbtXyBzOunVw6fFINMo7FzxxFADsUm4eUnZ_22nBqzEAE4xyQWDBp-X2ja15bBEP_5WV5MklyKzt2bu5Gzd72HuC4iK3rYUTwpZJy_O6RL976scv1LCfKTVOR2fmbLtR3-3GSpED5oWTXm5aZnQ3tb9lPA9mNsp8QsNs%3D&tracking_referrer=www.technologyreview.com>

²¹³ See memorandum subsection 5.3.2.

²¹⁴ Such a strategy would be in line with the net-zero path emphasized in Executive Order 14057, *Executive Order on Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, 86 Fed. Reg. 70935 (Dec 13, 2021).

²¹⁵ U.S. Department of Interior, Bureau of Land Management, *2020 BLM Specialist Report on Annual Greenhouse Gas Emissions and Climate Trends* (Nov 5, 2021) 3, figure ES-1 <<https://www.blm.gov/noc/blm-library/report/2020-blm-specialist-report-annual-greenhouse-gas-emissions-and-climate>> It should be noted that BLM does not include CO₂-EOR as a mitigation option. Id. at 108.

²¹⁶ U.S. Environmental Protection Agency, *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020*, EPA 430-P-22-001 (2022) ES-7, figure ES-3 <<https://www.epa.gov/system/files/documents/2022-02/us-ghg-inventory-2022-chapter-executive-summary.pdf>>

Where CO₂-EOR activities serve to nullify the footprint of CO₂ emissions, BLM could perhaps avoid some of the future legal issues that pertain to determining the social cost of carbon (SCC), since placing a monetary value on CO₂ tonnage would seem unnecessary where activities result in carbon neutrality. See *Louisiana v. Biden*, No. 22-30087, Document No. 00516242341 (5th Cir. Mar 16, 2022)

<<https://www.documentcloud.org/documents/21424359-scc-ruling>> See also Environmental Protection Agency, *National Emission Standards for Hazardous Air Pollutants: Coal- and Oil-Fired Electric Utility Steam Generating Units—Revocation of the 2020 Reconsideration, and Affirmation of the Appropriate and Necessary Supplemental Finding; Notice of Proposed Rulemaking*, 87 Fed Reg. 7624, 7648, note 72 (Feb 9, 2022). *Louisiana v. Biden*, No. 22-30087 (5th Cir. 2022) >

²¹⁷ *Louisiana v. Biden*, 2:21-cv-00778, 43 (W.D. La., June 15, 2021) <<http://climatecasechart.com/climate-change-litigation/case/louisiana-v-biden-2/>> <http://climatecasechart.com/climate-change-litigation/wp-content/uploads/sites/16/case-documents/2021/20210615_docket-221-cv-00778_ruling.pdf> See also Appellants'

that CO₂-EOR “could continue under the authority of the MLA up to the point that hydrocarbons are no longer being produced.”²¹⁸ Such a limitation could be coupled with addressing methane fugitive emissions from oil wells.²¹⁹

In Sir David Attenborough’s address to world leaders at COP26, he remarked:

...it’s easy to forget that ultimately the climate emergency comes down to a single number – the concentration of carbon in our atmosphere. The measure that greatly determines global temperatures and the changes in that one number is the clearest way to chart our own story, for it defines our relationship with our world.²²⁰

That single number is 420.85 ppm at time of publication.²²¹

Opening Brief, *Louisiana v. Biden*, No 21-30505, 38–48 (5th Cir filed Nov 16, 2021)

<http://climatecasechart.com/climate-change-litigation/wp-content/uploads/sites/16/case-documents/2021/20211116_docket-21-30505_brief.pdf>

²¹⁸ DOI Framework Report at 8 (cited in note 63). However, the interagency CCS task force dismissed any reliance on MLA authority, stating that MLA addresses the leasing of public lands for mineral extraction, not to “authorize disposal of wastes.” Interagency CCS Report at 65 (cited in note 64).

²¹⁹ International Energy Agency, *Global Methane Tracker 2022* (Feb 2022), *Strategies to reduce emissions from fossil fuel operations* (“Based on the elevated natural gas prices seen in 2021, almost all of the options to reduce emissions from oil and gas operations worldwide could be implemented at no net cost.”).

<<https://www.iea.org/reports/global-methane-tracker-2022/strategies-to-reduce-emissions-from-fossil-fuel-operations>> The report found “significant emissions from the Permian basin in Texas.” *Id.* Overview. See also

Maggie Astor, *Methane Leaks in New Mexico Far Exceed Current Estimates, Study Suggests*, New York Times (Mar 24, 2022) <<https://www.nytimes.com/2022/03/24/climate/methane-leaks-new-mexico.html>> See also

Department of Interior, Orphaned oil and gas wells federal grants guidance (Dec 17, 2021)

<<https://www.doi.gov/sites/doi.gov/files/state-notification-letter-bil-12-17-21.pdf>> See also U.S. Environmental Protection Agency, Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, 86 Fed Reg. 63110 (Nov 15, 2021).

See also U.S. Department of Interior, Press Release, *Interior Department, Federal Partners Announce Interagency Effort to Clean Up Legacy Pollution, Implement Infrastructure Law* (Jan 18, 2022)

<<https://www.doi.gov/pressreleases/interior-department-federal-partners-announce-interagency-effort-clean-legacy>> Yet well investigations will remain necessary. With regard to EOR, DOI has cautioned that, “Existing plugged, abandoned, and orphaned wells within a proposed geologic sequestration area would require reevaluation for integrity and, if necessary, remediated and/or re-plugged to meet the more rigorous requirements.” DOI Framework Report at 8 (cited in note 63).

²²⁰ United Nations, *David Attenborough, People’s Advocate for COP26, Address to World Leaders*, YouTube (Nov 2, 2021) <<https://www.youtube.com/watch?v=o7EpiXViSIQ>>

²²¹ Earth’s CO₂, Daily CO₂ <https://www.co2.earth/daily-co2> (Apr 6, 2022).