

This document was prepared by the Sabin Center for Climate Change Law separate from the LPDD Project. With the Sabin Center’s permission, it is being included here 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>

Model Federal Legislation for Ocean Carbon Dioxide Removal Research*

Introduction

There is now widespread scientific consensus that carbon dioxide removal (CDR) will be needed, alongside deep emissions cuts, to achieve the Paris Agreement’s goal of “[h]olding the increase in global average temperatures to well below 2°C” and ideally to 1.5°C above pre-industrial levels.¹ Modeling shows that global carbon dioxide emissions must reach net-zero in the early 2070s to limit temperature increases to 2°C and even sooner—by the early 2050s—to hold temperature increases to 1.5°C.² Rapid and widespread decarbonization of the global economy is necessary, but likely not sufficient, to achieve net-zero emissions on this timeframe. Almost all modeled scenarios for achieving the Paris Agreement’s goals also involve the use of CDR. This has led the Intergovernmental Panel on Climate Change (IPCC) to conclude that CDR deployment is “unavoidable.”³ According to the IPCC:

“In addition to deep, rapid, and sustained emissions reductions CDR can fulfil three different complementary roles globally or at country level: lowering net . . . emissions in the near term; counterbalancing ‘hard-to-abate- residual emissions (e.g., emissions from agriculture, aviation, shipping, industrial processes) in order to help reach net zero . . . emissions in the mid-term; and achieving net negative . .

* This model law was drafted by Romany M. Webb and Korey Silverman-Roati of the Sabin Center for Climate Change Law. Romany M. Webb is an Associate Research Scholar at Columbia Law School and Deputy Director of the Sabin Center for Climate Change Law. Korey Silverman-Roati is an Associate Research Scholar at Columbia Law School and Climate Law Fellow at the Sabin Center for Climate Change Law. This paper is the responsibility of the Sabin Center for Climate Change Law alone, and does not reflect the views of Columbia Law School or Columbia University. This paper is an academic study provided for informational purposes only and does not constitute legal advice. Transmission of the information is not intended to create, and the receipt does not constitute, an attorney-client relationship between sender and receiver. No party should act or rely on any information contained in this White Paper without first seeking the advice of an attorney. This work was generously supported by Ocean Visions.

¹ Paris Agreement, Dec. 12, 2015, Art. 2(1)(a).

² See generally, IPCC, Summary for Policymakers, in *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* 1, 23 (P.R. Shukla et al. eds, 2022), https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf

³ *Id.* at 36.

. emissions in the long-term.”⁴

Scientists have proposed a range of CDR techniques, including several ocean-based techniques. The ocean already absorbs significant amounts of carbon dioxide from the atmosphere and could, scientists posit, become an even larger carbon sink in the future.⁵ A 2022 report by the U.S. National Academies of Sciences, Engineering, and Medicine (NASEM) concluded that the ocean “includes much of the global capacity for natural carbon sequestration, and it may be possible to enhance that capacity through implementation of ocean-based CDR approaches.”⁶ Those approaches take a variety of forms but, generally speaking, involve in-ocean or coastal activities that remove and durably store carbon dioxide either directly from the atmosphere or from surface ocean waters in a manner that leads to a reduction in atmospheric carbon dioxide levels. Commonly discussed ocean CDR approaches include:

(1) *Ocean fertilization*, which involves adding iron, nitrogen, or phosphorous to the surface ocean to stimulate the growth of phytoplankton that uptake carbon dioxide and convert it into organic carbon.⁷

(2) *Artificial upwelling*, which involves installing vertical pipes in the ocean to transport nutrient-rich water from the deep ocean to the surface, and thereby stimulate the growth of phytoplankton. As in ocean fertilization, the phytoplankton uptake carbon dioxide and convert it into organic carbon, which may end up stored in the deep sea.⁸

(3) *Seaweed cultivation*, which involves growing kelp and other macroalgae that take up carbon dioxide as they grow and store it in biomass, which could later be harvested and used in place of more greenhouse gas-intensive products (e.g., fossil fuels) or sunk into the deep ocean to sequester the carbon it contains.⁹

(4) *Ocean alkalinity enhancement*, which involves adding alkalinity to ocean waters, typically by discharging ground silicate or carbonate rock to the water, which then reacts with carbon dioxide in the water, converting it into other forms of dissolved inorganic carbon (DIC) and thereby enabling the ocean to absorb additional carbon dioxide from the atmosphere.¹⁰

(5) *Electrochemical ocean capture*, which uses electricity to separate ocean water into basic and acidic streams. The basic stream can be added back into the ocean to increase the alkalinity of the water, enabling it to uptake additional carbon dioxide from the atmosphere. The acidic stream can be treated to strip out carbon dioxide, which can then be sequestered

⁴ *Id.*

⁵ Scott C. Doney et al., *A Research Strategy for Ocean-based Carbon Dioxide Removal and Sequestration* 2 (National Academy of Sciences, Engineering, and Medicine, 2022), <https://nap.nationalacademies.org/read/26278/chapter/1>.

⁶ *Id.*

⁷ For more information about ocean fertilization, *see id.* at 77-102.

⁸ For more information about artificial upwelling, *see id.* at 103-126.

⁹ For more information about seaweed cultivation, *see id.* at 127-180.

¹⁰ For more information about ocean alkalinity enhancement, *see id.* at 181-208.

onshore or in sub-seabed geologic formations.¹¹

Several of the techniques described above could also have non-carbon co-benefits. For example, depending on where projects occur, ocean fertilization and artificial upwelling could increase fish stocks, seaweed cultivation could help to combat coastal eutrophication, and ocean alkalinity enhancement and electrochemical ocean capture could mitigate ocean acidification (among other things).¹²

The Need for Research into Ocean-Based CDR

Further research is needed to fully evaluate each ocean-based CDR technique. Important scientific questions remain about the effectiveness of the techniques in removing carbon dioxide and the durability of any associated carbon storage, the scalability of the techniques, the environmental and social risks they might present, and their potential co-benefits.¹³ Many of the remaining scientific questions can only be answered through in-ocean research and, in some cases, relatively large-scale or long-duration field trials may be necessary.¹⁴

Currently, in the U.S., there is no specific legal framework for in-ocean CDR research.¹⁵ Unless such a framework is developed, research projects will be regulated under a variety of general environmental laws, which were developed with other activities in mind and thus may be poorly suited to regulating ocean CDR.¹⁶ Prior studies indicate that, under existing law, some ocean CDR research projects may be subject to multiple overlapping or duplicative permit and other requirements.¹⁷ The time, cost, and complexity associated with navigating those requirements could hinder or entirely prevent some needed ocean CDR research.¹⁸ Conversely, other ocean CDR research may not be adequately regulated under existing law, with prior studies identifying key gaps and shortcomings that could create opportunities for “rogue actors” to pursue projects that are not scientifically sound and/or present unacceptable risks to the environment or communities.¹⁹

¹¹ For more information about electrochemical ocean capture, *see id.* at 209-238.

¹² *Id.* at 256.

¹³ *Id.* at 258-260.

¹⁴ *Id.* at 261-262.

¹⁵ *Id.* at 41.

¹⁶ *Id.* at 52-44.

¹⁷ Korey Silverman-Roati et al., Removing Carbon Dioxide Through Ocean Fertilization: Legal Challenges and Opportunities (2022), https://scholarship.law.columbia.edu/faculty_scholarship/3637/; Romany M. Webb et. al., Removing Carbon Dioxide Through Artificial Upwelling and Downwelling: Legal Challenges and Opportunities (2022), https://scholarship.law.columbia.edu/faculty_scholarship/3337/; Korey Silverman-Roati et al., Removing Carbon Dioxide Through Seaweed Cultivation: Legal Challenges and Opportunities (2021), https://scholarship.law.columbia.edu/faculty_scholarship/2980/; Romany M. Webb et al., Removing Carbon Dioxide Through Ocean Alkalinity Enhancement: Legal Challenges and Opportunities (2021), https://scholarship.law.columbia.edu/faculty_scholarship/2739/.

¹⁸ Korey Silverman-Roati and Romany M. Webb, Conclusion, in *Ocean Carbon Dioxide Removal for Climate Mitigation: The Legal Framework* 310, 317-318 (Romany M. Webb et al. eds, forthcoming 2023).

¹⁹ Romany M. Webb, Introduction, in *Ocean Carbon Dioxide Removal for Climate Mitigation: The Legal Framework* 1, 6-8 (Romany M. Webb et al. eds, forthcoming 2023).

Given these deficiencies in existing law, the 2022 NASEM report called for development of a “clear and consistent legal framework” for ocean CDR research.²⁰ The report emphasized that the legal framework should balance the need for further research to enhance understanding of ocean CDR techniques against the potential risks of such research, and put in place appropriate safeguards to prevent or minimize negative environmental and other outcomes.²¹

Overview of the Model Legislation

The model legislation below would, if enacted by Congress, create a new legal framework specifically for ocean CDR research. This new framework is designed to achieve the dual goals of facilitating needed ocean CDR research, while also ensuring that research occurs in a scientifically sound, safe, and responsible manner. To that end, the model legislation addresses the following key issues:

- *Distinguishing ocean CDR research from deployment:* The model legislation defines a “research project” as an activity undertaken in ocean waters under the jurisdiction of the U.S. “for the purpose of advancing scientific understanding” of ocean CDR techniques. Research is distinguished from deployment, which is defined to mean large-scale projects, typically involving the use of an ocean CDR technique to remove and store 100,000 metric tons or more of carbon dioxide. The model legislation allows the federal agency overseeing ocean CDR research to establish a different threshold for deployment in certain circumstances.
- *Federal authority over ocean CDR research:* The model legislation provides that a single federal agency (described in the legislation as the “lead agency”) shall be responsible for regulating all aspects of ocean CDR research in U.S. ocean waters. This includes near-shore waters in which certain ocean-based activities are currently permitted or otherwise regulated by coastal states (commonly referred to as “state waters”). Under the model legislation, the lead federal agency has sole responsibility for permitting ocean CDR research projects, but may receive input and advice from others, including newly established Regional Research Councils (see below).
- *Defining national research goals for ocean CDR:* The model legislation directs the Ocean Policy Committee, a White House-led federal body tasked with informing and coordinating federal ocean policy, to establish an Interagency Working Group. The Interagency Working Group is to develop and periodically update a national plan for ocean CDR research. The Interagency Working Group would include representatives of key federal agencies with expertise or an interest in ocean CDR research. In developing and updating the national plan for ocean CDR research, the Interagency Working Group would be required to engage with key stakeholders, including Regional Research Councils (see below).
- *Encouraging regional planning for ocean CDR research:* The model legislation designates

²⁰ Doney et al., *supra* note 5, at 36.

²¹ *Id.*

Regional Research Councils made up of state and tribal representatives. The Regional Research Councils are authorized to, among other things, develop research programs to regionally implement the national plan developed by the Interagency Working Group. The Regional Research Councils also consult with the Interagency Working Group on development of the national research plan and with the lead agency on the designation of preferred research zones and the issuance of standard permits for individual research projects (see below).

- *Identifying priority areas for ocean CDR research:* The model legislation directs the lead federal agency to designate preferred zones for ocean CDR research, with input from the Regional Research Councils and other key stakeholders. Research projects within designated zones will be subject to expedited review and permitting by the lead federal agency. Other activities that could interfere with ocean CDR research projects are also restricted in designated zones.
- *Permitting of ocean CDR research:* The model legislation requires any person wanting to undertake an ocean CDR research project in U.S. ocean waters to obtain a permit from the lead federal agency. The lead agency is authorized to issue permits where it determines that the scientific merit of a research project outweighs any potential negative environmental or other effects of that project. The model legislation outlines certain procedural steps that the lead agency must take before issuing a permit. Additional steps apply where a research project would occur outside a designated ocean CDR research zone.
- *Providing for meaningful input by tribal, state, and local governments and communities:* While the model law provides for exclusive federal oversight of ocean CDR research, it requires close collaboration between the lead federal agency and tribes, states, local governments, and others. For example, in designating preferred research zones, the lead agency must be guided by the research programs developed by the Regional Research Councils. The Regional Research Councils include representatives of state governments and Native American Tribes and must hold public hearings to gather input from local communities in developing their research programs. Further, the lead agency must consult with the Regional Research Councils, other federal agencies, and hold public hearings before making decisions to establish research zones or to issue permits outside of research zones.
- *Ensuring adequate funds for environmental cleanup:* The lead agency may require that a person holding a permit maintain a bond or other financial assurance to ensure that funds are available for the cleanup of environmental harms caused by a research project. As ocean CDR techniques may include as-yet unknown environmental harms, ensuring adequate funds are available for cleanup is necessary to ensure that the public is not later asked to pay for large cleanup bills.

Acknowledgements

Development of the model law was informed by a series of stakeholder workshops and interviews conducted in the fall of 2022. For example, in October 2022, the Sabin Center for Climate Change

Law hosted two workshops in which over forty-five scientists, policy-makers, lawyers, and others with expertise in ocean CDR participated. Workshop participants discussed various issues associated with designing an effective legal framework for ocean CDR research, including the appropriate scope of federal authority over research projects, what role other governments – tribal, state, and local – and non-governmental stakeholders should play in overseeing research projects, the permitting and other requirements that should apply to research projects, and financial and liability considerations associated with research projects. Following the workshops, Sabin Center lawyers conducted one-on-one interviews with key stakeholders to obtain further input to inform drafting of the model laws. We are grateful to all who shared their expertise.

We also thank the following individuals who provided feedback on an early draft of the model law: Brad Ack, Chief Executive Officer at Ocean Visions; Ken Buesseler, Senior Scientist at Woods Hole Oceanographic Institution; Wil Burns, Co-Director of the Institute for Carbon Removal Law and Policy at American University and Visiting Professor at Northwestern University; Sarah Cooley, Director of Climate Science at Ocean Conservancy; Meghan Gavin, Partner at Cascadia Law Group PLLC; Becca Loomis, Project Attorney at Natural Resources Defense Council; Adam Orford, Assistant Professor at University of Georgia School of Law; Cymie Payne, Associate Professor at Rutgers University; Lisa Suatoni, Deputy Director, Oceans Division at the Natural Resources Defense Council; and Frances Wang, Associate Director, Carbon Dioxide Removal at ClimateWorks Foundation. We are also grateful to Michael Gerrard, Andrew Sabin Professor of Professional Practice at Columbia Law School and Faculty Director of the Sabin Center for Climate Change Law for his advice and guidance throughout the development of the model law. Funding for this project was generously provided by Ocean Visions.

Model Legislation for Ocean Carbon Dioxide Removal Research

Section 1. Findings and Purposes

(a) Climate change poses a serious threat to the health and safety of current and future generations, as well as the present and future economic well-being and national security of the United States.

(b) Emissions of carbon dioxide and other greenhouse gases have been shown to contribute to climate change. The United States has committed to reducing greenhouse gas emissions by 50 to 52 percent by 2030 and developed a long-term strategy for achieving net-zero greenhouse gas emissions by 2050.

(c) The Intergovernmental Panel on Climate Change has concluded that deployment of carbon dioxide removal will be needed to achieve net-zero emissions.

(d) The ocean has historically absorbed significant amounts of carbon dioxide from the atmosphere. This has caused ocean waters to become more acidic, which limits the ocean's ability to absorb additional carbon dioxide. Ocean acidification and warming due to climate change are also detrimentally affecting ocean ecosystems, which are already stressed due to other human activities, including overfishing and pollution.

(e) The ocean holds great potential for additional uptake and longer-term sequestration of carbon dioxide. A variety of ocean carbon dioxide removal techniques are under consideration and could help to realize this potential, while also delivering other co-benefits, including mitigating ocean acidification.

(f) Further research is needed to better understand the carbon sequestration potential, other benefits, and risks of ocean carbon dioxide removal techniques.

(g) Ocean carbon dioxide removal research projects should be designed to provide an improved and unbiased knowledge base to inform future societal decisions about whether, when, where, and how to deploy ocean carbon dioxide removal techniques. Research projects should be conducted in accordance with sound scientific principles, including with respect to transparency, monitoring and verification, stakeholder and public engagement, and environmental protection.

(h) The Federal Government has a strong interest in regulating ocean carbon dioxide removal research in ocean areas under the jurisdiction of the United States. The Federal Government has exclusive authority over areas lying beyond State waters within U.S. territory and retains regulatory authority to regulate in State ocean waters for the constitutional purposes of commerce, navigation, national defense, and international affairs.

(i) Along with the Federal Government, States, Indian Tribes, and local governments also play important roles in, and have valuable expertise and knowledge relating to, ocean

management and stewardship.

(j) This Act aims to give States, Tribal governments, and local governments and communities meaningful opportunities to participate in policymaking and permitting decisions regarding ocean carbon dioxide removal research.

(k) The purposes of this Act are to facilitate ocean carbon dioxide removal research, while also ensuring that research occurs in a scientifically sound, safe, and responsible manner.

(l) This Act does not apply to or permit the deployment of ocean carbon dioxide removal techniques.

Section 2. Definitions

(a) “Deployment” means an activity or project that involves the use of an ocean carbon dioxide removal technique to remove a total of 100,000 metric tons or more of carbon dioxide from the atmosphere or such other amount as the [lead agency administrator] may specify in regulations adopted pursuant to section 3(b) of this Act.

(b) “Exclusive economic zone” means the ocean waters located seaward of and adjacent to the territorial sea, and extending 200 nautical miles from the baseline, except where otherwise limited by treaty or other agreement recognized by the United States.

(c) “Standard permit” means a permit issued pursuant to section 8 of this Act. A standard permit authorizes the holder to undertake a research project in a specified area of U.S. ocean waters outside a designated ocean carbon dioxide removal research zone.

(d) “Geographic area” means the relevant U.S. ocean waters covered by a given Regional Research Council’s research program, as described in section 5 of this Act.

(e) “Interagency Working Group” means the body created by the Ocean Policy Committee pursuant to section 4 of this Act to establish a national research plan to advance national research priorities for ocean carbon dioxide removal.

(f) “National research plan” means the plan developed by the Interagency Working Group on ocean carbon dioxide removal research pursuant to section 4 of this Act.

(g) “Ocean carbon dioxide removal research zone” means an area of U.S. ocean waters designated by the [lead agency administrator] pursuant to section 6 of this Act.

(h) “Ocean carbon dioxide removal technique” means an activity, process, technology, or system that:

(1) occurs or takes place in the ocean;

(2) extracts carbon dioxide directly from the atmosphere or from ocean water in a manner that leads to reduction of atmospheric carbon dioxide; and

(3) durably stores the extracted carbon dioxide.

Ocean carbon dioxide removal techniques include, but are not limited to, ocean nutrient fertilization; artificial upwelling and downwelling; seaweed cultivation; ocean alkalinity enhancement; and electrochemical engineering approaches to ocean carbon dioxide removal.

(i) “Ocean Policy Committee” means the Committee established in section 8932 of title 10, United States Code.

(j) “Person” means an individual, association, partnership, public or private corporation, or officer, employee, agency, department, or instrumentality of the Federal Government, any Territory, State, Tribal, or local unit of government, or any foreign government.

(k) “Regional Research Council” means an entity designated by the [lead agency administrator] under section 5(a) of this Act.

(l) “Research program” means a regional ocean carbon dioxide removal program developed by a Regional Research Council to advance national research priorities.

(m) “Research project” means an action or activity undertaken in U.S. ocean waters for the primary purpose of advancing scientific understanding of ocean carbon dioxide removal techniques. Research projects may involve the development, testing, evaluation, and demonstration of ocean carbon dioxide removal techniques. Research projects exclude deployment, as defined herein.

(n) “Research zone permit” means a permit issued pursuant to section 7 of this Act. A research zone permit authorizes the holder to undertake a research project in a designated ocean carbon dioxide removal research zone.

(o) “Territorial sea” means the ocean waters located adjacent to the coast of the United States or any territory of the United States, and extending 12 nautical miles seaward of the territorial sea baseline.

(p) “Territorial sea baseline” means a line drawn according to the principles of the Convention on the Territorial Sea and the Contiguous Zone, 15 U.S.T. 1606, and the United Nations Convention on the Law of the Sea, 21 I.L.M., 1261, as recognized by the United States.

(q) “Tribe” means any Federally-recognized Indian or Alaska Native Tribe, band, nation, pueblo, village or community.

(r) “Tribal reserved rights” mean rights to aquatic or cultural resources reserved or held by a Tribe either expressly or implicitly through treaties, statutes, executive orders, or other sources of Federal law.

(s) “U.S. ocean waters” means the ocean waters and submerged lands over which the United States exercises jurisdiction consistent with international law. U.S. ocean waters include:

- (1) the territorial sea;
- (2) the exclusive economic zone;
- (3) the submerged lands underlying the territorial sea and exclusive economic zone;
- and
- (4) other submerged lands of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control.

Notes:

- The model law applies to ocean carbon dioxide removal research projects conducted in “U.S. ocean waters.” The definition of “U.S. ocean waters” in the model law includes all offshore areas over which the U.S. exercises jurisdiction under international law. Areas outside U.S. jurisdiction, such as the high seas, do not fall within the definition of “U.S. ocean waters.” Ocean carbon dioxide removal research projects in those areas are, therefore, not regulated under the model law. We recognize that some other federal statutes do regulate certain activities on the high seas. For example, the Marine Protection, Research, and Sanctuaries Act (MPRSA) regulates the dumping of materials into the waters of the high seas where that dumping occurs from a vessel that is registered, or was loaded, in the U.S.²² Some stakeholders recommended that the model law should similarly apply to ocean carbon dioxide removal research that is conducted on the high seas using U.S. vessels. As currently drafted, the model law does not apply to activities on the high seas. However, Congress might consider high seas applications in the future, especially given that more than 100 countries, including the U.S., recently agreed to a new “High Seas Treaty.”²³ The draft text of the treaty recognizes, among other things, “the need to address, in a coherent and cooperative manner, biodiversity loss and degradation of ecosystems of the ocean, due to, in particular, climate change impacts on marine ecosystems.”²⁴ The draft text envisions the use of area-based management tools, or tools to manage activities in certain areas towards conservation and sustainable use objectives, on the high seas.²⁵ Implementation of the treaty both internationally and in U.S. domestic law should inform any domestic regulation of ocean carbon dioxide removal research on the high seas.
- The model law defines “research project” broadly, with the important clarification that every research project must have the primary purpose of advancing scientific understanding of ocean carbon dioxide removal, and must not involve large-scale deployment. During stakeholder workshops, participants shared a variety of views on how research should be defined, including providing input on whether it must be hypothesis-

²² 33 U.S.C. § 1401.

²³ Draft agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (March 4, 2023), https://www.un.org/bbnj/sites/www.un.org/bbnj/files/draft_agreement_advanced_unedited_for_posting_v1.pdf.

²⁴ *Id.*, Preamble.

²⁵ *Id.*, Art. 1.

driven, include tribal understandings of research, set a limit on the scale or impact of the project, require data disclosure, and/or allow for some level of commercial activity. The question of whether to allow commercial activity has previously received attention from the international community. The parties to the 1972 London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and the 1996 Protocol to that Convention have adopted non-binding guidance on the conduct of ocean fertilization research.²⁶ The guidance defines research to mean an activity “designed to answer questions that will add to the body of scientific knowledge” and states:

Economic interests should not influence the design, conduct and/or outcomes of the proposed activity. There should not be any financial and/or economic gain arising directly from the experiment or its outcomes.²⁷

Many participants in the stakeholder workshops expressed concern that incorporating a similar restriction in the model law could limit private-sector investment in research. They argued that the private sector has played a key role in advancing ocean carbon dioxide removal research to date and private sector funding will be needed to enable additional research in the future. Consistent with the model law’s aim of advancing needed ocean carbon dioxide removal research, the definition of “research project” in the model law does not expressly prevent commercial activity, as long as the primary purpose of the project is to advance scientific understanding of ocean carbon dioxide removal.

- The model law clarifies that large-scale deployment of ocean carbon dioxide removal does not qualify as “research.” Stakeholders expressed differing views on what constitutes large-scale deployment. The model law defines this based on the volume of carbon dioxide removed through use of an ocean carbon dioxide removal technique. The model law sets a default threshold of 100,000 metric tons of carbon dioxide removed. This is consistent with the threshold used by the European Union in its Directive on geologic storage of carbon dioxide, which provides a ‘carve-out’ for research projects “with a total intended storage below 100 kilotonnes.”²⁸ We recognize that this may not be suitable for all projects and have, therefore, authorized the lead agency to set a different threshold for deployment.
- The definition of “ocean carbon dioxide removal technique” in the model law is based on the one used in a 2021 Aspen Institute report on “Guidance for Ocean-Based Carbon Dioxide Removal Projects.”²⁹ That report, and its definition of ocean carbon dioxide removal, were developed with input from twenty-eight experts representing a diverse array

²⁶ Resolution LC-LP.2(2010) on the Assessment Framework for Scientific Research Involving Ocean Fertilization (Oct. 14, 2010).

²⁷ *Id.* at 2.2.2.

²⁸ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the Geologic Storage of Carbon Dioxide and Amending Council Directive 85/227/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.

²⁹ Aspen Institute, Guidance for Ocean-Based Carbon Dioxide Removal Projects: A Pathway to Developing a Code of Conduct 7 (2021), <https://www.aspeninstitute.org/publications/ocean-carbon-dioxide-removal/>

of stakeholder groups, fields of expertise, and geographies.³⁰ The participants in our stakeholder workshops broadly supported the definition as did most reviewers of the draft model law. A small number of reviewers suggested expanding the definition to include activities that do not occur in the ocean, but involve discharges into it (e.g., from coastal facilities). Since that change would significantly expand the range of activities covered by the model law, and was not tested with stakeholders at the workshops, the authors did not implement it. It does, however, warrant further discussion.

- Some stakeholders recommended that the model law define what constitutes “durable” carbon storage. The definition of “ocean carbon dioxide removal technique” refers to techniques that “durably store” carbon dioxide, but does not specify a minimum duration for carbon storage. There is some disagreement within the scientific community as to how long carbon dioxide must remain stored in order for removal projects to deliver climate benefits. Often, however, scientists speak of carbon storage in terms of decades to centuries or millennia.³¹
- Many stakeholders emphasized the need for ocean carbon dioxide removal research to be open and transparent. While this is not expressly addressed in the definition of “research project,” data disclosure requirements are included in the permitting regimes established in sections 7 and 8.

Section 3. Agency Authority

(a) Lead agency

(1) The [lead agency] shall serve as the single lead agency of the Federal Government for the regulation of ocean carbon dioxide removal research in U.S. ocean waters.

(2) In carrying out the responsibilities and authority conferred by this Act, the [lead agency administrator] may obtain advice from Federal, State, Tribal, and local groups, as they may deem appropriate.

(b) Regulations

(1) The [lead agency administrator] may adopt regulations as necessary to carry out the responsibilities and authority conferred by this Act.

Notes:

- The main aim of Section 3 is to confer authority on a single federal agency to permit research projects. This should serve to streamline permitting by ensuring that permit applicants do not need to receive independent approval from multiple federal agencies with different criteria and timelines for consideration and varied levels of experience with ocean carbon dioxide removal. Giving a single agency authority over permitting will serve to

³⁰ One of the authors of this model law – Romany Webb – participated in the expert discussion that informed development of the Aspen Institute report.

³¹ See e.g., Doney et al., *supra* note 5, at 30.

build expertise within that agency, and allow the agency to drive the permitting process forward within the federal government.

- This model law does not specify which federal agency should act as the lead agency because multiple federal agencies may be well placed to fill this role. During stakeholder workshops and individual consultations, participants nominated and made compelling arguments for the National Oceanic and Atmospheric Administration (NOAA) in the Department of Commerce, the Department of Energy, the Bureau of Ocean Energy Management (BOEM) in the Department of the Interior, and the Environmental Protection Agency (EPA) to act as the lead agency. Further discussions between agency experts, stakeholders, and policymakers may be needed to ensure that the lead agency chosen is the right one, and the ultimate decision may be best made by Congress.
- The model law gives the lead federal agency exclusive authority to regulate all ocean carbon dioxide removal research in U.S. ocean waters. As defined in section 2 of the model law, “U.S. ocean waters” include all offshore areas over which the U.S. exercises jurisdiction pursuant to international law. Authority over those areas is shared among the U.S. federal government, coastal states, territories, Native American Tribes, and local governments. Near-shore areas—commonly known as “state waters”—fall under the primary jurisdiction of coastal states and territories. In most areas, state waters extend three nautical miles from the coast; one important exception is in the Gulf of Mexico, where state waters extend nine nautical miles from the coast.³² Native American Tribes and local governments have certain rights and authorities in state waters in some areas.³³ The federal government has relinquished all of its property rights to, and interests in, the submerged land and resources in state waters.³⁴ However, the federal government retains authority to regulate in state waters “for the constitutional purposes of commerce, navigation, national defense, and international affairs.”³⁵ Federal regulation of ocean carbon dioxide removal activities in state waters is authorized under the Commerce Clause and Property Clause of the Constitution.
- Although this model law confers exclusive regulatory authority to a single lead federal agency, we recognize that states, tribes, and local governments will often have an interest in ocean carbon dioxide removal research. The Congressional findings in section 1 emphasize that each group plays an important role in, and has valuable expertise and knowledge relating to, ocean management and stewardship. Section 3(a)(2) expressly authorizes the lead agency to consult with these groups when making decisions about ocean carbon dioxide removal research. The following sections of the model law further define each group’s role in agency decision-making.

³² 43 U.S.C. §§ 1301 & 1312. *See also* U.S. v. Louisiana, 100 S.Ct. 1618 (1980), 420 U.S. 529 (1975), 394 U.S. 11 (1969), 389 U.S. 155 (1967), 363 U.S. 1 (1960), 339 U.S. 699 (1950)

³³ In parts of New York, for example, local governments own the submerged land under state waters pursuant to Colonial patents. *See* Town of Oyster Bay v. Commander Oil Corp., 96 N.Y.2d 566, 572 (N.Y., 2001).

³⁴ 43 U.S.C. § 1311(b).

³⁵ *Id.* § 1314.

Section 4. Interagency Working Group

(a) Establishment

(1) The Ocean Policy Committee shall, within [30 days] of the enactment of this section, establish or designate an Interagency Working Group on ocean carbon dioxide removal research to coordinate the activities specified in subsection (c) of this section.

(2) The Interagency Working Group established under paragraph (1) shall be a subcommittee of the Ocean Policy Committee.

(b) Composition

(1) The Interagency Working Group shall be composed of not fewer than 1 senior level representative from each of the following Federal agencies:

(A) The Army Corps of Engineers;

(B) The Bureau of Ocean Energy Management;

(C) The Department of Energy;

(D) The Department of State;

(E) The Environmental Protection Agency;

(F) The Fish and Wildlife Service;

(G) The National Aeronautics and Space Administration;

(H) The National Oceanic and Atmospheric Administration;

(I) The National Science Foundation;

(J) The United States Coast Guard;

(K) The United States Navy;

(L) The White House Council on Environmental Quality; and

(M) The White House Office of Science and Technology Policy.

(2) To the greatest extent practicable, the Interagency Working Group shall incorporate members and findings from relevant interagency working groups, task forces, or similar bodies existing as of the date of enactment of this Act.

(c) Functions

(1) The Interagency Working Group shall develop and periodically update a national research plan for ocean carbon dioxide removal.

(2) The goal of the national research plan developed pursuant to paragraph (1) shall be to advance understanding of ocean carbon dioxide removal techniques, the role such techniques could play in mitigating climate change, and any environmental, social, or other benefits or risks associated with the techniques.

(3) The national research plan shall establish priorities for research, development, testing, evaluation, and demonstration of ocean carbon dioxide removal techniques during 5-year periods.

(d) Reporting

(1) By no later than [90 days] after its establishment, the Interagency Working Group shall submit the national research plan to the Ocean Policy Committee for consideration and approval.

(2) The Interagency Working Group shall submit an updated national research plan

to the Ocean Policy Committee at 5-year intervals.

(3) Within [30 days] of receiving the national research plan or any updated plan, the Ocean Policy Committee shall either:

(A) approve the plan and forward it to the [lead agency administrator] and each Regional Research Council; or

(B) return the plan to the Interagency Working Group for revision.

(4) If the Ocean Policy Committee returns the national research plan pursuant to paragraph (3)(B), the Interagency Working Group must make any required revisions and submit the revised plan to the Ocean Policy Committee within [90 days]. The Ocean Policy Committee must promptly forward the revised plan to the [lead agency administrator] and each Regional Research Council.

(e) Consultation

(1) In developing and updating the national research plan, the Interagency Working Group shall consult with the Regional Research Councils described in section 5 of this Act.

(2) In developing and updating the national research plan, the Interagency Working Group shall consider the findings of relevant reviews conducted, and reports issued, by States, Tribes, and other Federal Government agencies and research bodies, including the National Academies of Sciences.

(f) Authorization of appropriations

(1) There are authorized to be appropriated to the Ocean Policy Committee such sums as may be necessary to carry out this section.

Notes:

- Section 4 directs the Ocean Policy Committee to establish an Interagency Working Group (IWG) on ocean carbon dioxide removal research. First established by President Trump in 2018³⁶ and codified into law by the 2021 National Defense Authorization Act,³⁷ the Ocean Policy Committee is responsible for informing and coordinating federal ocean policy. A key function of the Ocean Policy Committee is to “identify priority ocean research, technology, and data needs.”³⁸ It is, therefore, well placed to oversee the development of a national research plan for ocean carbon dioxide removal as envisioned in section 4 of the model law.
- Under section 4 of the model law, the Ocean Policy Committee would be required to establish, as a subcommittee, an IWG on ocean carbon dioxide removal research. The IWG would gather expertise from relevant agencies throughout the federal government and develop a national research plan for ocean carbon dioxide removal. Although authority over individual research projects will be centralized in one agency, the IWG gives other agencies meaningful opportunities to provide input on national research priorities. The

³⁶ Executive Order 13840: Ocean Policy to Advance the Economic, Security, and Environmental Interests of the United States, 83 Fed. Reg. 29431 (June 22, 2018).

³⁷ National Defense Authorization Act, § 1055(b).

³⁸ 10 U.S.C. § 8932(b)(3).

national research plan developed by the IWG would be subject to review by the Ocean Policy Committee to ensure it is aligned with other ocean research efforts.

- In developing the national research plan, the IWG is required to consult with Regional Research Councils, described below. The IWG must also consider other relevant reports and studies conducted by states, tribes, and other federal government agencies and research bodies, including the National Academies of Sciences. This should help to ensure that the IWG’s work builds on, and does not duplicate, previous efforts to identify ocean CDR research priorities. Stakeholders who provided input to the model law pointed to the “research strategy for ocean carbon dioxide removal” developed by the National Academies of Sciences and the “CDR science strategy” developed by the National Oceanic and Atmospheric Administration as examples of previous work that could inform the IWG’s development of a national research plan.
- It should be noted that, in this section and throughout the model law, deadlines are set for agency action. The stakeholders we consulted expressed differing views on the appropriate deadlines for certain agency actions. We have taken into account their feedback, as well as the deadlines specified for similar agency actions in other statutes, in setting the deadlines in the model law. However, given the diversity of opinions and variation between existing statutes, the deadlines are specified in square brackets throughout the model law.

Section 5. Regional Research Councils

(a) Designation of Regional Research Councils

(1) The following entities are designated as Regional Research Councils:

(A) The Gulf of Mexico Alliance, comprised of the States of Alabama, Florida, Louisiana, Mississippi, and Texas.

(B) The Northeast Regional Ocean Council, comprised of the States of Maine, Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island.

(C) The Mid-Atlantic Regional Council on the Ocean, comprised of the States of New York, New Jersey, Delaware, Maryland, and Virginia.

(D) The West Coast Ocean Alliance, comprised of the States of California, Oregon, and Washington and the coastal Tribes therein.

(2) The Governor of any coastal State, commonwealth, territory, or possession of the United States that, at the time of enactment of this Act, is not a member of an entity listed in paragraph (1) may apply to the [lead agency administrator] for designation of another entity as a Regional Research Council.

(3) The [lead agency administrator] may designate an entity as a Regional Research Council under paragraph (2) if the entity:

(A) was established by the Governor(s) of one or more coastal States, commonwealths, territories, or possessions of the United States to address regional ocean matters;

(B) co-ordinates and informs ocean policy-making and management of ocean resources on a regional basis;

- (C) has, or includes members who have, experience with environmental issues affecting ocean areas in the region;
- (D) is not duplicative of an existing Regional Research Council designated under paragraph (1); and
- (E) if the entity incorporates two or more States, commonwealths, territories, and possessions of the United States, they share a common ocean or coastal area, without regard to whether the States, commonwealths, territories, and possessions are contiguous.

(b) Composition, Staff and Administrator

- (1) Each Regional Research Council shall have a governing body comprised of:
 - (A) at least 1 voting member from each participating coastal State, designated by the Governor of the coastal State;
 - (B) at least 1 voting member from the Tribal Committee described in subsection (c)(1), designated by the Tribal Committee; and
 - (C) may include such other non-voting members as the Regional Research Council considers appropriate.
- (2) Each Regional Research Council may appoint, and assign duties to, an executive director and such other full- and part-time administrative employees as the Regional Research Council determines are necessary to the performance of its functions.

(c) Committees and Advisory Panels

- (1) Each Regional Research Council shall establish a Tribal Committee.
 - (A) Each Regional Research Council shall notify Tribes within its geographic area of the opportunity to participate in the Tribal Committee within [30 days] of designation the Regional Research Council.
 - (B) The tribal chairperson or other chief executive of a Tribe in the geographic area of a Regional Research Council may appoint members to the Tribal Committee.
 - (C) The Tribal Committee shall develop priorities for ocean carbon dioxide removal research in the geographic area of its relevant Regional Research Council.
 - (D) The Tribal Committee shall assist and advise the Regional Research Council in carrying out its functions under this section.
 - (E) The Tribal Committee shall select, from amongst its members, at least 1 member to appoint to the governing body of the Regional Research Council.
- (2) Each Regional Research Council shall establish a Scientific Committee.
 - (A) Each Regional Research Council shall appoint members with expertise on ocean carbon dioxide removal, ocean science, or other relevant scientific disciplines to the Scientific Committee.
 - (B) Where possible, the Regional Research Council shall appoint members from academic and non-profit organizations within the geographic area of the Regional Research Council.
 - (C) The Scientific Committee shall advise the Regional Research Council on scientific matters relevant to the exercise of its functions under this

section.

(3) Each Regional Research Council shall establish, maintain, and appoint members to such other committees and advisory panels as are necessary or appropriate to assist it in carrying out its functions under this section.

(A) Regional Research Councils may retain outside consultants, as needed.

(B) Federal agencies are authorized to assign staff to aid Regional Research Councils in their work.

(d) Transaction of Business

(1) A majority of the voting members of any Regional Research Council shall constitute a quorum, but one or more such members designated by the Regional Research Council may hold hearings.

(2) All decisions of a Regional Research Council shall be by majority vote of the voting members present, in person or through live video participation, and voting.

(3) The voting members of each Regional Research Council shall select a Chair for such Regional Research Council from among the voting members.

(4) Each Regional Research Council shall meet at appropriate times and places in any of the constituent States of the Regional Research Council at the call of the Chair or upon the request of a majority of its voting members.

(e) Planning Authority

(1) Each Regional Research Council is authorized to develop, and periodically update, an ocean carbon dioxide removal research program to advance the priorities set out in the national research plan developed by the Interagency Working Group pursuant to section 4.

(2) A research program developed pursuant to paragraph (A) shall include:

(A) a list of priority locations for ocean carbon dioxide removal research within the Regional Research Council's geographic area;

(B) a plan for avoiding or minimizing environmental harm from ocean carbon dioxide removal research projects in the Regional Research Council's geographic area;

(C) a plan for avoiding or minimizing conflicts between ocean carbon dioxide removal research and other ocean uses in the Regional Research Council's geographic area; and

(D) a plan for minimizing any adverse impacts of ocean carbon dioxide removal research on coastal communities and maximizing coastal community participation in research projects in the Regional Research Council's geographic area.

(3) Each Regional Research Council that develops a research program pursuant to paragraph (1) shall submit the initial program and all updates to the [lead agency administrator].

(4) Before submitting its initial research program to the [lead agency administrator] pursuant to paragraph (3), each Regional Research Council shall conduct at least 3 public hearings in diverse locations throughout the Regional Research Council's geographic area.

(5) After submission of its first research program, each Regional Research Council

shall conduct at least 3 public hearings every 5 years, at appropriate times and in diverse locations throughout the Regional Research Council's geographic area, so as to allow all interested persons an opportunity to be heard on the Regional Research Council's research program.

(6) Each Regional Research Council may conduct additional public hearings, at appropriate times and in appropriate locations in the Regional Research Council's geographic area, as it determines necessary to allow all interested persons an opportunity to be heard in the development of the Regional Research Council's research program.

(7) Each Regional Research Council shall notify the public of any public hearing through mass and social media at least 30 days in advance of the public hearing.

(f) Consultation Functions

(1) Each Regional Research Council shall consult with, and provide input to, the Interagency Working Group on development of the national research plan described in section 4 of this Act.

(2) Each Regional Research Council shall consult with, and provide input to, the [lead agency] on:

(A) the designation of Ocean Carbon Dioxide Removal Research Zones pursuant to section 6 of this Act; and

(B) the issuance of standard permits pursuant to section 8 of this Act.

(g) Public Education Functions

(1) Each Regional Research Council shall undertake activities aimed at educating members of the public about ocean carbon dioxide removal research. Such activities may include, but are not limited to:

(A) developing and publishing fact sheets and online resources on ocean carbon dioxide removal techniques; and

(B) hosting public information sessions.

(h) Authorization of Appropriations

(1) There are authorized to be appropriated to the [lead agency] such sums as may be necessary to carry out this section.

(2) The lead agency shall make funds available to designated Regional Research Councils to carry out their functions under this section.

Notes:

- Section 5 of the model law establishes a framework for operationalizing the national ocean carbon dioxide removal research plan developed under section 4. Under section 5, designated Regional Research Councils are authorized to develop programs that implement the national plan regionally, taking into account local environmental conditions and ocean / coastal uses. Many participants in the stakeholder workshops supported this type of “regional planning” on the basis that it is an effective means of coordinating activities, minimizing conflicts, and promoting sustainable use of the ocean. The approach reflected in section 5 is consistent with the National Ocean Policy Implementation Plan, which

“supports voluntary regional marine planning, which brings together ocean users to share information to plan how we use and sustain ocean resources.”³⁹

- The model law designates four existing Regional Ocean Partnerships (ROPs) as Regional Research Councils that can, among other things, develop regional ocean carbon dioxide removal research programs. The ROPs are voluntary regional organizations that have been convened by state governors to facilitate better coordination between state agencies, tribes and the federal government to address common issues in ocean and coastal regions. The Infrastructure Investment and Jobs Act (IIJA), passed by Congress in 2021, provided \$56 million in funding to the ROPs to coordinate interstate and intertribal management of ocean and coastal resources.⁴⁰ Congress has also considered other measures to support ROPs’ work. For example, the Regional Ocean Partnership Act introduced in the 117th Congress, proposed to formally recognize and assign responsibilities to ROPs.⁴¹ Section 5 of the model law incorporates ideas from the Regional Ocean Partnership Act.
- The model law allows states and territories not currently participating in ROPs to form their own regional bodies and apply for designation of those bodies as Regional Research Councils. Although formation of new councils is voluntary, the model law sets criteria for the lead agency to consider in designating new councils. Previous efforts to coordinate ocean planning may serve as a guide for the formation of new councils. In 2010, the Obama Administration's Interagency Ocean Policy Task Force developed recommendations for organizing ocean planning.⁴² If states choose to follow those recommendations, new councils might be established for the Alaska/Arctic Region, the Caribbean Region, the Pacific Islands Region, and the South Atlantic Region.
- Although existing ROPs include processes for tribal engagement, the model law aims to formalize tribal involvement in the Regional Research Councils to ensure tribal governments are fully involved in planning for ocean carbon dioxide removal research. This is done by requiring each council to establish a Tribal Committee, the members of which are appointed by tribal governments in the region. The Committee is authorized to appoint at least one voting member to the governing board of the council. The Tribal Committee also provides tribal governments with the opportunity to develop formal priorities for ocean carbon dioxide removal research, and provide input before tribal consultations required in later sections of the model law.
- Some stakeholders expressed concern that the Regional Research Councils may not have sufficient expertise with respect to ocean carbon dioxide removal to develop a research program. The establishment of scientific committees is intended to address this concern,

³⁹ National Ocean Policy Implementation Plan, https://obamawhitehouse.archives.gov/sites/default/files/nop_ip_overview.pdf.

⁴⁰ Infrastructure Investment and Jobs Act, Pub. L. No. 117-58.

⁴¹ Regional Ocean Partnership Act, S.1894, 117th Cong., <https://www.congress.gov/bill/117th-congress/senate-bill/1894/text>.

⁴² The White House Council on Environmental Quality, Final Recommendations of the Interagency Ocean Policy Task Force (2010) https://obamawhitehouse.archives.gov/files/documents/OPTF_FinalRecs.pdf.

by creating a body that formally advises the council on scientific matters, and may develop needed expertise on the techniques.

- Section 5 of the model law requires the Regional Research Councils to engage with local communities and others. Two types of community engagement are provided for. First, public hearings are required before the development of regional research programs to give the public an opportunity to be heard. Second, the councils are tasked with developing fact sheets and online resources and holding information sessions to educate the public on carbon dioxide removal research. These are intended to address concerns that the public will not be well-informed enough to meaningfully engage in the public hearing process.

Section 6. Ocean Carbon Dioxide Removal Research Zones

(a) Authority to Designate Ocean Carbon Dioxide Removal Research Zones

(1) The [lead agency administrator] shall, within [90 days] of submittal of the first national research plan by the Interagency Working Group, designate areas of U.S. ocean waters as ocean carbon dioxide removal research zones.

(2) The notice and comment requirements of the Administrative Procedure Act (5 U.S.C. § 553) are not applicable to agency actions taken pursuant to this section.

(b) Location of Ocean Carbon Dioxide Removal Research Zones

(1) The [lead agency administrator] shall consider designating the following areas within U.S. ocean waters as ocean carbon dioxide removal research zones without limitation:

(A) naval test ranges and other military installations and facilities of the Department of Defense;

(B) wind energy areas designated by the Department of the Interior;

(C) such other areas as the [lead agency administrator] considers appropriate.

(2) The [lead agency administrator] shall establish at least one ocean carbon dioxide removal research zone in the geographic area of each Regional Research Council.

(3) Notwithstanding paragraph (2), the [lead agency administrator] is not required to designate an ocean carbon dioxide removal research zone in the geographic area of a Regional Research Council if the [lead agency administrator] determines that no part of that area is suitable for ocean carbon dioxide removal research, taking into account the factors established in subsection (d).

(c) Designation Decisions

(1) In designating ocean carbon dioxide removal research zones, the [lead agency administrator] shall consider the suitability of the area for research projects, taking into account the following factors:

(A) the potential for research projects in the area proposed to be designated to enhance scientific understanding of carbon dioxide removal;

(B) the effects of designation on the environment, both positive and negative;

- (C) the effects of designation on alternate uses of the ocean, including by Tribes, both positive and negative;
- (D) the effects of designation on coastal communities, including disadvantaged communities, both positive and negative;
- (E) the potential impact on military operations and readiness;
- (F) the extent to which any effects of designation could hinder or contribute to the achievement of local, State, Tribal, or national goals with respect to environmental protection or climate change; and
- (G) consistency with the national research plan adopted pursuant to section 4 and any research program developed pursuant to section 5.

(2) Prior to designating any ocean carbon dioxide removal zone, the [lead agency administrator] shall:

(A) consult with

- (i) any relevant Regional Research Council then in existence;
- (ii) if the carbon dioxide removal research zone site is in State waters, the relevant State; and
- (iii) if the carbon dioxide removal research zone is in waters historically used by a Tribe, or designation of the ocean carbon dioxide removal research zone may interfere with or otherwise impair the exercise of Tribal reserved rights or other Tribal interests, the relevant Tribe;

(B) hold a public hearing in a State, commonwealth, territory, or possession of any relevant Regional Research Council or, if no such Council is in existence, in the State commonwealth, territory, or possession closest to the proposed zone;

(C) notify the public of the public hearing and of other opportunities to comment through mass and social media at least 30 days in advance of the public hearing;

(D) give the public an opportunity to submit comments in writing, including electronically, on the proposed designation; and consider and respond to significant points raised by the public at any hearing held pursuant to subparagraph (2)(B) or in comments submitted pursuant to subparagraph (2)(D).

(d) Public Register of Ocean Carbon Dioxide Removal Research Zones

(1) The [lead agency] shall maintain a register of areas designated as Ocean Carbon Dioxide Removal Research Zones and a map showing the location of each designated zone.

(2) The list and map maintained pursuant to paragraph (1) shall be made available for inspection by the public free of charge in print form at the headquarters of the [lead agency] and in electronic form on the [lead agency's] website.

(e) Actions Affecting Ocean Carbon Dioxide Removal Research Zones

(1) The head of any Federal, State, or local government department or agency or any Tribe proposing to undertake, fund, or permit any action that may affect the conduct of research projects within an ocean carbon dioxide removal research zone

must, prior to the taking of such action, notify the [lead agency administrator].

(2) On receiving a notification under paragraph (1), the [lead agency administrator] shall inform the notifying agency as to whether the [lead agency administrator] objects to the action. The [lead agency administrator] shall object to an action if:

(A) the action is likely to significantly interfere with the conduct of a research project permitted under section 7; or

(B) the action is likely to prevent or significantly restrict future research projects in the ocean carbon dioxide removal research zone.

(3) If an objection is filed under paragraph (2), the department or agency proposing to undertake or permit the action must consult and coordinate with the [lead agency administrator] to ensure that the action does not significantly interfere with, or restrict current or future research projects.

(4) If, after consultation pursuant to paragraph (3), the [lead agency administrator] determines that an action proposed to be undertaken or permitted by another department or agency would unreasonably interfere with, or restrict current or future research projects and there is no practicable means of avoiding such interference or restriction, the action shall not be undertaken or authorized unless it is expressly required by law.

(5) For the avoidance of doubt, this subsection shall not apply to actions licensed, permitted, or otherwise authorized prior to the enactment of this Act.

Notes:

- Section 6 authorizes the lead agency to designate preferred zones for ocean carbon dioxide removal research. The goal is to identify ideal locations for ocean carbon dioxide removal research—i.e., locations where research will yield useful scientific insights and minimize adverse impacts on the environment and communities—and to facilitate streamlined permitting of research projects within those zones. The approach is modeled after similar efforts to streamline permitting of renewable energy projects in certain favorable locations (e.g., the designation of “solar energy zones” and “wind energy zones” on federal lands in some areas).⁴³
- Section 6(b)(1) directs the lead agency to consider designating, as ocean carbon dioxide removal research zones, certain ocean areas that are already used or proposed for use in other applications (e.g., wind energy areas). This direction was included because, in some circumstances, conducting research projects in areas where other activities are already occurring or proposed could help to minimize environmental disruptions and/or have other benefits. For example, there may be benefits to conducting research projects designed to test electrochemical ocean capture systems in areas with existing offshore renewable energy facilities, as those facilities could provide the energy required to operate the ocean capture systems.
- Section 6(c) sets out the criteria to be considered, and the process to be followed, by the lead agency in making zone designation decisions. Among other things, the lead agency

⁴³ See, e.g., Bureau of Land Management, Solar Energy Zones, Solar Energy Permitting and Program Resources, <https://blmsolar.anl.gov/solar-peis/sez/> (last visited Feb. 23, 2023).

must consider whether its designation decision is consistent with the national research plan developed under section 4, and any regional research program developed under section 5. That is, however, only one of several factors to be considered. The lead agency is not bound by the national plan or regional programs and could, for example, designate research zones in areas that were not identified in a regional program where such action is supported by other considerations.

- Section 6(c) provides for public participation in designation decisions through hearings and the submission of electronic comments. The lead agency is required to consider any significant points raised by the public at hearings or in comments. This is in line with the requirements for notice-and-comment rulemaking under the Administrative Procedure Act. The courts have held that, to meet the Act’s requirements, agencies “need not respond to every comment” received from the public but must respond, “in a reasoned manner,” to any “significant public comments.”⁴⁴ Since section 6 of the model law incorporates requirements to accept and consider public comments, actions taken under that section are exempt from the notice and comment requirements set out in the Administrative Procedure Act.
- Section 6(e) restricts certain activities that could interfere with ocean carbon dioxide removal research in designated zones. This section is modeled on section 307 of the Coastal Zone Management Act (CZMA), which requires federal agencies to ensure that certain actions they undertake, permit, or fund are performed in a manner consistent with any applicable state coastal management plan to the maximum extent practicable. Similar to the approach taken under the CZMA, section 6(e) requires government bodies to notify the lead agency about activities that “may affect” ocean carbon dioxide removal research in a designated zone. The lead agency must then assess whether the activity will substantially interfere with or restrict ocean carbon dioxide research and, if it will, work with the other government body to avoid that interference or restriction. Some stakeholders expressed concern that the requirement for government bodies to report every activity that “may affect” ocean carbon dioxide removal research in a designated zone is overly broad and suggested that only activities that significantly interfere with or restrict research should have to be reported. However, identifying activities that will significantly interfere with or restrict ocean carbon dioxide removal research may be difficult and require a detailed understanding of what is involved in research projects, which some government bodies (particularly at the state and local levels) may not possess. The determination is, therefore, better left to the lead agency.
- Section 6 does not include any size limitations on a research zone, as this may be best left to agency discretion and expertise. However, Congress might want to statutorily limit the size of research zones to minimize conflicts with other ocean users and the magnitude of potential effects.

⁴⁴ See generally, *Action on Smoking and Health v. CAB*, 699 F.2d 1209 (D.C. Cir. 1983); *St. James Hosp. v. Heckler*, 760 F.2d 1460, 1470 (7th Cir. 1985); *Ohio Valley Environmental Coalition v. Hurst*, 604 F. Supp. 2d 860, 881 (S.D. W. Va. 2009).

Section 7. Permitting in Ocean Carbon Dioxide Removal Research Zones

(a) Requirement for Permit

(1) No person may undertake a research project in an ocean carbon dioxide removal research zone designated pursuant to section 6, unless that person holds a research zone permit issued by the [lead agency administrator] pursuant to this section.

(b) Permit Applications

(1) The [lead agency administrator] shall require applications for ocean carbon dioxide removal research zone permits. The applications shall include information on:

- (A) the proposed ocean carbon dioxide removal technique;
- (B) the applicant's history of work on ocean carbon dioxide removal;
- (C) the ocean carbon dioxide removal research zone in which the research project will take place;
- (D) the applicant's plan for monitoring the environmental effects of the research project;
- (E) the applicant's plans to disseminate a research and monitoring plan and data from the research;
- (F) the identity of the applicant; and
- (G) such other information as the [lead agency administrator] deems appropriate in light of the factors specified in established in subsection (c)(2) of this section.

(c) Permit Decisions

(1) The [lead agency administrator] may issue a research zone permit, authorizing any person to undertake a research project within an ocean carbon dioxide removal research zone, where the [lead agency administrator] determines that the scientific merit of the project outweighs any potential negative environmental or other effects.

(2) In deciding whether to issue a research zone permit, the [lead agency administrator] shall consider the following factors:

- (A) the scientific merits of the research project to be permitted;
- (B) the potential effects of the project on the environment, both positive and negative, and the applicant's plan for monitoring and managing those effects;
- (C) the potential effects of the project on alternate uses of the ocean, including by Tribes, both positive and negative;
- (D) the potential effect of the project on coastal communities, both positive and negative;
- (E) the extent to which any effects of the project could hinder or contribute to the achievement of local, State, Tribal, or national goals with respect to environmental protection or climate change; and
- (F) consistency with the national research plan adopted pursuant to section 4 and any research program developed pursuant to section 5.

(3) For the avoidance of doubt, and notwithstanding anything in paragraph (2)(F),

the lead agency may issue a research zone permit regardless of whether any regional program has been developed pursuant to section 5.

(4) The [lead agency administrator] shall notify the U.S. Coast Guard of complete permit applications. Where the [lead agency administrator] determines that a research project proposed to take place in an ocean carbon dioxide removal research zone may adversely affect navigation in U.S. ocean waters, the [lead agency administrator] must consult with the U.S. Coast Guard prior to issuing a permit for the project. No permit may be issued for the project if the Coast Guard determines that navigation will be unreasonably impaired.

(d) Timing of Permit Decisions

(1) The [lead agency administrator] shall approve or deny a research zone permit application within [90 days] of receiving a complete application.

(e) Research Zone Permit Conditions

(1) Permits shall specify the location(s) in which the research project is to take place.

(2) Permits shall specify the ocean carbon dioxide removal technique(s) which is the subject of the research project.

(3) Where the research project involves a discharge into ocean waters, the permit shall specify the type and amount of, and methods and procedures for, the discharge.

(4) Where the research project involves the placement of any man-made structure or device in U.S. ocean waters, the permit shall specify the nature and location of the structure or device.

(5) Permits may specify such other requirements, limitations, or conditions as are necessary to assure consistency with any regional program developed pursuant to section 5.

(6) Permits shall specify that a research plan, research procedures, and data and findings of the research will be publicly available, unless the [lead agency administrator] determines that such publication is not in the public interest.

(7) Permits will be subject to a tiered structure of monitoring and review, with more stringent review in the first six months.

(8) The permit shall include requirements with respect to the establishment of monitoring facilities and protocols to assess any ecosystem and wildlife harms.

(f) Permit Term

(1) Permits shall specify an expiration date no later than three years from the date of issue.

(2) The [lead agency administrator] may suspend, modify, or cancel permits pursuant to the terms established in section 12 of this Act.

(3) Permit applicants may apply for renewal by filing an application pursuant to the requirements of subsection (b).

(4) The [lead agency administrator] shall renew permits unless the [lead agency administrator] determines that:

(A) the permit applicant has not complied with the permit conditions;

- (B) the project has caused significant negative effects on the environment or on navigation; or
- (C) the scientific merit of the research project no longer outweighs any potential negative environmental or other effects.

(g) Public Notice and Hearing Requirements

- (1) The [lead agency administrator] shall publish, through mass and social media, a notice informing the public of receipt of a permit application. The notice shall be published in a newspaper of general circulation and on social media for at least 3 consecutive days. All notices must be published within 30 days of receipt of the application by the [lead agency].
- (2) Any person may submit a request for a public hearing on the permit application to the [lead agency administrator]. Requests for public hearings must be submitted to the [lead agency administrator] within [30 days] of the last date of publication of the notice required under paragraph (1). Requests must explain the basis of the need for a public hearing and identify the specific grounds which could lead to the denial or imposition of significant conditions on the permit.
- (3) Within [30 days] of receipt of a request pursuant to paragraph (2), the [lead agency administrator] shall determine whether to hold a public hearing. In making this determination, the [lead agency administrator] shall consider whether the requester has raised substantive and significant issues relating to the permit application, including issues that create a reasonable likelihood that the permit applied for will be denied or be granted only with major modifications to the project because the project, as proposed, may not meet statutory or regulatory criteria or standards.
- (4) If the [lead agency administrator] determines that a public hearing should be held, the [lead agency administrator] shall:
 - (A) notify any relevant Regional Research Council then in existence at least 30 days before the public hearing; and
 - (B) publish, through mass and social media, a notice informing the public of the hearing and of other opportunities for public comment. The notice shall be published in a newspaper of general circulation and on social media for at least 3 consecutive days. The notice shall be published at least 30 days before the public hearing.
- (5) Any public hearing held under this subsection shall be conducted within [90 days] of the receipt of the permit application to which it relates.
- (6) The [lead agency administrator] may give the public an opportunity to submit comments on the permit application in writing, including electronically, in lieu of, or in addition to, holding a public hearing.
- (7) The [lead agency administrator] shall consider and respond to significant points raised by the public at any hearing held pursuant to paragraph (3) or in comments submitted pursuant to paragraph (6).

(h) Public Register of Applications and Permits

- (1) The [lead agency] shall maintain a register of applications received and permits issued under section 7.

(2) No information identified by the applicant as confidential business information shall be included in the register maintained under paragraph (1).

(3) The register maintained under paragraph (1) shall be made available for inspection by the public free of charge in print form at the headquarters of the [lead agency] and in electronic form on the [lead agency's] website.

Notes:

- Section 7 establishes the process for permitting within designated ocean carbon dioxide removal research zones, which is streamlined relative to the process for permitting outside of research zones. The section aims to establish clear application requirements in subsection (b)(1), factors for agency consideration in determining whether to issue permits in subsection (c)(2), and permit conditions in subsection (e). Key conditions include that the permittee will publicly disclose data from the research and will establish monitoring facilities to assess environmental harms. The 3-year permit term is double the 18-month term of research permits issued under the MPRSA. Several stakeholders suggested that an 18-month term was too short to account for potential funding and field-testing delays.
- Section 7(c) authorizes the lead agency administrator to issue permits for research projects in designated zones where he/she/they determine that the scientific merit of the project outweighs any potential negative environmental or other effects. Under section 7(c)(2), in making that determination, the lead agency administrator must consider a range of factors, including (but not limited to) whether the project is consistent with the national research plan developed under section 4 and any regional research program developed under section 5. However, the lead agency administrator is not bound by the national plan or regional programs and could issue permits for projects that are not envisaged in those documents, provided the requirements of section 7 are met.
- Section 7(g) gives members of the public the opportunity to request a public hearing and sets criteria for agency determination of whether to approve or deny that request. This approach is based on the process implemented by the New York Department of Environmental Conservation in determining whether to hold a public hearing on permit approval.⁴⁵ The authors considered and invited comment on two other approaches:
 - One approach involved no public hearing on permit applications. The authors note that an argument for this approach is that public hearings are provided for in the designation of research zones. Therefore, not requiring an additional hearing before issuing a permit would enable faster permit processing and thereby help to incentivize projects within research zones. There is, however, a risk that failing to provide opportunities for public participation in permitting decisions could undermine confidence in agency decision-making and lead to opposition to ocean carbon dioxide removal research.
 - Another approach would be to require a public hearing on every permit application. This would obviate the need for a person to request a hearing but would lengthen the time required to process permit applications.

⁴⁵ N.Y. Comp. Codes R. & Regs. tit. 6, § 621.8 (N.Y.C.R.R.).

- Most stakeholders preferred the public hearing approach adopted in section 7 (though some did recommend that public hearings be required on every permit application). The approach adopted allows for public hearings for more controversial projects but does not require them for all projects, balancing efficiency and public engagement concerns.
- Both sections 7 and 8 of the model law give the lead agency discretion to decide whether to consult with the Coast Guard based on a determination of whether the project may adversely affect navigation in U.S. ocean waters. This approach is based on language in the MPRSA, which requires EPA to consult with the Coast Guard only if it "appears to the Administrator" that an activity to be permitted "may adversely affect navigation."⁴⁶ In consultations, stakeholders suggested this approach works well, and could be replicated in the model law. Some reasoned that most research projects are unlikely to have an impact on navigation (given the nature of the activities likely to be involved) and so requiring consultation with the Coast Guard on every project is likely unnecessary and would add time and complexity to the process. Others may, however, view this approach as giving too much discretion to the lead agency to decide when consultation is required. To guard against this, the model law requires the lead agency to notify the Coast Guard of complete applications, giving the Coast Guard the opportunity to notify the agency of potential issues that might arise.

Section 8. Permitting outside Ocean Carbon Dioxide Removal Research Zones

(a) Requirement for Standard Permit

(1) No person may undertake a research project in any area of U.S. ocean waters outside an ocean carbon dioxide removal zone designated pursuant to section 6, unless that person holds a standard permit issued by the [lead agency administrator] pursuant to this section.

(b) Permit Applications

(1) The [lead agency administrator] shall require applications for standard permits. The applications shall include information on:

- (A) the proposed ocean carbon dioxide removal technique;
- (B) the applicant's history of work on ocean carbon dioxide removal;
- (C) the applicant's plan for monitoring the environmental effects of the research project;
- (D) the applicant's plans to disseminate a research and monitoring plan and data from the research;
- (E) the identity of the applicant;
- (F) the location of the project;
- (G) justification for why the project being pursued outside an ocean carbon dioxide removal research zone; and
- (H) such other information as the [lead agency administrator] deems appropriate in light of the factors specified in subsection (c)(2) of this section.

⁴⁶ 33 U.S.C. § 1416(c).

(c) Permit Decisions

(1) The [lead agency administrator] may issue a standard permit, authorizing any person to undertake a research project outside an ocean carbon dioxide removal zone, where the [lead agency administrator] determines that the scientific merit of the research project outweighs any potential negative environmental or other effects.

(2) In deciding whether to issue a permit for a research project, the [lead agency administrator] shall consider the following factors:

- (A) the scientific merits of the research project proposed to be permitted;
- (B) the suitability of the area in which the project is to take place for ocean carbon dioxide removal research;
- (C) the potential effects of the project on the environment, both positive and negative, and the applicant's plan for monitoring and managing those effects;
- (D) the potential effects of the project on alternate uses of the ocean, including by Tribes, both positive and negative;
- (E) the potential effect of the project on coastal communities, both positive and negative;
- (F) the extent to which any effects of the project could hinder or contribute to the achievement of local, State, Tribal, or national goals with respect to environmental protection or climate change; and
- (G) consistency with any National Research Plan adopted pursuant to section 4 and any relevant regional program developed by pursuant to section 5.

(3) For the avoidance of doubt, and notwithstanding anything in paragraph (2)(G), the lead agency may issue a standard permit for a research project regardless of whether any National Research Plan has been adopted pursuant to section 4 or any relevant regional program has been developed pursuant to section 5.

(4) The [lead agency administrator] shall consult with the following groups on whether to approve a standard permit application:

- (A) any relevant Regional Research Council then in existence;
- (B) the Interagency Working Group on ocean carbon dioxide removal research described in section 4;
- (C) if the research project proposed to be authorized under the standard permit will take place in State waters, the relevant State; and
- (D) if the research project proposed to be authorized under the standard permit is in waters historically used by a Tribe, or may impact Tribal reserved rights or other Tribal interests, the relevant Tribe.

(5) The [lead agency administrator] shall notify the U.S. Coast Guard of complete permit applications. Where the [lead agency administrator] determines that a research project that has applied for a standard permit may adversely affect navigation in U.S. ocean waters, the [lead agency administrator] must consult with the U.S. Coast Guard prior to issuing a permit for the project. No permit may be issued for the project if the Coast Guard determines that navigation will be unreasonably impaired.

(d) Timing of Permit Decisions

(1) The [lead agency administrator] shall approve or deny standard permit applications within [1 year] of receiving a complete standard permit application.

(e) Permit Conditions

(1) Permits shall specify the location(s) in which the research project is to take place.

(2) Where the research project involves a discharge into ocean waters, the permit shall specify the type and amount of, and methods and procedures for, the discharge.

(3) Where the research project involves the placement of any man-made structure or device in U.S. ocean waters, the permit shall specify the nature and location of the structure or device.

(4) Permits may specify such other requirements, limitations, or conditions as are necessary to assure consistency with any relevant regional program developed pursuant to section 5.

(5) Permits shall specify that a research plan, research procedures, and any data or findings of the research will be publicly available, unless the [lead agency administrator] determines that such publication is not in the public interest.

(6) Permits will be subject to a tiered structure of monitoring and review, with more stringent review in the first six months.

(7) The permit shall include requirements with respect to the establishment of monitoring facilities and protocols to assess any ecosystem and wildlife harms.

(f) Permit Term

(1) Permits shall specify an expiration date no later than 3 years from the date of issue.

(2) The [lead agency administrator] may suspend, modify, or cancel permits pursuant to the terms established in section 12 of this Act.

(3) Permit applicants may apply for renewal by filing an application pursuant to the requirements of subsection (b).

(4) The [lead agency administrator] shall renew permits unless the [lead agency administrator] determines that:

(A) the permit applicant has not complied with the permit conditions;

(B) the project has caused significant negative effects on the environment or on navigation; or

(C) the scientific merit of the research project no longer outweighs any potential negative environmental or other effects.

(g) Public Notice and Hearing Requirements

(1) The [lead agency administrator] shall:

(A) hold a public hearing before issuing a standard permit;

(B) notify any relevant Regional Research Council then in existence of the public hearing and of other opportunities to comment at least 30 days before it takes place; and

(C) publish, through mass and social media, a notice informing the public of the hearing. The notice shall be published in a newspaper of general circulation and on social media for at least 3 consecutive days. The final notice shall be published at least 30 days before the public hearing.

(2) The [lead agency administrator] may give the public an opportunity to submit comments on the permit application in writing, including electronically, in lieu of, or in addition to, holding a public hearing.

(3) The [lead agency administrator] shall consider and respond to significant points raised by the public at any hearing held pursuant to paragraph (1) or in comments submitted pursuant to paragraph (2).

[(4) Any person may submit a request for an additional public hearing to the [lead agency administrator].

(A) The request must explain the basis of the need for an additional public hearing and identify the specific grounds which could lead to the denial or imposition of significant conditions on the permit.

(B) The request must be submitted within [30 days] after the first public hearing is held or the due date for the filing of electronic comments, whichever is later.

(C) Within [30 days] of receipt of a request, the [lead agency administrator] shall determine whether to hold a second public hearing. In making this determination, the [lead agency administrator] shall consider whether the requester has substantive and significant issues relating to the permit application that were not adequately addressed in the first public hearing.

(D) If the [lead agency administrator] determines that a second public hearing should be held, the [lead agency administrator shall:

(i) notify any relevant Regional Research Council then in existence at least 30 days before the public hearing; and

(ii) publish, through mass and social media, a notice informing the public of the hearing. The notice shall be published in a newspaper of general circulation and on social media for at least 3 consecutive days. The final notice shall be published at least 30 days before the public hearing.]

(h) Public Register of Applications and Permits

(1) The [lead agency] shall maintain a register of applications received and permits issued under section 8.

(2) No information identified by the applicant as confidential business information shall be included in the register maintained under paragraph (1).

(3) The register maintained under paragraph (1) shall be made available for inspection by the public free of charge in print form at the headquarters of the [lead agency] and in electronic form on the [lead agency's] website.

Notes:

- Section 8 of the model law establishes a process for permitting research projects outside of designated research zones. This is important for two reasons. First, it enables research

projects to be permitted and move forward before zones are designated. Second, it enables the permitting of research projects that cannot take place in designated zones. It is unlikely that research zones will be able to accommodate all types of ocean carbon dioxide removal research. For example, zones established in preferential locations for research on seaweed cultivation may not be conducive to ocean alkalinity enhancement projects. Further, if too many research projects are proposed for a certain zone, the option for permitting outside of zones allows for more needed research to go forward. Projects are still incentivized to apply for permits within research zones, for the reasons described below.

- The basic standard for issuing permits for research projects under section 8 is the same as that set out in section 7—i.e., a permit may only be issued if the scientific merit of the project outweighs any potential negative environmental or other effects. Section 8(c)(2) specifies the factors the lead agency administrator must consider in determining whether to issue a permit. These include, among other things, whether the project to be permitted is consistent with the national research plan developed under section 4 and any regional research program developed under section 5. However, the lead agency administrator is not bound by the national plan or regional programs and could issue permits for projects that are not envisaged in those documents, provided the requirements of section 8 are met.
- Procedures for issuing standard permits are similar to those for research zone permits, with several important distinctions.
 - First, application requirements are slightly more onerous, as applicants must explain why they are applying for a permit to conduct research outside an existing research zone. Since the process to establish research zones could take several months, applying for a standard permit before research zones are established should be seen as sufficient justification for the standard permit application.
 - Second, the lead agency administrator must consult with other agencies and Regional Research Councils before issuing a standard permit. Further, the lead agency must consult with states, if the project is in state waters, and tribes, if the project is in waters historically used by a tribe, or may impact tribal reserved rights or other tribal interests. In research zones, the agency conducts these consultations when designating the zone, obviating the need for additional consultations on individual projects.
 - Third, the lead agency must hold a public hearing before issuing a standard permit. In research zones, public hearings on individual projects are only required if substantive and significant issues are raised. The less stringent public hearing requirement in research zones is in place because public consultations are required before designating zones.
 - Fourth, although not part of the permitting regime, environmental review is likely to be less complex within research zones. As explained further below, the lead agency is encouraged to conduct a programmatic environmental review when designating research zones, which would simplify the environmental review of individual projects within the zone.
- Subsection 8(g)(4) includes, in brackets, an optional process through which members of the public may apply for an additional public hearing, on top of the one required public

hearing. This would allow for more extensive public engagement on projects that may raise substantive and significant issues and may be unlikely to be approved. The process is based on that used by the New York Department of Environmental Conservation to determine whether to hold a public hearing on permit applications (see discussion above).⁴⁷

Section 9. Environmental Review Requirements

(a) General Requirements

(1) Prior to designating any ocean carbon dioxide removal research zone pursuant to section 6, or issuing any research zone or standard permit pursuant to section 7 or 8, the [lead agency] shall:

(A) prepare any environmental assessment or environmental impact statement required under the National Environmental Policy Act (41 U.S.C. § 4332); and

(B) conduct any consultation required under section 7 of the Endangered Species Act (16 U.S.C. § 1536) or section 106 of the National Historic Preservation Act (16 U.S.C. § 470f).

(b) Programmatic Reviews

(1) The [lead agency] shall ensure that preparation of any environmental impact statement required under the National Environmental Policy Act is coordinated with any consultation required under the Endangered Species Act.

(2) Where doing so would expedite preparation of any required environmental impact statement and/or completion of any required consultation, the [lead agency] shall adopt a programmatic approach that:

(A) uses a single, combined process to meet all requirements;

(B) results in combined documentation;

(C) eliminates repetitive discussions of the same issue;

(D) focuses on issues ripe for analysis at each level of review; and

(E) is consistent with the National Environmental Policy Act, Endangered Species Act, and other applicable laws.

(c) Judicial Review

(1) Notwithstanding any other provision of law, a claim seeking judicial review of any zone designation made by, or permit issued by, the [lead agency] pertaining to the review conducted under the National Environmental Policy Act and/or Endangered Species Act shall be barred unless:

(A) the claim is filed not later than [90 days] after the date of publication in the Federal Register of notice of final agency action;

(B) the claim is filed in the United States Court of Appeals for the District of Columbia; and

(C) in the case of an action pertaining to an environmental review conducted under the National Environmental Policy Act:

(i) the claim is filed by a party that submitted a comment during the

⁴⁷ N.Y.C.R.R. § 621.8.

environmental review; and
(ii) any commenter filed a sufficiently detailed comment so as to put the lead agency on notice of the issue on which the party seeks judicial review, or the lead agency did not provide a reasonable opportunity for such a comment on that issue.

Notes:

- Section 9 clarifies that decisions regarding the designation of research zones and issuance of research zone and standard permits are subject to the requirements of the National Environmental Policy Act (NEPA). In stakeholder workshops, many expressed the view that undercutting or skirting NEPA requirements could undermine public confidence in agency decision-making, and lead to public opposition to ocean carbon dioxide removal research. Others, however, expressed concern about the time required to complete NEPA reviews.
- To balance these competing concerns, section 9 directs the lead agency to take a programmatic approach to environmental reviews where possible. It is envisaged that, where designation of a research zone requires preparation of an environmental impact statement (EIS) under NEPA, the lead agency will prepare a programmatic EIS. The agency could then prepare tiered environmental assessments or EISs for individual projects within the zone. This should help to streamline the review and permitting of projects within designated zones and is justified on the basis that projects within the same zone will generally present similar environmental risks.

Section 10. Permit Fees

(a) Permit Application Fees

(1) Any person applying for a permit under section 7 or 8 shall pay fees sufficient to cover the [lead agency administrator's] estimate of reasonable costs that will be incurred by the [lead agency] in processing the permit application. The [lead agency administrator] may impose an additional fee if reasonable processing costs are higher than anticipated.

(2) The [lead agency administrator] shall waive the fee payable under subsection (a)(1) if the project is conducted by a Federal, State, territorial, or local government agency, a Tribe, an educational institution, or a non-profit association or non-profit corporation.

(3) For projects not covered by subsection (a)(2), the [lead agency administrator] may waive all or part of the fee payable under subsection (a)(1) when equitable or in the public interest.

(b) The [lead agency administrator] may impose fees to cover the cost of monitoring and inspecting research projects and enforcing and implementing this Act.

Section 11. Bonds and Other Financial Assurance

(a) The [lead agency administrator] may require that a person holding a research zone permit or standard permit maintain a bond or other financial assurance to ensure that funds are available for the cleanup of environmental harms, if any, caused by a research project.

(b) The bond or other financial assurance may be drawn, distributed, or forfeited as determined by the [lead agency administrator] if the person holding a research zone permit or standard permit fails to perform the obligations referenced in the bond or other financial assurance.

Notes:

- Section 11 of the model law aims to ensure that those conducting research projects have sufficient financial resources to mitigate and manage any environmental harms associated with their projects. The model law gives the lead agency discretion to determine the amount and form of any bond, consistent with the approach taken in other statutory regimes.⁴⁸
- The model law does not provide for the establishment of a centralized fund to cover the cost of cleaning up environmental harms. Such funds have been established in other contexts (e.g., for certain carbon storage projects) and are usually funded through contributions from project developers. Similarly, here, scientists and others undertaking research projects could be required to pay into a fund. Some stakeholder workshop participants and draft reviewers expressed concern that this approach could make the research prohibitively expensive, while others expressed support for establishing a fund. The law does not provide for such a fund at this time, as the authors were persuaded by arguments that the industry is in too early of a stage for the fund to be useful. It may become important as the industry further develops.

Section 12. Permit Suspension and Cancellation

(a) Suspension of Permits

(1) The [lead agency administrator] may suspend, for a specified period of time, a permit issued under section 7 or section 8 of this Act if the [lead agency administrator] determines that:

(A) any provision of this Act, any regulations issued under this Act, or any term of the permit is violated; or

(B) there is a threat of serious, irreparable, or immediate harm or damage to life, property, or the environment.

(2) The [lead agency administrator] shall give the permittee notice of a suspension and an opportunity for a hearing within [30 days] of the suspension.

(3) Where a permit is suspended pursuant to paragraph (1)(A), the suspension shall remain in effect until such time as the violation has been rectified.

⁴⁸ See, e.g., 43 C.F.R. § 3104.5.

(4) Where a permit is suspended pursuant to paragraph (1)(B), and after the permittee has been provided an opportunity to be heard, the [lead agency administrator] may modify the terms of the permit to rectify the threat.

(b) Cancellation of Permits

(1) The [lead agency administrator] may cancel a permit issued under section 7 or section 8 of this Act if the [lead agency administrator] determines that:

(A) any provision of this Act, any regulations issued under this Act, or any term of the permit is violated; or

(B) continued activity pursuant to the permit is likely to cause serious harm or damage to life, property, or the environment and that harm or damage outweighs the benefits, including any scientific benefits, of continued activity pursuant to the permit.

(2) No permit shall be canceled unless the permittee has been given notice and an opportunity for a hearing on the proposed cancellation.

(c) Civil Penalties

(1) Any person who violates any provision of this Act, or of the regulations promulgated under this Act, or a permit issued under this Act shall be liable to a civil penalty of not more than [\$50,000] for each violation to be assessed by the [lead agency administrator].

(2) No penalty shall be assessed until the person charged shall have been given notice and an opportunity for a hearing of such violation.

(3) In determining the amount of the penalty, the gravity of the violation, prior violations, and the demonstrated good faith of the person charged in attempting to achieve rapid compliance after notification of a violation shall be considered by the [lead agency administrator]. For good cause shown, the [lead agency administrator] may remit or mitigate such penalty.

(4) Upon failure of the offending party to pay the penalty, the [lead agency administrator] may request the Attorney General to commence an action in the appropriate district court of the United States for such relief as may be appropriate.

Notes:

- Section 12 establishes the criteria for permit suspension and cancellation, and the terms for imposition of civil penalties. The provision on civil penalties is based on a similar provision in the MPRSA.⁴⁹

Section 13. International Cooperation

(a) The Secretary of State, in consultation with the [lead agency administrator], shall seek effective international action and cooperation to facilitate ocean carbon dioxide removal research and ensure scientifically sound, safe, and responsible research.

⁴⁹ 33 U.S.C. § 1415.

(b) The Secretary of State may, for purposes discussed in subsection (a), formulate, present, or support specific proposals in the United Nations and other component international organizations for the development of appropriate international rules and regulations in support of the policy of this Act.

Notes:

- Section 13 of the model law directs the Secretary of State to take steps to advance international cooperation on ocean carbon dioxide removal research. Section 13(b) specifically envisions work to advance the adoption of international rules for conducting ocean carbon dioxide removal research. There are a number of existing international agreements and rules of customary international law that could have implications for the conduct of research projects.⁵⁰ These include the United Nations Framework Convention on Climate Change, the United Nations Convention on the Law of the Sea, the Convention on Biological Diversity, and the London Convention and Protocol. Those agreements were not, at the time of their adoption, intended to regulate ocean carbon dioxide removal research. There is, therefore, often significant uncertainty and complexity regarding when and how they will apply to research projects. While the parties to one agreement—the London Protocol—have adopted an amendment dealing specifically with so-called “marine geoengineering activities,” that amendment has yet to take effect, adding to the uncertainty surrounding the treatment of ocean carbon dioxide removal research under international law. The U.S. can and should play a leading role in advancing the development of a clear and consistent international legal framework.

Section 14. Relationship to Other Laws

(a) Application of Other Federal Laws

(1) After the effective date of this Act, no agency, department, or instrumentality of the Federal Government may adopt or enforce any requirements with respect to a research project in U.S. ocean waters, beyond those established in this Act. For the avoidance of doubt, such projects shall not require a permit or authorization from any Federal agency, except the [lead agency].

(2) After the effective date of this Act, all licenses, permits, and authorizations other than those issued pursuant to this Act shall be void and of no legal effect, to the extent that they propose to authorize a research project as defined herein in U.S. ocean waters.

(3) Notwithstanding paragraph (2), all licenses, permits, and authorizations issued for a research project in U.S. ocean waters prior to the effective date of this Act shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with applicable law.

⁵⁰ For a fuller discussion of the international legal framework for ocean carbon dioxide removal, see Doney et al., *supra* note 5, at 30.39-52; Romany M. Webb et al., *International Laws Governing Ocean CDR*, in *Ocean Carbon Dioxide Removal for Climate Mitigation: The Legal Framework* 47 (Romany M. Webb et al. eds, forthcoming 2023).

(b) Application of Territorial, State, and Local Laws

(1) After the effective date of this Act, no State, Territory, or local unit of government may adopt or enforce any requirements with respect to a research project as defined herein. For the avoidance of doubt, such projects shall not require a permit or authorization from any State, Territory, or local unit of government.

Notes:

- Section 14 of the model law includes a preemption clause which prevents federal agencies, other than the lead agency, as well as state and local agencies from imposing additional requirements on ocean carbon dioxide removal research projects. This ensures that projects will only require approval from the lead agency under the model law and not from any other federal, state, or local body. This is important to streamline the permitting process. Research by the authors prior to the drafting of this model law indicated that Congress has the constitutional power to preempt state and local regulation of ocean carbon dioxide removal research in state ocean waters and to establish authority over such projects in federal waters, including the Exclusive Economic Zone. Although state regulation would be preempted, states and other groups are given significant opportunities for input into the permitting process, especially through their participation in the Regional Research Councils.
- The broad scope of the preemption clause may be controversial, especially in regards to preemption of Army Corps of Engineers regulation of the placement of structures, the Coastal Zone Management Act requirements for state consultation, and the MPRSA, Clean Water Act, and state laws governing the discharge of materials. The argument for such a broad preemption clause is that requirements imposed by existing statutes duplicate those imposed in the model law and compliance with them would add significant time and complexity to the permitting process.