Scoping the Assessment Agenda for Carbon Removal

Meeting Report

March 14th, 2019

American University, Washington, D.C.

INSTITUTE *for* CARBON REMOVAL LAW AND POLICY

On March 14, 2019, the Institute for Carbon Removal Law and Policy hosted a workshop at American University on the assessment of carbon removal. Participants consisted mainly of representatives from American environmental non-governmental organizations (NGOs), along with several participants who are experts in the assessment of various carbon removal-related activities. (See Appendix I). This report summarizes the discussions at and outcomes from the workshop.

I. Workshop Background

The carbon removal assessment workshop emerged from a prior meeting that the Institute convened at the Wingspread Center in Racine, Wisconsin, in September 2018. That meeting brought together representatives from nearly two dozen US-based environmental and social justice NGOs to discuss carbon removal. While some organizations represented at the meeting had already begun engaging with carbon removal as a component of their climate change work, many organizations had yet to move beyond early internal discussions of the topic. During the course of the Wingspread meeting, NGO representatives expressed a need for information and tools to guide individual NGOs and society at large in the comparative assessment of the many different existing and proposed forms of carbon removal.[1]

As part of an ongoing project to identify and develop relevant tools for assessing carbon removal, the Institute convened the carbon removal assessment workshop to solicit input and ideas from a range of stakeholders and experts. The workshop was designed to help ensure that the Institute identifies and develops tools that meet NGOs' needs and interests as they develop their own positions on carbon removal-related matters.

II. Workshop Process

The workshop had four sessions: an introductory session and three sessions aimed at different aspects of the assessment agenda (See Appendix II).

During the introductory session, workshop participants discussed how they would, from their distinct individual and institutional perspectives, go about assessing various hypothetical carbon removal projects and programs. They were specifically asked to identify the kinds of information they would want about those projects and programs and the processes they might use to gather that information. (See Appendix III.)

[1] A report from the Wingspread meeting is available here: https://carbonremov.al/wingspread2018. For a primer on carbon removal options, see David Morrow et al. (2018) "Why Talk About Carbon Removal?" Institute for Carbon Removal Law and Policy, Washington DC, available at https://carbonremov.al/whytalk.

Building on the interests, concerns, and approaches that participants discussed in the introductory session, the remaining sessions drilled down into particular questions about how to assess carbon removal. Session 2 aimed to identify what Institute staff called different "objects of assessment" for carbon removal at different scales. The idea here was to unpack precisely *what* people are aiming to assess when they call for the assessment of carbon removal. For instance, is the object assessment an individual technology? A discrete project? Some larger program or portfolio? Session 3 then asked what aspects of those technologies, projects, etc. participants saw as most important to assess, including climate impacts, broader environmental impacts, social impacts, and so on. Session 4 aimed to identify tools that could be used to assess the objects identified in Session 2 along the dimensions identified in Session 3. Throughout the day, participants also discussed the politics of carbon removal and exchanged perspectives on carbon removal and carbon removal-related policies.

III. Workshop Outcomes

During Sessions 2, 3, and 4 of the workshop, the group generated structured lists of potential objects of assessment, potential dimensions of assessment, and potential assessment tools.

Session 2: Objects of Assessment

Typical assessments of carbon removal aim to answer questions like, "How much carbon dioxide could ***x*** remove per year?" The Institute's Director of Research, David Morrow, opened Session 2 by noting that most assessments of carbon removal to date ask these questions about the same *type* of thing. More specifically, the ***x*** in "How much carbon dioxide could ***x*** remove per year?" has almost always been a practice or technology. These practices or technologies are sometimes understood quite narrowly, as when Phil Renforth and colleagues assess the potential for ocean alkalization using limestone, and sometimes quite broadly, as when Sabine Fuss and colleagues summarize the potential for bioenergy with carbon capture and storage (BECCS) across a wide range of particular ways of implementing BECCS.

Challenging participants to expand the assessment agenda, Morrow argued that the focus on technologies is neither the only nor always the best approach to assessing carbon removal. During the introductory exercise in Session 1, for instance, participants had discussed the assessment of a discrete carbon removal project--namely, a single, relatively small-scale ethanol plant fitted with carbon capture and storage (CCS)--as well as a larger project involving ocean upwelling and an international government-backed program to promote biochar across North America. In those cases, the ***x*** in "How much carbon dioxide could ***x*** remove per year?" stood not for a technology, but for a particular project or program. In other words, an assessment of those projects or programs would be assessing a *different kind of object* than an assessment that focuses on a technology in the

abstract. Thus, technologies are not the only possible objects of assessment. Furthermore, assessing particular projects or programs allows a more concrete weighing of risks and benefits, making it better for certain purposes than more abstract assessments.

The central question for Session 2, then, was what kinds of objects society might want to assess when it assesses carbon removal. In other words, what kind of thing might ***x*** be in questions like, "How much carbon dioxide can ***x*** remove in a year?" or "What would the environmental side effects of ***x*** be?"

Table 1 lists, in no particular order, the possible objects of assessment identified during the workshop, along with a range of "contextual assessments," understood as background conditions that might affect (or be affected by) the potential, environmental impacts, or other aspects of one of the "first-order" objects of assessment. Several workshop participants expressed particular interest in conducting or reading these contextual assessments; they want to know how carbon removal fits into some broader picture.

The broad range of categories suggests the possibility for assessing carbon removal from a number of different angles and with a number of different aims.

TABLE 1. OBJECTS OF ASSESSMENT
Objects of First-Order Assessments
Carbon removal projects (e.g., a single direct air capture facility)
Carbon removal programs (e.g., a state-level program to promote soil carbon sequestration)
Carbon removal portfolios* (e.g., a national mix of negative emissions technologies)
Sectors (e.g., buildings or agriculture)
Supply chains (e.g., for biofuels or building materials)
Carbon removal-related policies (e.g., the 45Q tax credit for carbon capture and storage)
Technologies (broadly defined [e.g., BECCS] or narrowly defined [e.g., ocean liming])
Contextual Assessments
Politics
Incentive structures
Power structures
International agreements

* Note that carbon removal portfolios could be defined in two importantly different ways. They could be defined concretely in terms of a set of technologies (e.g., a portfolio that combines BECCS, afforestation, and direct air capture with carbon storage [DACCS]) or more abstractly in terms of a set of desired outcomes or characteristics (e.g., 2.5 GtCO2/yr of total carbon removal at no more than $100/tCO2).

Session 3: Dimensions of Assessment

Whereas Session 2 focused on what kinds of things various actors might want to assess, Session 3 focused on what those actors might want to know *about* those objects of assessment. For instance, when considering a particular afforestation project, an NGO might want to know how much carbon it could sequester, how much it would cost, how it would impact biodiversity, how it would impact rural livelihoods, and so on. These attributes or features of the project--sequestration potential, cost, environmental impacts, and social impacts--are examples of what the Institute refers to as "dimensions of assessment."

Many of the obvious dimensions of assessment are already widely recognized in the academic literature and in NGO statements on carbon removal. These dimensions include climate impacts, cost-effectiveness, broader environmental impacts, and social impacts. Workshop participants drilled down into those categories, as well as identifying a range of dimensions of assessment related to governance. Table 2 lists, in no particular order, a set of indicative dimensions of assessment identified and discussed during the workshop. This is not presented as an exhaustive list but rather as a starting point for additional work.

Various items in the "Governance Considerations" category merit some further explanation. What does it mean, for instance, to assess a carbon removal technology along the "barriers to adoption" dimension? It involves identifying the barriers to adoption facing that particular technology and then, as a separate matter, determining what those barriers imply about the technology. For two technologies that offer significant climate benefits with relatively low environmental and social impacts, the one with higher barriers to adoption would be less attractive than the technology with lower barriers to adoption. But for much riskier technologies, those facing lower barriers to adoption might provoke greater concern than those facing higher barriers to adoption. Similar remarks apply to the assessment of the regulatory environment, political feasibility, regulatory burdens on firms, and the incentive and power structures related to the project, program, technology, etc. Other dimensions listed under "Governance Considerations" do not display this context-sensitive quality. For instance, better accounting methodologies and more transparent reporting make projects better, other things being equal.

Note that different actors are likely to focus on different dimensions from Table 2, while a complete assessment would address a wider range of dimensions. For instance, a firm looking to implement a carbon removal project would be especially interested in the potential rate of removal, cumulative potential, cost-effectiveness, financing (crucially including whether financing would be

available up front or only after sequestration), the regulatory environment (including the regulatory burdens involved in implementing the project) and liability regimes, and accounting methodologies. Banks would likely be interested in these same dimensions, along with any social and environmental impacts that feed into their social and environmental standards for project financing. A social justice-focused non-governmental organization (NGO) may be especially interested in the social impacts, the extent of public consultation, transparency, liability regimes, power structures, and coherence with local social values. Still other kinds of organizations would focus on other combinations of the dimensions listed above. A complete assessment would address all of these dimensions, likely through a socially distributed assessment by a wide range of actors.

TABLE 2. DIMENSIONS OF ASSESSMENT	
Technological Considerations	**Environmental Impacts**
Rate of lifecycle removals (tCO2/yr)	Environmental risks, including cumulative impact assessment and effects on tipping elements
Cumulative sequestration (tCO2)	Co-benefits/co-effects
Durability and certainty of removals	Transboundary impacts
Cost-effectiveness ($/tCO2), including future changes in cost-effectiveness	Impacts on land use (including changes to use of freshwater and marine surface area)
Damages avoided	Impact on environmental justice
Scalability	
Technological maturity	
Social Impacts	**Governance Considerations**
Social risks/safety	Regulatory environment
-Impacts on food and water security	Political feasibility
-Impacts on human health	Barriers to adoption
-Effects on land tenure	Accounting methodologies
Equity considerations, including the distribution of costs and benefits	Transparency
Social co-benefits/co-effects, including effects on local or regional climate resilience	Financing, including sources, timing, structure, financial risk, and connection to markets (e.g., offset markets)

TABLE 2. DIMENSIONS OF ASSESSMENT (Cont.)	
Social Impacts (Cont.)	**Governance Considerations (Cont.)**
Economic impact (e.g., jobs, livelihoods)	Liability regime
Public perception	Constituencies, current and future
	"Moral hazard" effects
	Capacity for adaptive governance
	Potential for path dependency
	Incentive and power structures
	Extent of public consultation
	Coherence with various social values
	Regulatory burden on firms and organizations implementing projects

Session 4: Tools for Assessment

In the final session of the day, Institute staff prompted participants to identify specific tools that they would or could use to assess carbon removal projects, programs, etc. along the dimensions outlined in Table 2. The discussion during this session emphasized four keys points.

First, many of the tools needed to assess certain aspects of carbon removal already exist because they are used to assess other kinds of projects, programs, etc. along the same dimensions. For instance, there are standard procedures and tools for conducting environmental impact assessments, social impact assessments, economic impact assessments, cost-benefit analyses, cost-effectiveness analyses, and so on.

Second, most of the carbon removal-specific tools relate, in one way or another, to monitoring, reporting, and verification. For instance, one workshop participant identified LIDAR-based land-cover maps as a valuable tool for monitoring carbon removal in reforestation projects. Another participant stressed the difficulty in monitoring soil carbon across the various parts of even a single farm. With regards to reporting and verification, lifecycle emissions calculators exist for other domains but would need to be adapted for various approaches to carbon removal. Similarly, accounting methodologies and corporate reporting standards would need to be tailored to the specific questions surrounding the removal and sequestration of atmospheric carbon.

Third, some workshop participants suggested policy instruments that could make it easier to access the information needed to use the various assessment tools, although other participants stressed the burden these policy instruments would impose on firms and organizations engaged in carbon removal. For instance, legal requirements for corporations to report lifecycle emissions in certain ways would make it easier to assess the impact of carbon removal projects but create additional regulatory burdens for firms.

Fourth, participants also expressed interest in tools for assessing scalability and barriers to adoption, as well as tools that can anticipate changes in variables of interest over time to reflect learning, climatic changes, and other social, political, and economic changes.

Political Considerations

Across all four sessions, workshop participants highlighted the importance of political considerations for the future of carbon removal. Most assessments of carbon removal have focused on the first three categories in Table 2: technological considerations, environmental impacts, and social impacts. These categories are obviously important, as projects, programs, etc. ought to be economically, environmentally, and socially sustainable. Many assessments omit the less easily quantified dimensions that Table 2 lists under "Governance Considerations." Yet these are just as crucial, for they significantly affect the political feasibility of any project, program, policy, technology, etc.

In addition to identifying the particular governance considerations that seem most important, participants repeatedly emphasized the need to build broad political coalitions that can overcome political gridlock. This is most salient at the federal level in the United States, where partisan gridlock over climate policy remains particularly problematic. This implies the need for careful and context-specific political assessment of carbon removal--another reason that assessment needs to go beyond technology-level assessment to look at particular project, programs, and policies in particular places.

IV. Conclusions and Next Steps

The workshop as a whole revealed a number of important points about the assessment agenda for carbon removal. These include:

1. Assessing carbon removal requires supplementing the assessment of various technologies with assessments of individual projects, programs, policies, sectors, supply chains, etc.

2. A comprehensive assessment of any particular technology, project, etc. involves understanding and evaluating not just technical, environmental, and social issues, but also a wide range of issues related to governance, values, and politics.
3. Different organizations will want to assess carbon removal along different dimensions and with different goals in mind. A comprehensive assessment is therefore likely to be conducted in a socially distributed way, with different organizations conducting different parts of the assessment.
4. Many of the tools needed to assess carbon removal, such as protocols for environmental impact assessments, already exist for doing similar assessments of other activities. Many of the carbon removal-specific tools that would be needed relate to monitoring, reporting, and verification and to synoptic overall assessments.
5. Conducting a comprehensive assessment of technologies, projects, etc. is not the end of the story. Those assessments will feed into assessments about the way carbon removal affects and is affected by broader contextual factors, such as incentive structures and international agreements.

The Institute plans to build on the outcomes of this workshop to do the following:

1. Identify and characterize existing assessment tools that can be applied or adapted to assess carbon removal;
2. Identify gaps in the existing toolkit and collaborate with relevant partners to develop tools to fill those gaps, focusing especially on tools related to monitoring, reporting, and verification;
3. Assemble specific assessment toolkits for use by different kinds of organizations, ranging from carbon removal firms to environmental and social-justice NGOs, or for the assessment of different kinds of objects, such as projects, policies, or technologies; and
4. Develop synoptic assessments, such as sustainability scorecards, that stakeholders could use to guide their overall assessment of particular projects, programs, etc.

Appendix I
Meeting Participant List

Maya Batres - The Nature Conservancy
Andrew Beauchamp - Verra
Amanda Borth - Institute for Carbon Removal Law and Policy
Maya Breitburg-Smith - RESOLVE
John Coequyt - Sierra Club
Hunter Cutting - Climate Nexus
Brenda Ekwurzel - Union of Concerned Scientists
Steven Feit - Center for International Environmental Law
Jason Funk - Land Use & Climate Knowledge Initiative
Suzanne Hunt - Hunt Green LLC
Tim Kruger - Oxford Geoengineering Programme
Sara Leavitt - The Nature Conservancy
Katie Lebling - World Resources Institute
David Morrow (meeting facilitator) - Institute for Carbon Removal Law and Policy
Deepika Nagabushan - Clean Air Task Force
Simon Nicholson - Institute for Carbon Removal Law and Policy
John Noël - Clean Water Action
Joe Rudek - Environmental Defense Fund
Daniel Sanchez - University of California - Berkeley
Cynthia Scharf - Carnegie Climate Geoengineering Governance Initiative
Phil Sharp - Resource for the Future
Kate Simonen - University of Washington
Kelly Stone - ActionAid
Sasanka Thilakasiri - Oxfam America
Michael Thompson - Carnegie Climate Geoengineering Governance Initiative

Appendix II
Meeting Agenda

8:30 am - Breakfast

9:00 am - Introduction + Opening Exercise

ICRLP review of the discussion at Wingspread meeting as to the needs related to assessment tools for carbon dioxide removal options. ICRLP also will lay out the agenda for the day, including objectives and anticipated outcomes. An opening exercise and experts presentations will orient participants to the existing assessment landscape and to the specific conversation about the assessment of carbon removal approaches.

10:30 am - Coffee Break

10:45 am - Session 1: Objects of Assessment

Discuss what tends to be the focus of the current conversation about carbon removal (i.e. broad categories of technologies) and what instead *needs* to be the focus if we're interested in a full assessment of carbon removal proposals (e.g. proposed carbon removal projects, state- or national-level carbon removal programs, etc.). We will look at the assessment of broad technologies, determined where assessments fall short, and what needs to be done.

12:00 pm - Lunch

1:30 pm - Session 2: Dimensions of Assessment

Discuss the aspects of each object of assessment that stakeholders regard as essential for a thorough evaluation of those objects. The goal is not to identify specific indicators of standards, but to produce a list of aspects for which indicators should be developed, the kinds of impacts to be assessed, and so on.

3:00 pm - Coffee

3:15 pm - Session 3: Determine Tools

Discuss existing tools for assessing carbon removal and closely related activities, such as bioenergy production, and identify the kinds of tools that stakeholders would be interested in using to evaluate the various objects of assessment identified earlier in the day. The goal is not to identify or develop specific standards or tools but to produce a list of the kinds of tools that stakeholders believe should be utilized.

5:00 pm - Dinner

Appendix III
Introductory Exercise

Background: In order to prompt participants to begin thinking about how their organizations would approach the assessment of various sorts of carbon removal, the participants were divided into groups of two to three, given two of the three scenarios listed below, and prompted to answer the following questions. The groups were allotted five minutes per scenario to formulate their responses to questions one and two. Each group then shared their initial reactions with the room for larger discussion.

Scenario 1: Commercial BECCS Pilot Project
A major agribusiness plans to open a pilot plant that would capture CO2 from corn ethanol fermentation and inject the captured CO2 into a saline aquifer. The plant would capture approximately 1 MtCO2/yr.

Scenario 2: NOAA Ocean Upwelling Pilot Project
NOAA proposes a ten-year ocean upwelling pilot project in Florida that aims to protect reefs and sequester carbon.

Scenario 3: North American Biochar Initiative
The US, Canada, and Mexico plan to include a North American Biochar Initiative in their next NDCs. This program would remove and sequester 1 GtCO2/yr collectively across all three countries.

Questions:
1. What questions would you need to answer about this program to decide whether to support it?

2. What process would you use to answer those questions, and where would you go for the information you need as an input for the process?

Appendix IV
Additional Resources

Institute for Carbon Removal Law and Policy's Website:
https://www.american.edu/sis/centers/carbon-removal/

Why Talk About Carbon Removal?:
https://www.american.edu/sis/centers/carbon-removal/upload/CRBP001_why_talk_about_carbon_removal_ICRLP.pdf

Carbon Removal Technology Fact Sheets:
https://www.american.edu/sis/centers/carbon-removal/fact-sheets.cfm