CARBON DIXOIDE REMOVAL & CARBON CAPTURE, UTILIZATION & STORAGE

ISEN 432

Spring 2024

Harris L06

2.00-3.20pm MW

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Office hours: Scott Hall, Room 307, by arrangement, or via Zoom or phone. If you want to meet virtually, please do so via my Calendly: https://calendly.com/wil_burns

URSE OVERVIEW

Climate change is the keystone environmental issue of this generation, and most likely for many generations to come. While the world community and individual countries have formulated policies to address climate change, these policies are almost universally recognized as being wholly inadequate to effectuate the objective of the Paris Agreement to hold global temperatures to well below 2ºC above pre-industrial levels, and to pursue efforts to limit increases to 1.5ºC.

Indeed, it has become increasingly obvious that achievement of Paris temperature objectives will require both aggressive emission reductions initiatives and large-scale deployment of carbon dioxide removal/negative emissions technologies and processes (CDR), sometimes also referred to as a major sub-category of climate geoengineering, and carbon capture and sequestration with storage (CCS), technologies that capture carbon dioxide remissions at the flue stack.

This course will discuss the exigency of deploying CCS and CDR approaches at scale, including potential benefits and risks of these options. It also will discuss regulatory and governance considerations at both the national and international level, as well as business and policy-oriented strategies to incentivize large-scale adoption of these approaches.

RNING OBJECTIVES

After taking this course you should be able to:

- Distinguish between carbon dioxide removal and carbon capture and storage approaches;
- Understand the technological aspects of carbon capture and storage, potential risks and benefits, and constraints to large-scale deployment;
- Understand the potential risks and benefits of natural and industrial carbon removal approaches;
- Assess the adequacy of current governance mechanisms for CCS and CDR options and identify gaps in governance;
- Identify constraints to large-scale deployment of carbon dioxide removal approaches

URSE READINGS

The readings for the course will be derived from the following sources, designated in the class schedule with the icons listed below:

- E **Electronic readings**, which are available on the course Canvas site for this course. Click on the "Files" link and look for the "Readings" folder.
- O **Online Hyperlinks**, which must be accessed via the online version of the Syllabus on the course Canvas site.

SESSMENT/ASSIGNMENT SCHEDULE

Special Topics Presentations	**Per Assigned Date in Syllabus**	**35%**
Blog Article	**June 4**	**40%**

Class Participation	**Ongoing**	**25%**

IEF SUMMARY OF ASSIGNMENTS

cial Topics Presentations

Students will work in groups of 2-3 to prepare 15-20 minute presentations for class on assigned topics. Please see the "Assignment Guidelines" folder under the Files folder for further instruction.

Post [40% of grade]

Students will work in teams of 2-3 to draft a blog post for potential publication on the Institute for Responsible Carbon's blog site. Please consult the "Blog Posting Assignment" folder in the Assignment Guidelines folder (under Files) for guidelines for completing the assignment. The folder also contains a file containing useful resources to guide preparation of the post.

s Participation

Class participation assessment will be comprised of your participation during class sessions, including participation in class exercises and Q&A during presentations. Being prepared for class is about more than just showing up, it's also about making sure you've completed the readings, homework, etc. so that you are able to make thoughtful contributions during class. Sitting silently and/or being unprepared can damage your participation grade. When in a virtual class, I expect students to keep their cameras on. When in the classroom, I expect students to keep their phones off.

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GRADING/ASSESSMENT

All questions and problems regarding grades must be presented in writing within one week after the test, homework, or project has been returned. The grading scale is fixed, please do not wait until the end of the quarter if you are concerned about the direction of your grade.

Pass / Fail: MSES Students may not take any classes as “pass/fail” or “pass/no pass.” They must receive a letter grade of a “C-” or better for each class in order to receive their degree.

Extensions: Extensions will only be granted in extenuating circumstances and must be requested in writing prior to the submission deadline.

Late Work: Unless an exception has been granted by the professor in advance, 10% will be deducted from late homework assignments turned in within 24 hours of the deadline. 50% will be deducted from late homework assignments that are more than 24 hours but less than 7 days late. No credit will be given for homework turned in more than 7 days after the deadline.

Grading Scale: Grades will be assigned based on all the work you have completed during the semester using the following scale:

A	93.333 to 100	**C**	73.333 to 76.666
A-	90.000 to 93.333	**C-**	70.000 to 73.333
B+	86.666 to 90.000	**D+**	66.666 to 70.000
B	83.333 to 86.666	**D**	63.333 to 66.666
B-	80.000 to 83.333	**D-**	60.000 to 63.333
C+	76.666 to 80.000	**F**	< 60.000

Class Attendance

MSES Students are expected to attend all class meetings and complete all assignments in a professional manner, as they are an important part of learning course material. The Program understands that things come up which require students to miss class. When this happens, students must request an excused absence from the instructor in writing prior to the class they will miss. Events such as jury duty, bereavement, accident, emergency, and sickness may result in an excused absence. Job interviews should not be scheduled during class time, but students can request (in writing) an exception with extenuating circumstances.

Typically, vacations and conferences are not eligible for an excused absence. Unexcused absences arise when the student misses a class without getting approval for the absence in writing (via email) from the instructor or TA. In the event of an unexcused absence, the student's participation grade will be impacted (automatic zero for participation in the missed class). For example, if a student misses one 90-minute class in a typical 10-week, two classes-per-week schedule, their participation grade will automatically decrease by 5%. Excessive class absence may result in withdrawal from the course or a grade of incomplete or failure.

While we're supportive of MSES students that are also parents, and can arrange accommodations for children's emergencies, we typically do not expect children, other family members, or guests to attend class unless prior arrangements have been made with the instructor. In some cases, outside attendees may not be able to join classes even with instructor support due to Northwestern University policies around health, safety, confidentiality, or student privacy.

Expectations for Class Participation

Being prepared for class is about more than just showing up, it's also about making sure you've completed the readings, homework, etc. so that you are able to make thoughtful contributions during class. Sitting silently and/or being unprepared can damage your participation grade. When in a virtual class, we expect students to keep their camera and mute on as much as possible. When in the classroom, we expect students to keep their phones off and put away.

Academic Integrity Statement

Students in this class are required to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic Guide". All papers submitted for credit in this course must be submitted electronically unless otherwise instructed by the professor. Your written work may be tested for plagiarized content. For details regarding academic integrity at Northwestern or to download the guide, visit: https://www.northwestern.edu/provost/policies/academic-integrity/index.html

Any form of cheating, including improper use of content generated by artificial intelligence, constitutes a violation of Northwestern's academic integrity policy.

Accessibility

Northwestern University is committed to providing the most accessible learning environment possible for students with disabilities. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process (e: accessiblenu@northwestern.edu; p: 847-467-5530). If you already have established accommodation with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodation. Disability information, including academic accommodations, is confidential under the Family Educational Rights and Privacy Act.

Religious Observance

Northwestern is committed to fostering an academic community respectful and welcoming of persons from all backgrounds. To that end, the policy on academic accommodations for religious holidays stipulates that students will not be penalized for class absences to observe religious holidays. If you will observe a religious holiday during a class meeting, scheduled exam, or assignment deadline, please let me know as soon as possible, preferably within the first two week of class. If exams or assignment deadlines on the syllabus fall on religious holidays you observe, please reach out so that we can discuss that coursework.

Course Details Subject to Change

Please note that the specifics of this course syllabus are subject to change in the case of unforeseen circumstances. Instructors will notify students of any changes as soon as possible. Students will be responsible for abiding by the changes.

Exceptions to Class Modality

Class sessions for this course will occur in person. Individual students will not be granted permission to attend remotely except as the result of an Americans with Disabilities Act (ADA) accommodation as determined by AccessibleNU.

Community health remains our priority. If you are experiencing symptoms of COVID-19, do not attend class and follow the steps outlined by the CDC for testing and isolation. Contact your instructor as soon as possible to make plans to complete your coursework.

Students who experience other personal emergencies should contact the instructor as soon as possible to arrange to complete coursework.

Should public health recommendations prevent in-person class from being held on a given day, the instructor or the university will notify students.

Class Recording

This class or portions of this class will be recorded by the instructor for educational purposes. Your instructor will communicate how members of the class can access the recordings. Portions of the course that contain images, questions or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term.

Prohibition of Recording Classes by Students

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy and state law. Students requesting the use of assistive technology as an accommodation should contact AccessibleNU. Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University's Copyright Policy, faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

Support for Wellness and Mental Health

Northwestern University is committed to supporting the wellness of our students. Student Affairs has multiple resources to support student wellness and mental health. If you are feeling distressed or overwhelmed, please reach out for help. Students can access confidential resources through the Counseling and Psychological Services (CAPS), Religious and Spiritual Life (RSL) and the Center for Awareness, Response and Education (CARE). All Northwestern students are also eligible to access support at no cost though TimelyCare, a virtual mental health platform that provides counseling, health coaching and 24/7 on-demand services.

Additional information on the resources mentioned above can be found here:

https://www.northwestern.edu/counseling/

https://www.northwestern.edu/religious-life/

https://www.northwestern.edu/care/

https://www.northwestern.edu/studentaffairs/timelycare.html

The Writing Place

When working on writing assignments for this class, I encourage you to visit the Writing Place, Northwestern's peer writing center. You will work with juniors and seniors who have been trained to provide you feedback and assistance on any type of writing at any stage in the writing process. They will not edit your work. Rather, they will work with you to brainstorm ideas, organize or outline an essay, clarify your argument, document your sources correctly, or refine grammar and style.

To book an appointment, register for an account at https://northwestern.mywconline.com/.

Other Resources

Students can find useful resources for safety and security, academic support, and mental and physical health and well-being at the NUhelp website.

COURSE SCHEDULE

3.26	**Introduction to the Course** ▪ Instructor introduction ▪ Student introductions ▪ Review of syllabus
3.27	**The Exigencies Driving CCUS/CDR** **LEARNING OBJECTIVES:** **READINGS:** O International Energy Agency, Net Zero by 2050: A Roadmap for the Global Energy Sector 79-80 (2021) O NASEM, *Negative Emissions Technologies and Reliable Sequestration: A Research Agenda* 23-34 (2019) E Buck, et al., *Why residual emissions matter right now*, 13 NATURE CLIMATE CHANGE 351-58 (2022) E Faber, 10 reasons we need carbon removal, Carbon-Based Commentary, Dec. 19, 2023
SECTION 1	**Carbon Capture Utilization & Storage (CCUS)**

4.1

LEARNING OBJECTIVES:

- Be able to identify and describe the methods for effectuating carbon capture and sequestration;
- Be able to quantify the sequestration potential of CCS;
- Distinguish between potential methods of sequestration and utilization;
- Be able to identify and quantify potential risks associated with large-scale deployment of CCS

READINGS:

E Bandilla, *Carbon Capture and Storage,* FUTURE ENERGY 669-692 (3rd ed. 2020)

4.3

Carbon Capture with Utilization and Storage (CCUS): Technology Overview, Part 2

READINGS:

E Rycroft, *Introduction to carbon capture and storage,* DEPLOYMENT OF CARBON CAPTURE AND STORAGE 1-22 (2024)

O Martin-Roberts, *Carbon capture and storage at the end of a lost decade,* 4(11) ONE EARTH 1569-1584 (2021)

4.8

Policymaking and CCS: International and National Dimensions

LEARNING OBJECTIVES:

- O Fontenelle, et al., The role of the Sustainable Development Goals for better governance of Carbon Capture and Storage (CCS), 62 DMA 478-98 (2023)
- O Haines, et al., EPA bets on CCS in proposed regulations under Clean Air Act, ReedSmith, May 12, 2023
- O Ferrell & Stewart, *Geological Sequestration of Carbon Dioxide: The State of Responsible Primacy*, National Wildlife Federation 1-10 (2024)
- E Dlouhy & Rathi, The World's Leader in Carbon Capture Shows Why It's a Long Shot, Bloomberg, Dec. 10, 2023

SECTION 2 Nature-Based Carbon Dioxide Removal Solutions

4.10

Afforestation/Reforestation

LEARNING OBJECTIVES:

- Be able to identify the causal mechanism by which trees sequester carbon dioxide
- Be able to assess the potential sequestration associated with large-scale afforestation/reforestation
- Be able to assess the potential environmental and social-justice ramifications of large-scale

afforestation/reforestation

READINGS:

E Rackley, *Afforestation and other land- and soil-based methods*, NEGATIVE EMISSIONS TECHNOLOGIES FOR CLIMATE CHANGE MITIGATION 215-224 (2023) (through sec. 11.2)

E Di Sacco, et al., *Ten golden rules for reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits,* GCB REVIEWS 1-21 (2020)

O Burns, Seeing the Forest for the Trees?: The Role of Afforestation and Reforestation in Combating Climate Change, American Bar Association, Environment, Energy & Resources, Jan. 14, 2021

O Greenfield & Chingono, 'We don't know where the money is going': the 'carbon cowboys' making millions from credit schemes, THE GUARDIAN, Mar. 15, 2024

STUDENT GROUP PRESENTATION: SCIENCE-BASED TARGETS INITIATIVE (SBTi) AND FOREST PROTOCOLS

- Aquino
- Whynott

4.15 Soils/Regenerative Agriculture

LEARNING OBJECTIVES:

- Be able to identify the causal mechanism for carbon dioxide sequestration through soil methods
- Be able to assess the sequestration potential of soil-based CDR approaches
- Be able to identify the difficulties of measuring and monitoring soil-based CDR approaches

READINGS:

E Almaraz, et al., *Soil carbon sequestration in global working lands as a gateway for negative emission technologies*, 29(21) GLOBAL CHANGE BIOLOGY 5988-5998 (2023)

O Ranganathan, et al., Regenerative Agriculture: Good for Soil Health, but Limited Potential to Mitigate Climate Change, World Resources Institute, May 12, 2020

O Harris, The hype behind carbon farming comes down to earth, Anthropocene Magazine, June 16, 2022

Guest Speaker: Radhika Moolgavkar, Head of Methodology, Nori Carbon Removal Marketplace, https://nori.com/about

4.17 Biochar

Asynchronous Class: Video Lecture

LEARNING OBJECTIVES:

- Be able to identify the process of production of biochar and the causal mechanism for carbon

dioxide removal

- Be able to assess the potential carbon sequestration potential of biochar approaches
- Be able to identify the primary constraints to large-scale deployment of biochar

READINGS:

E Lefebvre, et al., *Soil carbon sequestration in global working lands as a gateway for negative emission technologies*, 5 BIOCHAR 1-17 (2023)

E Roberts, *Key enablers for carbon dioxide removal through the application of biochar to agricultural soils: Evidence from three historical analogues*, 195 TECHNOLOGICAL FORECASTING & SOCIAL CHANGE 1-22 (2023)

SECTION 3 Bioenergy with Carbon Capture and Storage

4.22 Bioenergy with Carbon Capture and Storage: Overview

LEARNING OBJECTIVES:

- Be able to identify the key components of a BECCS system;
- Be able to assess the sequestration potential of large-scale deployment of BECCS;
- Be able to identify key risks of large-scale deployment of BECCS

READINGS:

E Lefvert & Grönkvist, *Lost in the scenarios of negative emissions: The role of bioenergy with carbon capture and storage (BECCS)*, 184 ENERGY POLICY 1-5 (2024)

E Burns, *Human Rights Dimensions of Bioenergy With Carbon Capture and Storage: A Framework for Climate Justice in the Realm of Climate Geoengineering*, in CLIMATE JUSTICE: CASE STUDIES IN GLOBAL AND REGIONAL GOVERNANCE CHALLENGES 149-70 (2016)

E Full, *A New Perspective for Climate Change Mitigation — Introducing Carbon-Negative Hydrogen Production from Biomass with Carbon Capture and Storage (HyBECCS),* 13 SUSTAINABILITY 1-22 (2021)

Student Group Presentation: Algae with Bioenergy Carbon Capture and Storage (ABECCS)

- Bicakci
- Cebezas Parra
- Vanjari

SECTION 4 Direct Air Capture

4.24 Direct Air Capture, Part 1

LEARNING OBJECTIVES:

- Be able to identify the key components of a Direct Air Capture system;
- Be able to assess the sequestration potential of large-scale deployment of Direct Air Capture systems
- Be able to assess the potential risks and costs associated with large-scale deployment of Direct Air Capture systems

READINGS:

E Izikowitz, et al., *Assessing capacity to deploy direct air capture technology at the country level – an expert and information entropy comparative analysis*, 5 ENVIRONMENTAL RESEARCH COMMUNICATIONS 1-23 (2023)

O Jacobson, *The health and climate impacts of carbon capture and direct air capture*, 12 ENERGY ENVIRON. SCI. 3567-74 (2019)

O Kusnetz, Occidental is Eyeing California's Clean Fuels Market to Fund Texas Carbon Removal Plant, Inside Climate News, Apr. 6, 2022

O House, et al., Direct air capture: An expensive, dangerous distraction from real climate solutions, Bulletin of the Atomic Scientists, Dec. 15, 2023

Student Group Presentation: Direct Air Capture Hubs in the United States

- Gharpure
- Olivares Rodriquez
- Tiffany

4.29 Direct Air Capture, Part 2: Policy Drivers

LEARNING OBJECTIVES:

- Be able to identify the essential components to scale Direct Air Capture in the future
- Be able to identify the respective roles of

READINGS:

E Young, et al. *The cost of direct air capture and storage can be reduced via strategic deployment but is unlikely to fall below stated cost targets*, 6 ONE EARTH 1-19 (2023)

E Sovacool, et al., *Climate policy for a net-zero future: ten recommendations for Direct Air Capture*, 17 ENVIRONMENTAL RESEARCH LETTERS 1-19 (2022)

SECTION 5 Enhanced Mineral Weathering

5.1 Enhanced Mineral Weathering: Overview

Synchronous Online

LEARNING OBJECTIVES:

- Be able to identify the chemical processes associated with enhanced mineral weathering;

- Be able to assess the sequestration potential of large-scale deployment of enhanced mineral weathering
- Be able to distinguish enhanced mineral weathering from mineral carbonation approaches
- Be able to assess the potential risks and costs associated with large-scale deployment of enhanced mineral weathering operations

READINGS:

E Beerling, et al., *Farming with crops and rocks to address global climate, food and soil security*, 4 NATURE PLANTS 138-47 (2018)

E Dietzen, et al., *Quantification of CO_2 uptake by enhanced weathering of silicate minerals applied to acidic soils*, 125 INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL 1-10 (2023)

E Lawford-Smith & Currie, *Accelerating the Carbon Cycle: the ethics of enhanced weathering*, 13 BIOLOGY LETTERS, Art. 20160859 (2016)

O Hillsdon, Can enhanced rock weathering weather greater scrutiny as a solution to climate change? REUTERS, Nov. 1, 2023

Guest Speaker: Eric Matzner, CEO, Metalplant

Student Group Presentation: Vesta

- Das
- Baguma
- France

5.6 Enhanced Mineral Weathering: Legal Considerations

Synchronous Online

LEARNING OBJECTIVES:

- Be able to identify the key domestic laws and regulations for enhanced mineral weathering operations
- Be able to identify gaps in governance of enhanced mineral weathering operations and procedures to develop this regulatory framework

READINGS:

O Webb, *The Law of Enhanced Weathering for Carbon*, Sabin Center for Climate Change Law 12-42 (up to Sec. 4) (2020)

Guest Speaker: Doug Edwards, Head of Operations & General Counsel, Vesta

SECTION 6 Marine-Based Carbon Dioxide Removal

5.8 The Oceans and CDR, Part 1: Overview

LEARNING OBJECTIVES:

- Be able to identify the biotic and abiotic mechanisms in the world's oceans that effectuate atmospheric carbon dioxide removal
- Be able to identify the key marine-based CDR approaches
- Be able to assess the potential risks to marine-based ecosystems associated with large-scale deployment o marine-based approaches

READINGS:

E KELLER, *Marine Climate Engineering*, HANDBOOK ON MARINE ENVIRONMENTAL PROTECTION 261-76 (2018)

E Krause-Jensen, et al., *Sequestration of macroalgal carbon: the elephant in the Blue Carbon room*, 14 BIOLOGY LETTERS, Art. 20180236 (2018)

E Burns & Corbett, *Antacids for the Sea? Artificial Ocean Alkalinization and Climate Change*, 3 ONE EARTH 154-56 (2020)

STUDENT PRESENTATIONS:

- **Topic: Electrochemical Ocean CDR**
  - Goyal
  - Calibo

5.13 The Marine Environment and CDR, Part 2: Overview

READINGS:

O Boyd, *Operational Monitoring of Open-Ocean Carbon Dioxide Removal Deployments: Detection, Attribution, and Determination of Side Effects*, Ocean-Climate Nexus 1-10 (2023)

E Cooley, et al., *Sociotechnical Considerations About Ocean Carbon Dioxide Removal*, 15 ANNUAL REVIEW OF MARINE SCIENCE 41-66 (2023)

5.15 Legal Regulation of Marine-Based Approaches, Part 1

LEARNING OBJECTIVES:

- Be able to identify the key international treaties and customary law principles pertinent to regulation of marine-based CDR approaches;
- Be able to identify key domestic legal and regulatory provisions pertinent to regulation of marine-based CDR approaches

READINGS:

E Brent, *Marine geoengineering governance and the importance of compatibility with the law of the sea*, RESEARCH HANDBOOK ON CLIMATE CHANGE, OCEANS AND COASTS 442-61 (2020)

O Röschel, et al., *Ocean-based negative emissions technologies: a governance framework review*, 10 FRONTIERS IN MARINE SCIENCE 1-19 (2023)

STUDENT GROUP EXERCISE:

We will engage in a group treaty interpretation exercise, focused on a number of treaty regimes that have addressed carbon removal to date, or might in the future. The pertinent treaties are available in the "Treaty Interpretation Exercise" folder.

5.20 Legal Regulation of Marine-Based Approaches, Part 2

READINGS:

E Lezaun, *Hugging the Shore: Tackling Marine Carbon Dioxide Removal as a Local Governance Problem*, 3 FRONTIERS IN CLIMATE, Art. 684063 (2021)

O London Convention, Annex 4, Resolution LP.4(8) on the Amendment to the London Protocol to Regulate the Placement of Matter for Ocean Fertilization and Other Marine Geoengineering Activities (2013)

STUDENT GROUP EXERCISE:

We will engage in a group treaty interpretation exercise, focused on a number of treaty regimes that have addressed carbon removal to date, or might in the future. The pertinent treaties are available in the "Treaty Interpretation Exercise" folder.

SECTION 7 Market & Non-Market Processes to Drive CDR Deployment

5.22 The Potential Role of Carbon Takeback Obligations (CTBOs) in Driving CDR Deployment

LEARNING OBJECTIVES:

- Be able to identify the rationale and contours of a carbon takeback obligation plan
- Be able to identify key benefits and potential risks of a carbon takeback obligation

READINGS:

E Jenkins, *Upstream decarbonization through a carbon takeback obligation: An affordable backstop climate policy*, 5(11) JOULE 2777-2796

O Gordon, How a "carbon takeback obligation" can ensure net zero, Energy Monitor, April 13, 2023

E Lackner, et al., *Carbon accounting without life cycle analysis*, ENERGY & ENVIRONMENTAL SCIENCE 1-15 (2023)

5.29	Policies to Drive CDR Deployment

LEARNING OBJECTIVES:

- Be able to identify key drivers for CDR deployment
- Be able to assess the potential benefits of a number of governmental and private sector incentive mechanisms for CDR deployment

READINGS:

E Nemet, *Negative Emissions – Part 3: Innovation and upscaling,* 13 ENVIRONMENTAL RESEARCH LETTERS, Art. No. 063003 (2018)

E Honneger, *Who Is Paying for Carbon Dioxide Removal? Designing Policy Instruments for Mobilizing Negative Emissions Technologies*, 3 FRONTIERS IN CLIMATE, Art. 672996 (2021)

O Höglund, Who should pay for carbon removal?, Illuminem, Nov. 16, 2022

O Gevers Deynoot, Carbon removals: 2024 watching brief, Illuminem, Jan. 18, 2024

Roundtable Panel on the Future of CDR:

- Tito Jankowski, CEO, AirMiners, https://tito.co/
- Radhika Moolgavkar, VP Supply and Methodology, NORI
- Ben Rubin, Executive Director and Co-Founder of the Carbon Business Council, https://www.bendrubin.com/
- Celina Scott-Buechler, Senior Resident Scholar, Data for Progress, https://www.linkedin.com/in/celina-scott-buechler-b5a4a489/