

Interagency Carbon Dioxide Removal Research Coordination (I-CDR-C)

Interagency carbon cycle research coordination

Established in 1999, the [U.S. Carbon Cycle Science Program](http://www.carboncyclescience.us) (US CCSP) Office, in conjunction with the [Carbon Cycle Interagency Working Group \(CCIWG\)](#), coordinates and facilitates the activities for the U.S. Carbon Cycle Science Program (www.carboncyclescience.us) relative to global change issues. The CCIWG/ US CCSP are responsible for defining program goals, setting research priorities, and reviewing the progress of the research programs that contribute to carbon cycle science as described in the Strategic Plan for the U.S. Climate Change Science Program (2003), the goals and objectives of the [U.S. Carbon Cycle Science Plans \(1999, 2011\)](#) and the goals of the US Global Change Research Program (USGCRP)'s [National Global Change Research Plan \(2012\)](#) and its subsequent Congressionally mandated '[National Global Change Research Plan 2012-2021: A Triennial Update](#)' (2017).

Our mission is to coordinate and facilitate federally funded carbon cycle research, and provide leadership to the USGCRP on carbon cycle science priorities. The CCIWG and the US CCSP, representing 14 federal agencies, funds and coordinates U.S. and international carbon cycle research across terrestrial, atmospheric, oceanic and societal systems and interfaces.

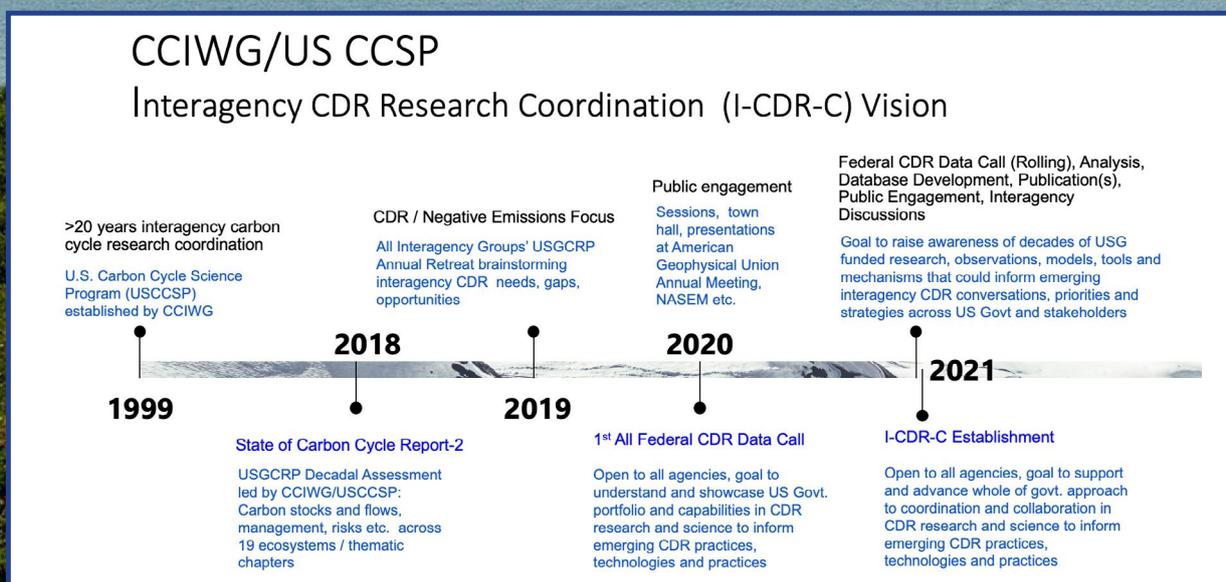
We seek to improve the understanding of the carbon cycle across North America and adjacent oceans, to develop science-based information and resources to support and inform decisions, and to communicate findings broadly among and with national and international science communities and stakeholders, such as via the [State of the Carbon Cycle Report](#). Our work supports the vision and efforts of the USGCRP, pursuant to the 1990 U.S. Global Change Research Act, *to develop and coordinate a comprehensive and integrated United States research program which will assist the Nation and the world to understand, assess, predict, and respond to human-induced and natural processes of global change.* The CCIWG's annual contributions directly support the [U.S. Carbon Cycle Science Program Office](#) (US CCSP) budget.

Opportunities for Interagency Carbon Dioxide Removal (CDR) research coordination

After completing a multi-year strategic outlook and several public engagement events seeking community input on next decadal research needs (e.g. [NACP Open Science Meeting](#), [AGU Meetings](#)) in 2019-2021, we are now conceptualizing a roadmap to facilitate the development of the next decadal U.S. Carbon Cycle Science Plan. Our plans and activities will evolve in response to new scientific developments and needs, White House and CCIWG agencies' priorities and the upcoming USGCRP decadal strategic plan.

We seek information exchange, ideas, collaboration and coordination opportunities (e.g., workshops, assessments / publications, decision tools, joint research calls, projects etc.) covering topics such as CDR across land, ocean, atmosphere and societal systems and interfaces, with diverse interagency groups and federal and non-federal stakeholders and partners.

In 2021, we launched the I-CDR-C with the goal of exploring and advancing interagency CDR research coordination strategies.



New CCIWG efforts on CDR and informing CDR research coordination (2020-2021 and beyond)

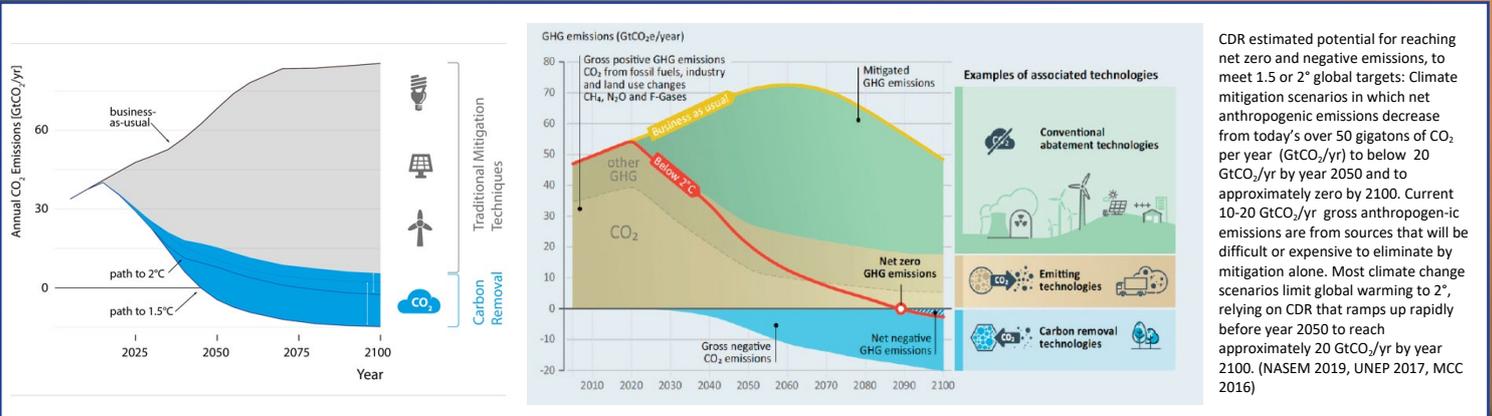
As illustrated above and as described below, we have launched preliminary CDR research coordination efforts, with the goal of informing future federal and interagency CDR research coordination and collaboration inclusively and equitably.

- [Launched the first Federal CDR Data Call 2020-2021](#) (rolling submissions accepted from all federal programs and personnel): In 2020, we launched this data call with the aim of developing the first federal CDR research compendium/database, encompassing federally-funded research activities across land, ocean, atmosphere and coastal interfaces; observations, monitoring and management activities informing CDR or showing potential to inform future CDR strategies.
- Preparing a **Federal CDR Compendium/Database/Inventory** (to be released in 2021), so far, including over 600 CDR relevant projects received via the data call.
- Preparing a **memo to the USGCRP and federal colleagues** to be shared in mid-2021.
- Preparing a **brief perspective publication summarizing federal CDR** research efforts and interagency opportunities, to be submitted in 2021.
- Planning for an all-federal CDR research coordination strategy workshop (pending availability of resources) in 2021/2022.
- Establishment and operation of **Interagency CDR Research Coordination (I-CDR-C)** group as work stream of CCIWG/USCCSP.
- Participation in and coordination with **2021 DOE-led Interagency CDR Task Force Report** to Congress.

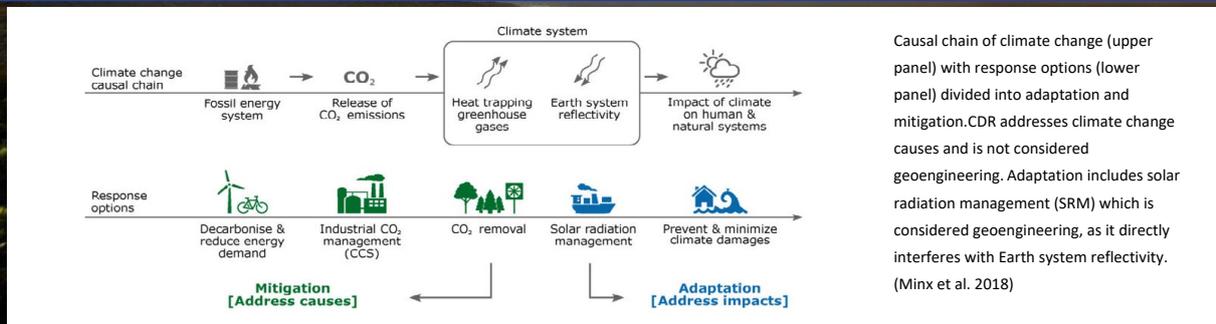
Advancing the science of CDR and informing decisions to respond to climate change

Carbon Dioxide removal (CDR) refers to any process, practice or technology that removes CO₂ from the atmosphere by either enhancing existing natural processes that remove carbon from the atmosphere (e.g., by increasing its uptake by trees, soil, or other 'carbon sinks') or using chemical processes to, for example, capture CO₂ directly from the ambient air and store it elsewhere (e.g., underground). In the context of a 1.5°C-consistent climate change pathway, CDR needs to be implemented to offset residual emissions and to achieve net negative emissions to return to 1.5°C from an overshoot. Co-benefits of CDR include biodiversity enhancement and flooding or storm hazard mitigation, while trade-offs could include consequences for sustainable development if the use of land competes with producing food to support a growing population, biodiversity conservation or land rights (IPCC 2018).

In light of U.S. and global scientific consensus (see figures), the CCIWG/USCCSP is conducting interagency activities to explore and highlight the state of federal CDR research and to inform pertinent decisions. This fulfills both the USCCSP mission and USGCRP goals.



CDR estimated potential for reaching net zero and negative emissions, to meet 1.5 or 2° global targets: Climate mitigation scenarios in which net anthropogenic emissions decrease from today's over 50 gigatons of CO₂ per year (GtCO₂/yr) to below 20 GtCO₂/yr by year 2050 and to approximately zero by 2100. Current 10-20 GtCO₂/yr gross anthropogenic emissions are from sources that will be difficult or expensive to eliminate by mitigation alone. Most climate change scenarios limit global warming to 2°, relying on CDR that ramps up rapidly before year 2050 to reach approximately 20 GtCO₂/yr by year 2100. (NASEM 2019, UNEP 2017, MCC 2016)



Causal chain of climate change (upper panel) with response options (lower panel) divided into adaptation and mitigation. CDR addresses climate change causes and is not considered geoengineering. Adaptation includes solar radiation management (SRM) which is considered geoengineering, as it directly interferes with Earth system reflectivity. (Minx et al. 2018)

Some prior CDR pertinent interagency activities

- [Second State of the Carbon Cycle Report](#) (USGCRP 2018): Encompassing 19 chapters across four interconnected sections (I. [Synthesis](#), II. [Human Dimensions of the Carbon Cycle](#), III. [State of Air, Land, and Water](#), IV. [Consequences and Ways Forward](#)), we led the latest decadal North America-wide USGCRP sustained climate assessment report which included CDR science advances and gaps.
- [North American Carbon Program](#) (NACP) and [Ocean Carbon and Biogeochemistry](#) (OCB) Programs: Representing the US CCSP's community science-led activities, NACP and OCB include coastal scientists. Recently, a new [Aquatic Continuum OCB-NACP Focus Group](#) was established to help identify community-based mechanisms to facilitate exploration of and progress on high-priority coastal carbon research and pertinent NACP-OCB cross-cutting questions. A new [NACP Science Implementation Plan](#) will be released in 2021.
- [Interagency Research Calls](#): Periodic joint solicitations since year 2004 have supported over \$100M in interdisciplinary research to improve the understanding of changes in the distribution and cycling of carbon among land, ocean and atmospheric reservoirs and how that understanding can inform a scientific foundation for societal responses to global environmental change.
- [Interagency Operational Greenhouse Gas \(GHG\) Information and Analysis System](#): In 2021, we approved the formation of this interagency work stream, recognizing that our ability as a nation to quantify, verify and understand GHG emissions and removals, provides the foundation for climate change mitigation. The goal is to coordinate efforts across agencies to identify and act on near-, mid-, and long-term opportunities to implement an operational GHG observing and analysis system to support and inform pertinent decisions in response to the GCRA (1990) and new White House Executive Order and Administrative priorities.
- [Global Science and Data Network for Coastal Blue Carbon](#): In collaboration with the [Commission for Environmental Cooperation](#) (CEC), we co-sponsored the Global Science and Data Network for Coastal Blue Carbon Workshop, identifying opportunities for blue carbon data, stakeholders networks and definitions in the field of blue carbon science.
- [Coastal Carbon Research Coordination Network](#) (CCRCN): Built on work by the Blue Carbon Initiative, NASA and U.S. Carbon Cycle Science Program.
- [REgional Carbon Cycle Assessment and Processes](#): International effort assessing carbon balance for all subcontinents and ocean basins.
- [Soil Carbon Vulnerability and Resilience](#): This effort generated publications, a community survey and frameworks for a method using soil order classifications assessing and predicting soil vulnerability with respect to carbon loss and potential for mitigation; and a synthesis of proxies for modeling carbon cycling, such as carbon use efficiency.
- [Sustained Observations for Carbon Cycle Science and Decision Support](#)—Identifying carbon observational research that is ripe for translation to decision support services, of data products and data synthesis techniques informing stakeholders and carbon management efforts. See [this report](#).

References

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