Chapter 6

Technical Annex

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A6.1 Methodology for literature assessment

Systematic map of the perceptions literature

In this analysis, the English-language scientific literature was searched using two databases (Web of Science and Scopus), and all studies that evaluate perceptions of methods that capture and store carbon dioxide were extracted. The search uses the same comprehensive search strategy as used in the *State of CDR* 2nd Edition. Screening also included literature on CDR expert perceptions and media analyses on CDR and of papers that do not mention CDR explicitly but talk about methods, such as biochar applications, that are considered to lead to net removals from the atmosphere. Decisions on inclusion are particularly challenging for CDR methods with blurred lines between CDR as a main outcome versus carbon removal as a co-benefit. Such decisions can lead to very different findings regarding the size of the literature. This challenge is especially salient for methods based on the management of natural systems, such as forest management and peatland restoration. For the 3rd Edition, we updated the search to include all publications up to September 2025.

Synthesis of factors driving perceptions and conditions for deployment

To understand why public groups hold certain views about CDR, a qualitative synthesis of findings from the literature was conducted. For this analysis, the English-language peer-reviewed literature was reviewed for mentions of factors driving public attitudes: that is, attributes of the respondent or project that might influence how CDR, the specific method or the proposed implementation is perceived. Conditions for deployment (i.e. under what conditions CDR methods or proposals might become acceptable) were also examined, because support for novel interventions is likely to be fragile and conditional. The papers identified in the systematic map (see previous section) were manually coded by reading the whole paper and assigned to the different codes of factors and conditions. Then, a scoring system was applied, based loosely on the IPCC agreement scales, to judge the certainty of evidence:

- 3 = strong evidence
- 2 = mixed results (e.g. where different tests within a single paper show different outcomes, or where deliberative participants were split)
- 1 = weak or no evidence (e.g. non-statistically significant results or low effect sizes)

- −1 = the inverse relationship (where the direction of the relationship is the inverse of the expectation or hypothesis)

The resulting codes and scores were finally aggregated for synthesis.

A6.2 Methodology for CDR news media analysis

Trends in news media reporting on CDR

For the analysis of newspaper coverage on CDR, a keyword-based search query was entered in the LexisNexis Newspapers and Wires database for nine CDR methods to identify news media articles on CDR. This approach is standard for news media analyses and the LexisNexis database has been used in many media analyses to date[1–4]. The search was global in coverage but restricted to English-language articles appearing both in print and online. The results were deduplicated and filtered to a list of 122 newspapers compiled from (1) the list of Media and Climate Change Observatory core sources (a prominent compilation of sources for media studies on climate topics) and (2) a list of general interest newspapers (i.e. not specialist journals) that yielded more than 1,000 results for the CDR keywords.

The search resulted in 191,000 hits. To eliminate false hits, a protocol for inclusion/exclusion was developed and approximately 1,500 articles were manually coded. A pre-trained classifier developed for identifying CDR methods in scientific articles was then applied to predict the relevance of subsequent articles in the data set. Automatically classified articles had high precision compared to the manually coded set, but relatively low recall. As such, the results represent a lower bound of news media discussions on CDR. An exception to this concerns CDR (general), which, as in the Twitter analysis, is a category included to capture broader discussions on CDR concepts and their role in climate policy, as opposed to specific discussions of individual CDR methods. This general category showed both low agreement between different manual coders and poor matching between the manually and automatically coded sets. This is likely due to the subjective boundary in these articles between what should be considered a discussion that "primarily" focuses on CDR (which is included in the coding scheme) versus a discussion that only "tangentially" focuses on CDR (which is excluded in the coding scheme). This report therefore does not present results for the CDR (general) category. In addition, it should be acknowledged that the coverage of LexisNexis is likely incomplete and only partially overlaps with other databases such as NewsBank, ProQuest or Factiva.

Analysis of responsible communication

For the more interpretative analysis of responsible communication, we developed a coding scheme based on recommendations for communicating CDR in the literature[5]. The scheme comprises a series of questions with a binary (yes/no) answer: (1) Does the article mention the need to reduce emissions? (2) Does it highlight the importance of emissions reductions relative to CDR? (3) Does it avoid framing CDR as an alternative to reducing emissions? (4) Does it avoid framing CDR as "natural"? (5) Does it avoid framing CDR as "unnatural"? (6-9) Does it mention CCUS/fossil CCS/offsets of avoided emissions/SRM of geoengineering? (And if yes, are these categories conflated with CDR?) We restricted the analysis to newspaper articles from eight sources from the United States, United Kingdom and Australia, four CDR methods (DACCS, BECCS, afforestation/reforestation, soil carbon sequestration) or general CDR reporting and articles appearing in 2019 or later. Because some of these questions are interpretative, articles were coded in several rounds, some of which were performed by two researchers who subsequently discussed and resolved conflicting results. The final dataset of 252 included articles was finally checked for consistent coding across articles.

A6.3 Methodology for social media analysis

Twitter/X

We updated our previous analysis based on a data set of 570,000 tweets that contain keywords specific to CDR methods or other generic CDR terms and that were posted on Twitter/X between 2010 and 2022 and were collected in 2023. To do so, we purchased access to the X API and downloaded posts uploaded to the platform between 2023 and 2025 using the full-archive search API (https://api.x.com/2/tweets/search/all) with the same queries as for the last editions. Only English-language tweets were included; retweets were not included. Further details on the methodology are provided in Müller-Hansen et al. (2023)[6] and Repke et al. (2024)[7]. The analysis used machine learning to automatically classify sentiments (i.e. the tone of the language used in tweets) as positive, negative or neutral. This classification can differ from the attitude towards CDR expressed in a tweet, as sentiment only refers to how something is said and not the position taken in the text with respect to CDR. This approach draws on well-established sentiment detection algorithms but has limitations. For example, algorithms sometimes struggle to detect irony.

To ensure consistency of the reported counts over time, we used the counts API (https://api.x.com/2/tweets/counts/all) for reporting counts by CDR method and year in Figure 6.6. Note that these counts are slightly lower than the numbers reported in the 2nd Edition of this report, especially for the years with the highest number of posts between 2018 and 2022. The decrease is very likely due to deletion of posts and user accounts that occurred over time and were especially frequent after the takeover of Twitter in 2022.

Reddit

We used a dump of the entire Reddit archive[8] to search submissions and comments using the same search queries as for the Twitter/X data. Restricting this search only to climate-related subreddits resulted in 11,164 posts (631 submissions and 10,533 comments) which were posted between 2009 and June 2025. We checked the accuracy of the posts on a sample of 233 manually annotated post, which were drawn randomly from the dataset such that each CDR method was covered at least 20 times. Based on this evaluation, we removed 2 keyword combinations with very bad accuracy. This resulted in an overall accuracy of 80%. For the sentiment analysis, we used the same approach based on a RoBERTa model9 as for the Twitter/X sentiment analysis.

Bluesky

We searched an archive[10] of 235 million publicly available Bluesky posts shared between February 2023 and February 2024 with the same queries as the Twitter/X data. This resulted in a total of 6,500 posts on CDR topics and methods. For the sentiment analysis, we used the same approach based on a RoBERTa model9 as for the Twitter/X sentiment analysis.

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