

Near and longer-term priorities for international governance of carbon dioxide removal

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Abstract:

Carbon dioxide removal (CDR) encompasses a broad set of methods, which together—and in conjunction with emissions reductions—are essential for addressing climate change. This assessment of the current institutional landscape reveals that a governance gap exists. Because of urgency in scaling up CDR, we argue that now is the time to develop new institutional functions to facilitate the deployment of sustainable CDR to gigatonne scale. Examples of previous institutional innovations, as well as a framework of necessary governance functions, provide guidance for institutional design. Further, an array of nascent CDR initiatives have the potential to address important aspects of the governance gap, while missing others. We see an effective pathway, in which 1) an initial set of capabilities focused on data, coordination, and signalling is established, 2) in a transitional phase, additional functions—implementation and policy analysis—are phased in, and 3) in the longer term, the governance gap is filled with coordination of rules and standards. Transparency and engagement with diverse stakeholders throughout will be central to this process of building governance capacity. A regime of international organizations that encompasses the full scope of CDR methods would provide robust governance in the face of persistent change and uncertainty over the coming decades.

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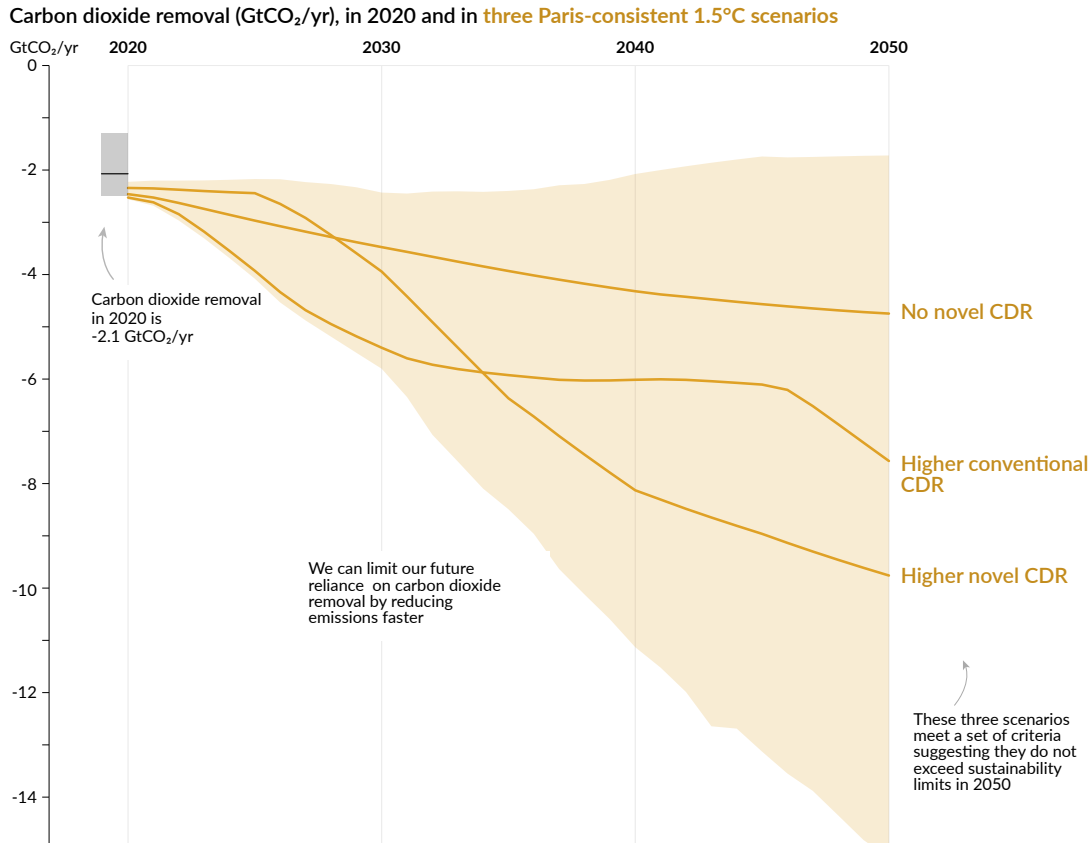
Executive summary

Carbon dioxide removal (CDR) encompasses a broad set of methods, which together—and in conjunction with emissions reductions—are essential for addressing climate change. This assessment of the current institutional landscape reveals that a governance gap exists. Because of urgency in scaling up CDR, we argue that now is the time to develop new institutional functions to facilitate the deployment of sustainable CDR to gigatonne scale. Examples of previous institutional innovations, as well as a framework of necessary governance functions, provide guidance for institutional design. Further, an array of nascent CDR initiatives have the potential to address important aspects of the governance gap, while missing others. We see an effective pathway, in which 1) an initial set of capabilities focused on data, coordination, and signalling is established, 2) in a transitional phase, additional functions—implementation and policy analysis—are phased in, and 3) in the longer term, the governance gap is filled with coordination of rules and standards. Transparency and engagement with diverse stakeholders throughout will be central to this process of building governance capacity. A regime of international organizations that encompasses the full scope of CDR methods would provide robust governance in the face of persistent change and uncertainty over the coming decades.

ES.1. Meeting climate goals requires both rapid emissions reductions and deployment of CDR.

Meeting the Paris Agreement’s long-term temperature goal requires both emissions reductions and carbon dioxide removal (CDR). The most important mitigation strategy in the near term is reducing emissions. But global greenhouse gas emissions continued to grow in 2025, a trend which is incompatible with climate targets regardless of how much CDR is deployed. Deep and rapid emissions reductions are essential but insufficient for achieving net zero and thus stabilizing global temperature.

Removing carbon dioxide (CO₂) from the atmosphere is also necessary to meet climate goals. CDR consists of human activities capturing CO₂ from the atmosphere and storing it durably in geological, terrestrial, ocean reservoirs, or in products. How much CDR we will need depends in part on the peak global temperature we reach and how quickly and by how much we reduce emissions, among other factors. But even with those uncertainties, modelling shows that to meet targets, we will need to deploy well over a hundred gigatonnes of CDR between now and when we reach net zero emissions. Scenarios, in which high mitigation ambition is pursued with immediate action, show a scale up from two gigatonnes per year at present to 7 to 13 gigatonnes per year in mid-century. Almost all current CDR—about 2 gigatonnes per year—originates from conventional CDR (primarily afforestation and reforestation); only two megatonnes of novel CDR (more recently developed methods) have been deployed, and they need to scale up to several gigatonnes over the next 25 years. This rate of scale up is possible but on the very high end of previous expansions of technology. There is thus urgency to deploying novel CDR as well as maintaining and expanding conventional CDR, while accounting for sustainability constraints.



ES Figure 1. Carbon removal in Paris-consistent emissions scenarios.

ES.2. International governance would facilitate deployment of CDR

As in other areas, coordinating aspects of CDR development at the international level can spread knowledge, inform policy design, and catalyse deployment, among other activities. Many of these activities would be duplicative at the national level, so there are gains from aggregation of capabilities and information. We use the IPCC definition of governance as “the structures, processes and actions through which private and public actors interact to address societal goals.” Evidence from past efforts shows that broad international cooperation can accelerate deployment and extend the benefits of new technologies beyond early movers. For example, governance of oil supplies in the 1970s built resilience among members of the International Energy Agency, and governance of renewable energy at the International Renewable Energy Agency (IRENA) diffused policy design to dozens of countries. For CDR, governance is widely recognised as a necessary ingredient for robust, transparent, fair, and participatory innovation ecosystems, project deployments and CDR markets. But as we document here, governance of CDR at the international level to date is limited to nascent initiatives and consequently a governance gap exists. Further, we are missing a comprehensive approach, encompassing the full range of diverse CDR methods. We thus expect strong benefits from the establishment of an international organisation performing governance functions currently missing.

ES.3. Now is the time to fill the CDR governance gap

Our assessment finds that it is time to establish an international institution—or significantly strengthen capacity and coordination of existing institutions—to develop robust national and international governance mechanisms for CDR. Many CDR approaches are at an early stage of development, with few shared definitions or policy approaches. There is immediacy to this governance challenge because of the urgency of the climate problem and because of the time it takes for new institutional capacities to be adopted, implemented, and expanded. Climate impacts are becoming more intense and pervasive while global emissions still grow. Net zero targets have been adopted by countries representing >80% of global greenhouse gas emissions. The number of start-ups and level of investment in CDR are rising. But as the State of CDR reports show, there is still a multi-gigatonne difference between country pledges and what is needed in Paris Agreement-compatible scenarios. Institutionally, IRENA, for example, took a decade from initial concept to establishment of a new institution, and further time elapsed until the institution performed its full suite of functions. There is thus a need to progress faster and to initiate that institutional development process soon. The current multi-lateral landscape is facing profound challenges, which while imposing difficulties, also creates opportunities for novel forms of pluri-lateral governance.

ES.4. Systematic assessment of governance functions gives insight on past and current initiatives

We adopt a methodology that involves: describing mechanisms by which international coordination addresses barriers to scale up; identifying governance gaps; surveying existing initiatives; describing options for filling governance gaps; and prioritising functions to implement. We employ a framework of six essential governance functions: 1) signalling and guidance; 2) rules and standards; 3) implementation, finance, and capacity building; 4) data, knowledge, and learning; 5) policy analysis; and 6) convening and coordination. We apply this framework to established climate-relevant international organisations and to 12 CDR initiatives. The results show where governance supply is ample, partial, or absent across our sample, and informs our recommendations for a sequence of functions for a new or enhanced existing institution. It also provides us with a set of promising strategies that we observe both in CDR initiatives as well as in existing institutions.

ES.5. Previous institutional innovations provide a playbook and show expanded scope over time

Historical analogues show that nascent organisations with a limited set of functions can evolve into durable institutions that grow in scope to serve a broader set of activities over time. Trusted information has played a particularly important role in building legitimacy, especially when coupled with early efforts to enhance awareness of the potential gains to cooperation. Among the institutions analysed, IRENA provides the most directly relevant model for how an international institution can catalyse progress in a nascent sector. A trusted knowledge base (REN21) provided the foundational capacity to enable the launch of a new international organisation (IRENA). The International Energy Agency shows how both scope and membership can grow over time and that core mission can evolve to maintain salience. Mission Innovation and the Clean Energy Ministerial show the potential for high-level convening of leaders, to

coordinate goals and identify priorities. In multiple cases, a crucial contribution came from policy entrepreneurs—public officials who can galvanise support within their governments and cultivate a coalition of willing partners. In addition, the explicit mention of multiple benefits in visions and mission statements has been important. Key implications for CDR are to:

- 1) begin with a limited set of functions to expand over time;
- 2) identify policy entrepreneurs to enable nascent support;
- 3) use shared data to establish credibility and legitimacy; and
- 4) clearly communicate the multiple benefits attributable to international coordination.

However, development of CDR governance must progress more quickly than previous organisations, if these solutions are to reach the scale necessary to keep the Paris long-term temperature goal within reach.

ES.6. Emerging CDR initiatives emphasise signalling and coordination

We identify 12 CDR initiatives with clear plans about how they would contribute to CDR governance in terms of the six functions of governance. We find the most emphasis on two functions: signal and guidance; and convening and coordination. At least half of sampled initiatives demonstrate evidence of playing a role in coordination and signalling while data, knowledge, and learning was present across five initiatives. These results are well aligned with the analysis of non-CDR historical analogues described above. We see less, but some, activity in: implementation, finance, and capacity; and policy initiatives—areas with potentially greater needs for governance development. While such activities are planned across many initiatives, meaningful activity was only identified at two initiatives. Across sampled initiatives, we found no evidence of demonstrated supply of governance for rules, standards, transparency—a critical area for establishing and upholding integrity for CDR—despite that such functions appear planned or partially supplied at eight initiatives.

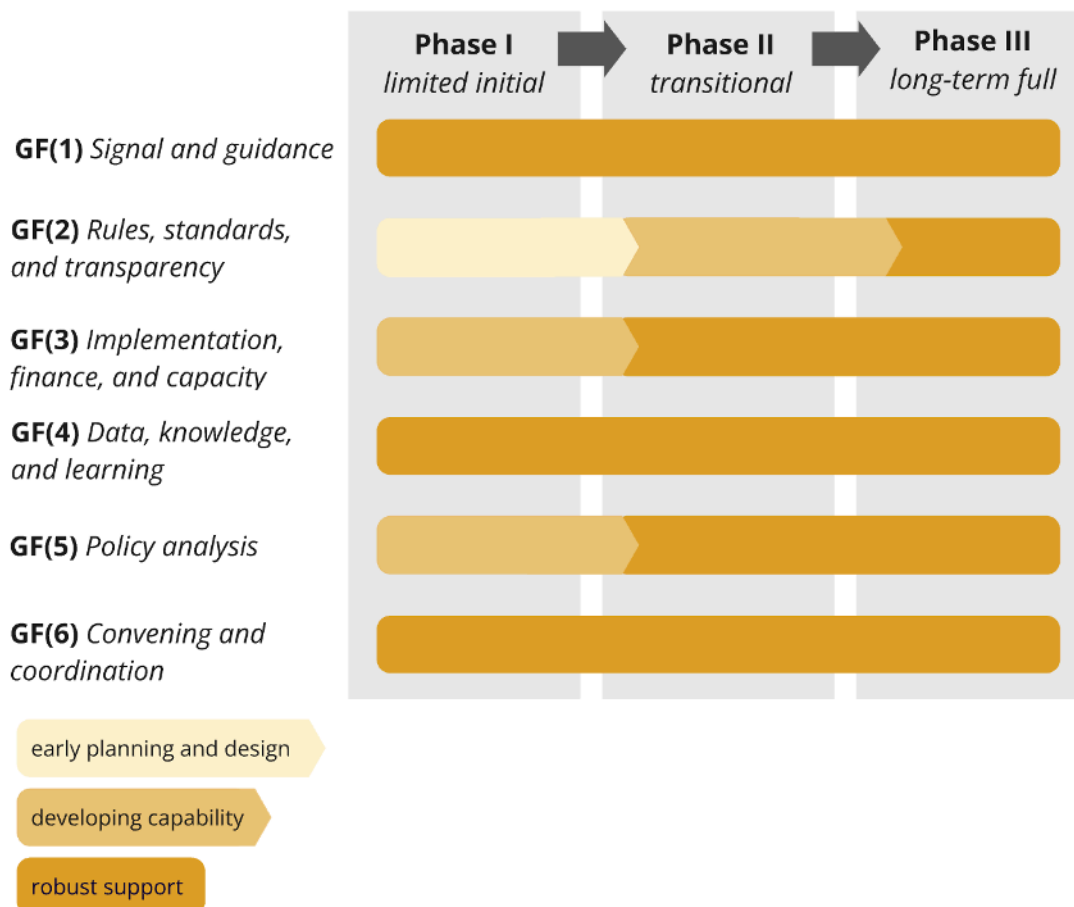
ES.7. Near-term priorities for CDR are data, coordination, and signalling

A first implication of the analysis is that convening and coordination, signalling, and knowledge creation and dissemination are high value functions to initiate early on. Over time other essential functions, such as coordination of rules and standards, will need to be developed. We thus recommend a phased approach that balances where the most acute gaps are and the feasibility of addressing them. In Phase 1 we prioritise fully functioning programs in signal and guidance; data, knowledge, and learning; and convening and coordination. Those are essential programs that build legitimacy and credibility for the organisation, setting the stage for developing governance capacity for other functions. We thus also see Phase 1 as a time to identify and build capability in implementation and finance; and policy analysis. Phase 1 is also a time to initiate dialogue among participants to develop early plans for more contentious issues such as rules, standards, and transparency because they require more intensive dialogues among stakeholders.

ES.8. Additional capabilities to develop in the longer term include rules, standards, and transparency

We recommend that in Phase 2, the existing programs continue while new programs in implementation and policy analysis are launched as fully functioning programs. That phase is

also a time to shift the dialogues on rules, standards, and transparency to developing capacity to implement those as functions of the organisation. In Phase 3, the five established programs continue and the program on rules, standards, and transparency is launched. At that point the organisation will be performing all six of the governance functions.



ES Figure 2. Proposed Progression of functional coverage for CDR governance across three phases of development.

In implementing this proposal, an array of issues will need to be considered, and priorities kept in mind, including equity, the role for capacity building, and more generally engaging the Global South. Another will be establishing sufficient budget for a secretariat to perform Phase 1 functions. Membership and contributions will also be critical issues, as will coordinating government engagement on functions that span multiple government agencies. Above all, finding a way to establish the secretariat and move through the three phases at a faster pace than analogous historical examples will be an essential mandate for the organisation. We identify several promising strategies in this assessment: elevating co-benefits; flexible membership, tailoring to context; broadening scope over time; building on existing capabilities; and engagement of diverse stakeholders. The authors are using this set of recommendations to begin a process of co-developing these and other implementation issues with partner organisations and multi-sectoral audiences with a Roadmap to CDR Governance report to follow.

In summary, a new institution dedicated to CDR governance would promote credibility and legitimacy for carbon removal while also systematically gathering lessons, good practice, and policy designs. This would comprehensively inform governments and other interested stakeholders about developments in the sector and provide practical information for supporting removals in their countries. In the near term it would provide a source of trusted information and in the medium- and longer-term support for rules, standards, and transparency among members.

1. The need for CDR and governance

Meeting the Paris Agreement’s long-term temperature goal requires both emissions reductions and carbon dioxide removal (CDR). In the near term, reducing emissions is the most effective and efficient mitigation strategy. Yet global greenhouse gas (GHG) emissions continued to rise in 2025 (Friedlingstein et al., 2025), a trajectory incompatible with climate targets regardless of how much CDR is deployed. Deep and rapid emissions reductions are essential for reaching net zero CO₂ emissions to stabilize global warming, but they cannot do it alone. Some GHG emissions will remain unabated at net zero, particularly from hard-to-abate sectors such as long-haul aviation, heavy industry, and agriculture. Addressing these residual emissions necessitates a role for CDR in reaching net zero CO₂. The scale of CDR needed will depend on peak global temperature and the pace and depth of emissions reductions, among other factors. Even under scenarios with more aggressive decarbonisation, modelling consistently indicates that meeting climate targets will require the deployment of well over a hundred gigatonnes (Gt) of CDR (1 Gt is equivalent to 1 billion tonnes), cumulatively, between now and when we reach net zero CO₂ (Smith et al., 2024).

There is thus now broad scientific recognition for the role of, and need for, CDR in achieving global climate and temperature targets, especially after a period of exceedance of a specific level of global warming followed by a decline to or below that level, also known as “overshoot” (Geden & Reisinger, 2025; IPCC, 2023b, 2023a; Smith et al., 2024). However, deployment of a broad suite of CDR solutions by mid-century is only feasible with near-term investment and rapid scale-up (Nemet et al., 2018). Despite growing recognition of the urgent need to scale CDR, the international governance mechanisms essential for spurring and steering upscaling remain underdeveloped relative to the field’s needs. The landscape of extant and emerging international institutions as well as the literature on CDR governance evidence this gap.

As a proportion of CDR research overall, research that deals with governance accounts for just one to three percent and exhibits knowledge gaps in terms of how to integrate CDR into climate governance and in coverage of the Global South (Lück et al., 2024). Empirical case studies and comparisons are largely missing (Schenuit et al., 2021) and extant literature tends to be more conceptual rather than empirical, focusing on high-level principles and how CDR figures in global mitigation scenario planning (Babiker et al., 2022). Also, CDR governance research tends to focus more on national rather than international implementation and is uneven across methods (Lück et al., 2024). These gaps underscore the need for more empirical, method-agnostic, and geographically comprehensive CDR governance research.

1.1. Gigatonnes of annual removals needed by mid-century

To be sure many individual countries have reduced their emissions over the past several years; for example, the UK has reduced its emissions more than 50 percent since 1990 (Office for National Statistics, 2025). However, global GHG emissions continued a rising trend in 2025. While emissions cuts remain the primary mitigation strategy for climate change, complementary deployment of CDR to counterbalance hard-to-abate residual emissions is now unavoidable (Dooley et al., 2022; IPCC, 2023b). Three roles emerge for CDR in responding to climate change: accelerating the pace of CO₂ emissions reductions in the near-term; counterbalancing residual emissions to achieve net zero and limit overshoot in the medium-term; and achieving

and sustaining net-negative CO₂ emissions in the long-term (Babiker et al., 2022; Bellamy & Geden, 2019; Geden & Reisinger, 2025; IPCC, 2023b). To meet the 1.5°C Paris Agreement target sustainably, an estimated seven to nine gigatonnes of annual CDR will be needed by mid-century (Smith et al., 2024). Between 2020 and 2100, estimates for the cumulative amount of CDR required to limit global temperature rise to 2°C or lower vary substantially across pathways, ranging from 450 to 1,100 GtCO₂ (Smith et al., 2023). The ultimate quantity of CDR necessary to keep global temperatures below 1.5°C (or bring the world back to this level after initial exceedance) will depend on many factors, including relative dependencies on novel versus conventional methods (see **Figure 1**). Given that most CDR to date—about two gigatonnes—is delivered through conventional CDR (i.e., afforestation and reforestation), there is a significant need for investment and scale-up of novel, generally more durable CDR technologies (e.g., DACCS and BECCS), which currently deliver less than 0.1% of the total (see **Figure 2**) (Smith et al., 2024).

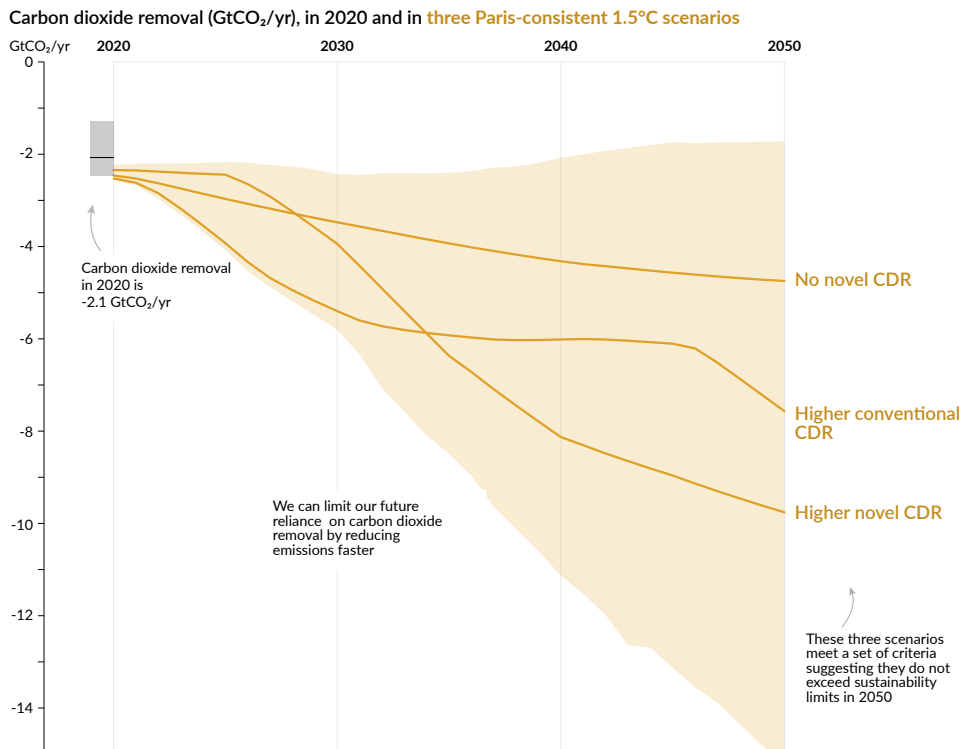
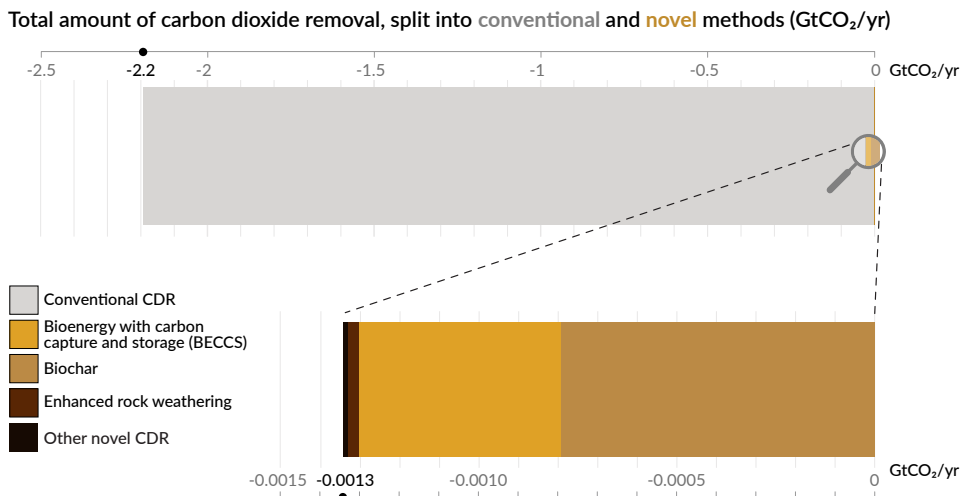


Figure 1. Graph illustrating three Paris-consistent 1.5°C scenarios for CDR deployment between 2020 and 2050 from Smith et al., 2024.



Amount of carbon dioxide removal (CDR) is the sum of conventional CDR (2013-2022) and novel CDR (2023)

Figure 2. Bar graph illustrating shares of conventional (2013-2022) and novel CDR (2023) from Smith et al., 2024.

1.2. Defining governance of CDR

The Intergovernmental Panel on Climate Change (IPCC) defines *governance* as “the structures, processes and actions through which private and public actors interact to address societal goals,” including “formal and informal institutions and the associated norms, rules, laws and procedures for deciding, managing, implementing and monitoring policies and measures at any geographic or political scale, from global to local” (IPCC, 2023a). In this paper, “CDR governance” refers to the set of interlocking structures, processes, and actions through which actors interact to address climate change through intentional, durable removal of carbon dioxide from the atmosphere. This includes efforts to understand CDR, sustainably manage its risks and benefits, and—where deemed appropriate—develop and scale it. It encompasses many different structures and systems, tangible and intangible, formal and informal, at levels ranging from local to global; and it implicates state and non-state actors, public and private. Developing and implementing governance mechanisms helps to answer questions about if, and how, CDR should scale, and who decides, benefits, and pays.

The IPCC defines *governance capacity* as “the ability of governance institutions, leaders and non-state and civil society to plan, coordinate, fund, implement, evaluate and adjust policies and measures over the short, medium and long term, adjusting for uncertainty, rapid change and wide-ranging impacts and multiple actors and demands” (IPCC, 2023a). In short, governance capacity describes the ability of actors to create, implement, and uphold governance mechanisms in an adaptive manner. This paper treats governance capacity as a resource, whose abundance or scarcity is reported in terms of “supply,” borrowing the concept of “governance supply” from Otto and Oberthür (2024). Thus, we treat the terms “governance capacity” and “governance supply” as functionally equivalent.

Since the IPCC defines *mitigation* to include both reduction of emissions and enhancement of sinks, it is accurate to characterise CDR as one of many tools in the mitigation toolbox. Thus,

CDR governance is not separate from, but sits within the context of, broader climate governance. Embedding efforts to govern CDR within frameworks for broader mitigation governance may therefore be advantageous. Historical case studies of international climate governance can be instructive for understanding and shaping CDR governance. For example, the signing of the Montreal Protocol led to effective remediation of harm to the ozone and is often cited as an example of successful climate intervention. The Kyoto Protocol, another global climate treaty, “built national capacity for [GHG] accounting, catalysed the creation of GHG markets, and increased investments in low-carbon technologies” (Patt et al., 2022). In contrast, the Paris Agreement takes a more “bottom-up” or polycentric approach, engaging a broader array of actors at regional, national, and sub-national levels; though its effectiveness is the subject of debate (Patt et al., 2022). In each case, the underlying institutional structures, the Treaty texts themselves, and any implementing legislation promulgated by nation-states in response to them, may be considered governance (or “objects of governance”). The processes, actors, and norms that shape the Treaty text also constitute governance. These examples illustrate how governance refers not only to the “what” (e.g., Treaties) but also the “who” (e.g., signatories) and the “how” (e.g., Conference of the Parties (COP) negotiations).

Turning toward CDR, discussions of governance often revolve around how CDR shows up in climate policy and multilateral instruments such as Nationally Determined Contributions (NDCs), national long-term mitigation plans (LTS), domestic legislation, and net zero transitions (Babiker et al., 2022; Schenuit et al., 2021). CDR governance is also commonly invoked as a means to prevent overreliance on CDR and attenuate risks of delaying mitigation action (Schenuit et al., 2021). Prominent examples include efforts to establish clear and separate targets for levels of CDR and emissions reductions in NDCs, LTSs, and national mitigation plans as well as sub-targets for different types of CDR (Babiker et al., 2022; ESABCC, 2025; Lebling et al., 2024). Another example, dubbed “like-for-like” restrictions, would create provisions to ensure a given removal’s permanence mirrors the residence time of the emission it seeks to counterbalance (e.g., geologic storage is used to counterbalance fossil fuel emissions while conventional CDR can be used to counterbalance emissions from biological sources). However, CDR governance can encompass other activities as well.

A more complete definition of governance can draw upon theories of governance beyond climate policy. The concept of “epistemic governance,” for example, highlights how knowledge is shaped, circulated, and institutionalised; how problem definitions are constructed; and how these processes influence what actors perceive as possible, appropriate, or legitimate (Alasuutari & Qadir, 2014). Governance is therefore not only about formal rules, policies, and institutions, but also about the production and structuring of knowledge itself. As Boettcher argues, discourse plays a constitutive role in shaping governance outcomes (Boettcher, 2020).

From this perspective, the boundary for what is considered “governance” extends to actions that influence information production and knowledge-sharing. In the climate domain, this implicates institutions involved in generating and disseminating authoritative knowledge about climate change and societal responses. In a CDR context, reports produced by trusted entities such as the United Nations Environment Programme (UNEP), the IPCC, and State of CDR, in tandem with other drivers of public perception, heavily influence actors’ understanding of CDR, including

what actions seem possible and legitimate. In this sense, the reports and their authoring institutions may also be considered CDR governance.

1.3. Why we need international governance of CDR

Governance is widely recognised as a necessary ingredient for robust, healthy, fair, and participatory innovation ecosystems, project deployments, and markets (Dörpmund et al., 2025; Harasaki et al., 2025; Lück et al., 2024; McQueen & Burns, 2025). As one peer-reviewed editorial argues,

the central questions for CDR governance therefore no longer concern *whether* CDR should be pursued, but *how*, which CDR methods should be pursued, to what extent, when, where, and by whom. Despite this, the governance frameworks and democratic processes that will be needed to responsibly incentivise, develop, and sustain CDR remain largely neglected not just by policymakers, but also by much of the academic research community as well (Bellamy, Geden, et al., 2021).

Recognition of the need for strong governance of CDR emerges in part as a direct legacy of failed governance for carbon credits and markets for land-based CDR. Poor governance of carbon credit accounting and verification, largely generated via afforestation and reforestation, led to persistent overestimation of projects' climate benefits due to "challenges of additionality, leakage, double counting, environmental injustice, verification, and permanence." In turn, this has undermined public trust in voluntary carbon markets (VCM) and stymied growth (Romm et al., 2025). One study of more than 2,000 projects found that less than 16 percent of carbon credits issued constituted real emissions reductions, calling for fundamental reform of carbon crediting mechanisms (Probst et al., 2024). Recent estimates suggest CDR makes up less than ten percent of total credits sold on the VCM (Smith et al., 2024). Despite CDR's relatively small market share, poor governance threatens to make climate policies ineffective and inefficient, and undermine trust and public acceptance of carbon credits, markets and, by extension, removals (DeFries et al., 2022). It also creates a "race-to-the-bottom" risk, wherein high-quality credits generated from projects with more rigorous adherence to high standards of monitoring, reporting and verification (MRV) struggle to compete with an abundance of low-quality, cheap credits. International CDR governance is therefore needed to create "consistent and comparable accounting rules for land-based removals" under global frameworks and to guide integration of credits into markets (Bellamy & Geden, 2019). Ultimately, CDR governance is important for balancing market efficiency and innovation dynamics with the guardrails that minimise negative side effects of scaling CDR.

However, the need for CDR governance is not limited to market rules and credit integrity. Multilateral and multi-level cooperation is also needed to coordinate global action on CDR between governments of all levels, industry, and researchers. International cooperation is an essential ingredient to responding meaningfully to climate change, and research shows it's having a positive and measurable effect. It's essential because (1) climate change is a global commons problem that requires coordinated solutions and (2) cooperative solutions present opportunities for economic efficiencies (Patt et al., 2022). Climate mitigation and CDR alike will depend on pre-existing as well as new and strengthened forms of international cooperation. IPCC

synthesis finds “international cooperation is emerging” for CDR “but so far fails to fully address transboundary issues,” such as governance of ocean iron fertilisation (Patt et al., 2022).

The need for CDR governance reaches further still to encompass issues like global technology transfer; land use change and conflicts emerging from it; the sustainability and ethics of CDR supply chains; impacts on air and water resources, human health, energy, and ecosystems; and procedural and distributive justice and community engagement (Babiker et al., 2022). Innovation dynamics—supply-side (e.g., research, development, and demonstration) and demand-side (e.g., niche markets)—also require governance interventions (e.g., incentives for early deployment; environmental integrity, public acceptance) if CDR is to scale on a timeline commensurate with climate targets (Nemet et al., 2018). The literature also highlights the need for emerging CDR governance regimes to minimise negative trade-offs, exploit co-benefits, and account for differences in societal values, policies regimes, and knowledge capacities (Bellamy, 2018; Bellamy, Fridahl, et al., 2021; Bellamy, Geden, et al., 2021; Cox & Edwards, 2019). Our analysis of CDR governance is not exhaustive; rather, we seek to create a typology of governance functions that each represent a bundle of related activities and that collectively represent the governance ecosystem as a whole (see section 2).

Whether considering market integrity, international cooperation, or some other dimension, governance of CDR in its current state appears insufficient to responsibly govern the sector’s growth, integrity, and its effectiveness in mitigating climate change. Thus, both national and international policy and governance regimes will need to be developed to better incorporate CDR constraints and opportunities and account for its risks (UNEP, 2023).

1.4. The need for a broad portfolio of CDR methods

Despite having vastly different characteristics, diverse CDR methods are often lumped together. For example, biochar—an engineered solution that pyrolyses biomass to lock away carbon—could be regulated or funded under regimes that fail to distinguish it from, say, direct ocean carbon capture and storage (DOCCS), despite few similarities. CDR methods within and among novel and CDR categories vary substantially in terms of their permanence, technological readiness, and mitigation potential (see **Figure 3**) (Smith et al., 2024). In some cases, lumping methods under shared governance regimes may be appropriate or necessary (e.g., to facilitate fungibility of carbon credits or estimating global CDR needs in relation to global emissions as part of net zero planning), while in others it can create problems and confusion. Historically, broad categories like “geoengineering” and “carbon management” have subsumed CDR, risking conflation with carbon capture and storage (CCS) or planetary-scale climate interventions like solar radiation management. As such, unique governance needs emerge at different phases of development and for different CDR methods, subverting any notion of “singular grand designs for CDR governance” and likely insinuating, in its place, a patchwork of political and regulatory initiatives (Bellamy & Geden, 2019). For instance, CDR methods that rely on geologic storage or that interact with different environments (e.g., soils, forests, or the ocean) carry different governance implications. BECCS deployments, for example, require tailored policy and governance regimes to ensure feedstocks are sustainably and ethically sourced, whereas, mineral- and alkalinity-based methods (e.g., OAE, ERW) rely on a very different supply chain with unique governance considerations (e.g., human and environmental impacts of mining

operations, especially at scale). It follows that the applications, needs, goals, means, and scales of different methods are context-dependent, having both method-specific and category-wide implications (Bellamy & Geden, 2019). Thus, governance interventions likely need to be tailored not only to geographic and political contexts, but also to method-specific contexts (see section 5.4.8).

Given method heterogeneity, investing in a broad portfolio of methods, sometimes called a “portfolio approach,” reduces the risk of overlying on any one method, enables a broader array of deployment pathways (i.e., time and place) and use cases, allows for optionality in balancing trade-offs (e.g., resource use, burden-sharing, distributional fairness), and creates overall system-level robustness.

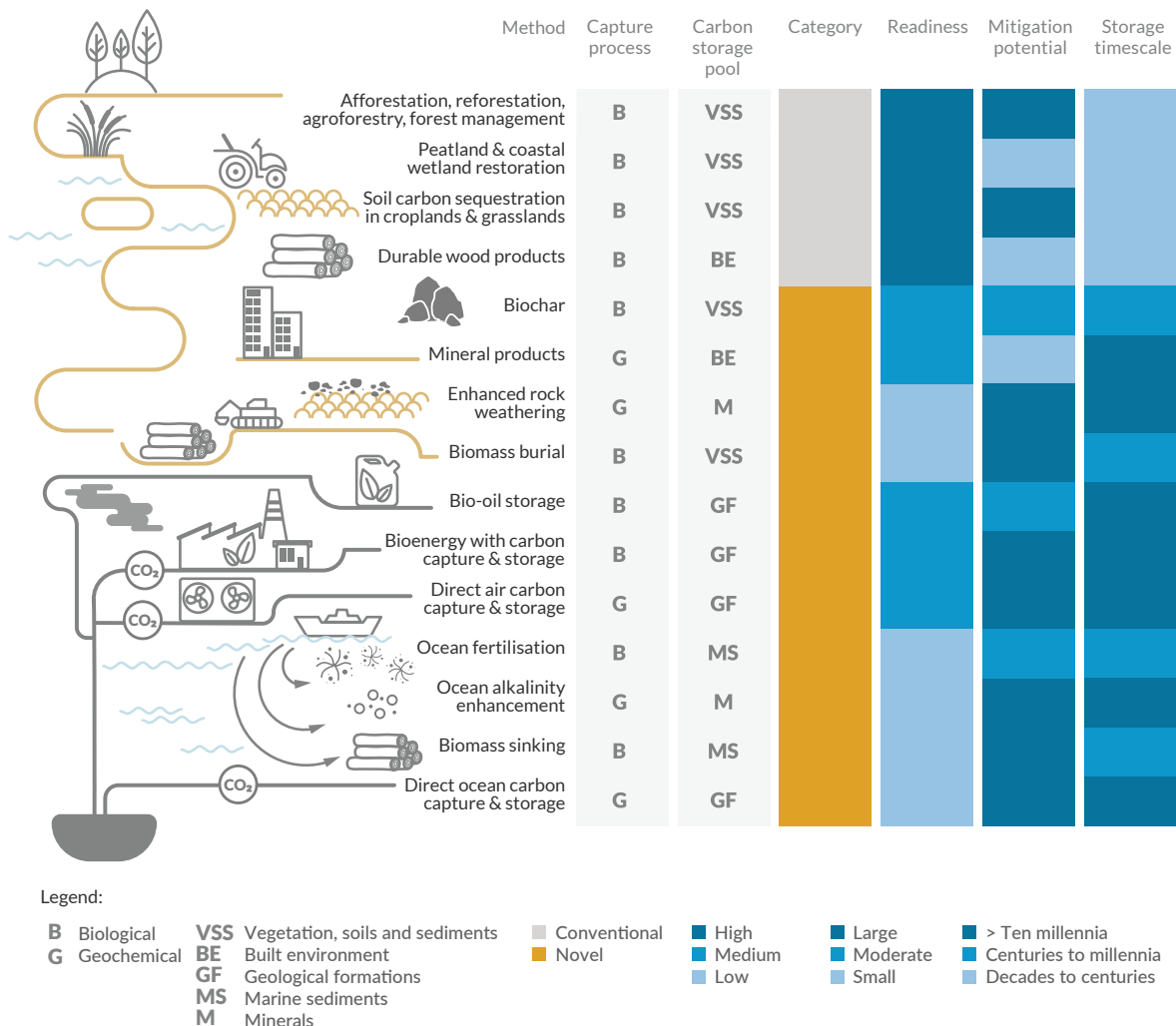


Figure 3. Summary of CDR methods from Smith et al., 2024.

1.5. Coordination to accelerate technology and policy diffusion

Policy diffusion refers to how policies spread across jurisdictions, a process that can be horizontal (e.g., between states) or vertical (e.g., between state and federal governments) and bidirectional. Both technology diffusion and policy diffusion can follow a characteristic S-curve, beginning with early adopters before reaching widespread adoption, though other curve patterns are possible. Diffusion up and down these channels can enable virtuous cycles of learning and adoption of successful policies (Dolowitz & Marsh, 2000).

Given historical and predictable patterns of diffusion, CDR technology and policy stands to learn a lot from successfully diffused technologies, such as “appealing to heterogeneous users, managing policy risk, as well as understanding and addressing public concerns” all of which are “crucial yet not well represented in the extant literature” (Nemet et al., 2018). That work also reveals significant biases in the CDR literature’s attention to supply-side innovation (research and development (R&D), demonstration, and scale-up)—and R&D in particular—at the expense of post-R&D and demand-side innovation. Given significant lead-up times in scaling and deploying novel technologies and the diverse actors that must ultimately adopt them, there is urgency to develop, and encourage wide-scale adoption of, CDR technologies. To that end, future research should focus on the incentives for early deployment, niche markets, scale-up, demand, and public acceptance (Nemet et al., 2018).

The innovation literature makes clear that policy and technology diffusion have the potential to accelerate adoption of CDR, and that actors governing CDR can directly influence this process. For example, international coordination can facilitate policy diffusion by sharing examples of what has worked in specific countries or for subnational governments. With this understanding of the theory of diffusion of innovation in mind—and the role of governance in influencing this process—we find further evidence for the case that governance is urgently needed to accelerate upscaling and adoption of CDR globally.

2. Methodology: systematic assessment of governance capacity

Assessing existing and planned governance capacities is a necessary step toward identifying governance gaps in the global CDR ecosystem. To that end, we draw upon case studies from well-established, broadly climate-focused institutions to distil patterns and lessons learned from institutional histories, including pathways to legitimacy, structural aspects, and governance roles. We pair this with an analysis of CDR-focused initiatives—proposed, early-stage, and advanced—to identify emergent gaps in CDR governance.

2.1. Identifying key dimensions of organisational structure and function

For each institution or initiative, we summarise the following criteria:

1. **Mission:** What are the stated, overarching missions, objectives, or goals?
2. **Scope:** For broader climate orgs, what kinds of technology are covered? For CDR initiatives, which CDR methods are in scope; for all, which geographies are in scope?
3. **Leadership, membership:** Who leads and who participates?
4. **Funding:** How is it funded?
5. **Inception, status:** How, or in what context, was it established and what is its developmental status today (i.e., proposed, early stage, or advanced)?
6. **Governance functions:** What roles, functions, or services does it deliver or aspire to deliver? How does or will it contribute to global CDR governance now or in the future?
7. For well-established climate organisations (Section 3 only), we include a seventh criterion, “**CDR linkages,**” which describes the extent to which an institution’s mission or objectives intersects with CDR.

2.2. Assessment of governance functions

Otto and Oberthür deploy a framework of six core governance functions (GF) to systematically assess institutional options for advancing global governance for decarbonisation of energy-intensive industries. Their typology builds on previous literature, which identified five main governance functions: (1) signal and guidance; (2) rules for collective action; (3) transparency and accountability; (4) means of implementation; (5) knowledge and learning; and advances it by adding a sixth function, (6) orchestration and coordination. As the authors note, this framework “may also be applicable to other areas of global (climate) governance, helping to advance systematic assessment of institutional options beyond the industry sector” (Otto & Oberthür, 2024). Owing to its multidimensional structure and its basis in the literature on international climate governance, we find this framework highly suitable for assessing the institutional landscape for CDR; we thus adapt the six functions and apply them to the international governance of CDR (see *Figure 4*).

Otto and Oberthür define GF(1) signal and guidance broadly as actions that steer policy direction and align developments across different levels of government. In a CDR context, this could mean CDR roadmaps and readiness reports, vision and pathway documents, and carbon management strategies. Examples from government include the Australian CDR Roadmap, the Netherlands CDR Roadmap, Canada’s Carbon Management Strategy, Germany’s Long-Term Strategy on Negative Emissions for Dealing with Unavoidable Residual Emissions, the European Commission’s “Sustainable Carbon Cycles” policy communication, and the U.S. Department of

Energy (DOE)’s Carbon Management Strategy (Bundesministerium für Wirtschaft und Klimaschutz (BMWK), 2024; Commonwealth Scientific and Industrial Research Organisation (CSIRO), 2025; European Commission. Directorate-General for Climate Action, 2021; Natural Resources Canada, 2023; Netherlands Ministry of Climate Policy and Green Growth, 2025; U.S. Dept. of Energy (DOE), 2024). Target-setting, which may take many forms (e.g., domestic or regional legislative mandates, voluntary private-sector commitments), is another activity that can constitute guidance and signalling, since shared targets help create shared expectations, goals, and, in some cases, mandates. However, not all signals are created equal: the quality and ambition of the signal and the guidance matter tremendously for creating effective demand and supply of CDR. Maximising certainty and predictability—crucial prerequisites for investor confidence—requires policy signals and guidance that are long-term, loud, and legal. To that end, incorporation of removals into existing emissions trading schemes (ETSs) (e.g., UK and EU ETS) and UN facilitated trading mechanisms (e.g., PACM) is in development. Novel policy concepts that would make fossil fuel producers directly responsible for their emissions (i.e., a carbon takeback obligation) and other related measures (e.g., carbon border adjustment mechanisms and sustainable fuel mandates) are also being explored. Although compliance regimes would largely be implemented by national and regional governments, intergovernmental and transnational initiatives can play a key role in facilitating their development and adoption. Beyond compliance regimes, intergovernmental coalitions can lead efforts to steer voluntary signals and guidance, which are arguably equally important.

Because the rules that facilitate collective action in a CDR context are intricately linked with those that regulate mechanisms for transparency and accountability (e.g., MRV protocols and policies) we combine functions (2) and (3). And, as Otto and Oberthür point out, the two functions are closely related as “sufficient transparency and accountability is a precondition for the enforcement of rules and policies” (Otto & Oberthür, 2022). In our analysis, GF(2) rules, standards, and transparency refers to the suite of functions that harmonise, regulate, or otherwise instil norms for the integrity of CDR writ large. This sprawling category, essentially “trust infrastructure” for CDR, can include actions that determine (govern) what CDR “counts,” such as formal or informal adoption of high-level principles or standards for carbon removal, and advocacy or promotion of such principles. It may also include promulgation, adoption, or promotion of policies or other kinds of rule-making mechanisms that govern accounting methodologies and protocols, certification, and reporting requirements. This is consistent with Otto and Oberthür’s definition of the ‘rules for collective action’ function, which encompasses “common definitions, standards, methodologies and certification schemes.” In CDR, examples from government include the European Union Carbon Removal Certification Framework, the Shared Principles for Growing High-Integrity Use of Carbon Credits, and the U.S. Principles for High-Integrity Voluntary Carbon Markets (Biden-Harris Administration, 2024; Coalition to Grow Carbon Markets, 2025; Regulation (EU) 2024/3012, 2024). Extra-governmental examples include the Oxford Principles for Net Zero Aligned Carbon Offsetting, standards set by standards bodies and registries (e.g., Puro.earth, Isometric, and the International Organization for Standardization), and the ICVCM Core Carbon Principles (Integrity Council for the Voluntary Carbon Market, 2024). A lack of robust rules that are harmonised across geographies, there is a risk of under-delivering removals and of overly conservative estimates that drive up costs.

We adapt Otto and Oberthür’s fourth function, “means of implementation” to our GF(3) implementation, finance, & capacity building, which encompasses actions that directly lower barriers to project demonstration and deployment; allocation or coordination of finance; and dissemination or delivery of training, education, or other forms of capacity building. Here, capacity building means actions that enhance “the strengths and attributes of, and resources available to, an individual, community, society or organisation to respond to change” (IPCC, 2023a). Public research, development and demonstration programmes like the U.S. DOE Regional DAC Hubs, the EU Innovation Fund, the UK Greenhouse Gas Removal Demonstration Programme, and Germany’s 2026 budget allocation supporting negative emissions projects are government-led examples of this function. Extra-governmental examples could include advanced market commitments (e.g., Frontier Climate, Stripe Climate) multilateral (e.g., Green Climate Fund, World Bank) and philanthropic funders (e.g., Quadrature Climate Foundation), and delivery of CDR-relevant curricula (e.g., the CDR Primer, the UPenn CDR Executive Education Program, and dedicated CDR and related curricula at Columbia Law, Northwestern, CU Boulder, Yale, and Harriot Watt) (Cain, 2026; Heriot-Watt University, 2025; University of Colorado Boulder, n.d.; Wilcox et al., 2022; Wilcox & Deich, 2025). One of the important roles of GF(3) is helping to correct Global North-South inequities by delivering finance to emerging economies so that they can participate equitably in the growth of CDR ecosystems. GF(3) also helps address the “who pays” question that applies to public goods generally and to CDR; public funding for innovation and early deployment helps correct this market failure.

Otto and Oberthür define their fifth governance function, knowledge and learning, as “providing analysis, gathering data, disseminating best practices, and facilitating stakeholder collaboration” (Otto & Oberthür, 2024). According to their framework, this function serves to “reduce uncertainties, disseminate relevant technical knowledge or promote effective policy frameworks” and “advance cross-country learning and collaboration” through stakeholder networking (Otto & Oberthür, 2022). We append “data” to the label for this function—GF(4) in our typology—to expressly call out the important role that data collection, analysis, and dissemination play in CDR governance. Examples of GF(4) in practice include CDR knowledge-sharing summits (e.g., Gassnova Knowledge Sharing Summit 2026) and workshops (e.g., Mission Innovation CDR Mission hybrid workshop in Tokyo, Japan), open-source tools and platforms maintained by CDR.fyi, and the State of CDR Reports (Smith et al., 2024). This governance function is critical to ensure countries and companies can make effective investment decisions that maximise benefits and accelerate near-term scale up. It’s also important for supporting capacity building efforts under GF(3) to ensure communities wherein projects are sited have the information they need to contribute meaningfully to decision-making.

We add a distinct function for policy analysis, GF(5), to disambiguate roles such as policy concept design, inventorying, ex-ante assessment and ex-post evaluation methodologies, and dissemination from other aspects of data, knowledge and learning. Archetypal examples of this function include CDR policy dashboards (Carbon Removal Standards Initiative, 2025; Climate Recovery Institute, 2025) and reports (W. Jones, 2024).

We adapt Otto and Oberthür’s sixth function, “orchestrate and coordinate” to our GF(6), labelled convene and coordinate. They define this function as coordinating “existing institutions and initiatives, as well as their activities” by “supporting institutions that have similar objectives or

by steering their governance and activities through persuasion or incentives” (Otto & Oberthür, 2022). In a CDR context, the meaning is nearly identical, but we emphasise the role of convening actors in addition to coordinating institutions. Examples can include convening roles played by intergovernmental climate alliances (e.g., the Group of Negative Emitters and G-ZERO Alliance) and multilateral platforms for climate tech innovation (e.g., Mission Innovation). This governance function cuts across all other functions and its relevance increases with the density of the governance landscape by enabling institutions “to exploit synergies, avoid duplication of efforts and prevent frictions” (Otto & Oberthür, 2024). **Table 1** summarises the meaning of these six governance functions as adapted for CDR.

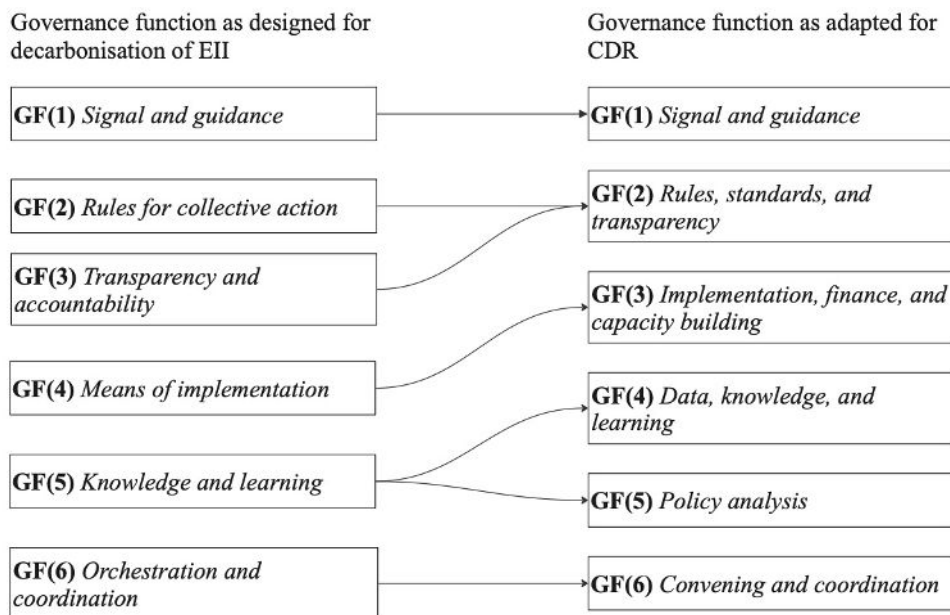


Figure 4. Adaptation and repurposing of six-function governance framework from Otto & Oberthür (2024) for assessment of CDR landscape.

2.3. Limitations

There are limitations to our assessment. Regarding the six-function typology, some ambiguity exists between functions with overlapping definitions (e.g., training and capacity building may fall under GF(3) or (4), depending on the context; political commitments that constitute signalling under GF(1) may be tightly linked with shared commitments made by multilateral coalitions, invoking GF(6)); in some cases, GF(5) policy analysis may be a subset of GF(4) data, knowledge, and learning; and the role of governance in steering engagement, such as co-design of research and project development or securing social license, falls under multiple functions, including GF(3) and (4)). Evaluation against the six governance functions is reduced to three grades (“●”, “◐” and “blank”) to provide a simplified, high-level analysis of extant governance functions and reveal gaps. This grading system introduces substantial subjectivity, underscoring the need for future and external validation of gap identification. We do not assess the efficacy of institutions in delivering governance or verify their claims.

Recent CDR governance scholarship also highlights the prevalence of “deep uncertainty” and “market-shaping and market-led complexity” that collectively render future CDR governance arrangements, institutions, and drivers largely unknowable (Workman et al., 2026). This framing points to the lack of historical precedent, the lack of relevant past long run data, and the highly dynamic and context-dependent intricacies that shape or will shape the sector as part of a broader “meta-transition” as reasons for such deep uncertainty. Accordingly, we put forth our assessment not as a prediction of future outcomes but as a non-exhaustive snapshot of current governance activity in a highly dynamic space, using a standardised methodology to assess efforts in parallel, and to inform current efforts to strengthen international governance capacity for CDR. This analysis represents an empirical starting point for future discussions with broader groups of stakeholders. We intend for these ideas to be malleable and adapt and evolve over time.

Governance function	Description	Archetypes/examples
<i>GF(1) Signal and guidance</i>	Actions that steer activity and policy direction and create market signals	<ul style="list-style-type: none"> • Policy documents like NDCs, CDR roadmaps, carbon management strategies, and readiness reports • Setting targets and benchmarks for industry and government • Legislative frameworks e.g., compliance markets
<i>GF(2) Rules, standards, and transparency</i>	<p>Promulgation of rules and policies that facilitate collective action or prohibit detrimental activity; and</p> <p>Actions and commitments that enforce and uphold transparency and accountability</p>	<ul style="list-style-type: none"> • Policies or frameworks that regulate MRV, methodologies, and certification • Required reporting (e.g., NDCs, BTRs) under the UNFCCC • Adoption of high-integrity CDR principles
<i>GF(3) Implementation, finance, and capacity building</i>	Actions that address barriers to technology development, investment costs, and supporting infrastructure; resource support for CDR demonstration, scaling, and deployment; actions that enhance the strengths and attributes of, and resources available to, an individual, community, society or organisation to respond to change (IPCC, 2023a).	<ul style="list-style-type: none"> • Provisioning financial resources • Technology transfer or diffusion • Technical assistance • Capacity building and trainings
<i>GF(4) Data, knowledge, and learning</i>	Efforts to generate new knowledge of CDR (research); analysis, synthesis; dissemination of existing knowledge; or facilitation of knowledge exchange through collaboration; data collection	<ul style="list-style-type: none"> • Data-sharing platforms • Provision of educational materials, (e.g., trainings, curricula, communications) that support CDR research, deployment, or policymaking capacity • Tracking CDR deployments, purchases, deliveries, and other related metrics
<i>GF(5) Policy analysis</i>	Ex-ante and ex-post analysis, inventorying, and dissemination of current policies and policy design concepts including from other relevant innovation and deployment processes	<ul style="list-style-type: none"> • Publishing papers, dashboards, or decision support tools that compare, recommend, or evaluate policies • Ex-ante assessment and ex-post evaluation methodologies • Tracking CDR policies
<i>GF(6) Convening and coordination</i>	Efforts to convene, align, or coordinate institutions, governments, or other actors and their activities; may be intergovernmental or between different hierarchies of governance	<ul style="list-style-type: none"> • Convening intergovernmental alliances to accelerate or coordinate CDR innovation, deployment, or technology policy • Convening intergovernmental coalitions to establish shared commitments for net zero, net-negative, or CDR funding • Multi-institutional and transboundary efforts to exchange best practices, policy design concepts, or align incentives and compliance schemes including linking common standards or mutual recognition of standards

Table 1. Description of governance functions as adapted from Otto & Oberthür (2024) for CDR context.

3. Learning from well-established, international climate organisations

While a governance gap exists for CDR, as outlined above, many international organisations have been established to support the scale-up of other mitigation technologies and measures. These organisations can serve as models for how different institutions can develop and serve to foster international cooperation towards common goals. This section provides a brief overview of eight selected international organisations in the climate mitigation space and reports their missions and respective governance roles.

Among the institutions analysed, the International Renewable Energy Agency (IRENA) provides the most directly relevant model for how an international institution can catalyse progress in a nascent sector. Its success is instructive not only because of its eventual impact, but also because of the long and deliberate process that led to its formation—with a starting point that mirrors the current developmental stage of CDR in 2025. The initial idea for IRENA was proposed as early as 1981 during a United Nations (UN) conference focused on renewable energy, reflecting early recognition of the need for global coordination in the sector (IRENA, n.d.-a).

However, it took over two decades before the concept gained formal traction: in 2004, a resolution supporting the creation of IRENA was adopted in Bonn, Germany. This momentum culminated in the agency's official founding in January 2009, when 75 countries signed on as founding members. Since 2004, as a first step towards IRENA, the renewable energy community benefited from the Renewable Energy Policy Network for the 21st Century (REN21), a trusted and widely used knowledge platform that helped build consensus and legitimacy for IRENA—much like the role the State of CDR report plays today in the CDR space.

Other relevant analogues are Mission Innovation (MI) and the International Energy Agency (IEA). MI transitioned from concept to implementation more rapidly than IRENA, though with a much narrower scope and constituency. Conversely, the IEA was formed under the Organisation for Economic Cooperation and Development (OECD) to cooperate on energy security in the wake of severe oil disruptions in the 1970s, with its mandate and membership expanding over decades.

These historical precedents underscore a key lesson: the transformation from a data-driven initiative to a formal international organisation requires the active involvement of policy entrepreneurs—public officials who can galvanise support within their governments and cultivate a coalition of willing partners. For CDR, however, the urgency of the climate crisis demands a more accelerated pathway than the one that led to IRENA's creation.

		Governance functions (GF)					
		(1)	(2)	(3)	(4)	(5)	(6)
Initiative	Formation Year	SIGNAL	RULES	IMPLEMENTATION	DATA	POLICY ANALYSIS	COORDINATION
REN21	2004				X	X	X
IRENA	2009	X		X	X	X	X
IEA	1974	X	X	X	X	X	X
MI	2015	X	~	X	X		X
CEM	2010	X	~	X	X	~	X
SEforAll	2011			X	X	~	X
CCAC	2012	X	X	X	X	~	X
Race to Zero	2020	X	X	~			

Table 2. Summary of select international organisations in the clean-tech sector. Framework adapted from Otto & Oberthür (2024). “X” means we find robust evidence for the governance function within an initiative’s demonstrated or planned activities. “~” means there is some evidence for the governance function within an initiative’s demonstrated or planned activities, but it is limited or indirect. REN21: Renewable Energy Policy Network for the 21st Century; IRENA: International Renewable Energy Agency; IEA: International Energy Agency; MI: Mission Innovation; CEM: Clean Energy Ministerial; SEforAll: Sustainable Energy for All; CCAC: Climate and Clean Air Coalition.

3.1. Renewable Energy Policy Network for the 21st Century (REN21)

REN21 is a global multi-stakeholder network that brings together governments, industry, NGOs, academia, and international organisations to accelerate the global transition to renewable energy.

- Mission:** REN21’s mission is “to achieve a world built on renewable energy by uniting diverse stakeholders and creating the momentum for the necessary rapid, lasting change” (REN21, n.d.-a). It aims to uncover blind spots, challenge entrenched systems and ensure that renewable energy is at the centre of global policymaking and economic planning. Through *dialogue, debate, and data*, REN21 works to shape the narrative that renewables are the clear choice for both people and nature.
- Scope:** REN21 operates globally, covering all regions through its broad partner network and regional reports. Its thematic focus is renewable energy and related enabling policies.
- Leadership, membership:** While it started as an initiative comprised of a handful of public policy entrepreneurs, REN21 has expanded to include industry associations, governments, intergovernmental organisations, NGOs, and academic and scientific institutions. Members convene every three years to review the proposed upcoming, three-year work plan and to elect a REN21 Steering Committee. This Steering Committee represents the REN21 community, providing strategic direction to REN21’s work programme.
- Funding:** REN21 is funded by a broad range of supporters committed to a renewable energy future, including governments, foundations, and multilateral organisations.
- Inception, status:** Founded in 2004 following the Bonn International Conference on Renewable Energy, it emerged as a "coalition of the willing" dedicated to scaling up renewables (REN21, n.d.-b). REN21 has developed a strong reputation as a trusted data provider and convener in the field.

6. Governance functions:

- Data, knowledge, and learning: REN21 consolidates and disseminates reliable, real-time data on global renewable energy developments. Through reports like the *Renewables Global Status Report*, *Global Futures Report*, and various regional and thematic publications, it informs policy debates and highlights the progress and challenges of the energy transition.
 - Policy analysis: REN21 also publishes reports on renewable energy policy to provide policymakers with a better understanding of the broad range of policy options for an increased renewable energy deployment.
 - Convening and coordination: REN21 creates open forums for stakeholders across sectors to engage in structured debate and collaboration. It organises high-level events such as the *International Renewable Energy Conference* and internal network-building platforms like the *REN21 Academy* to encourage knowledge exchange, partnership building, and strategic coordination.
7. **CDR linkages**: REN21 has not engaged extensively on CDR, as it focuses largely on renewable energy. Accordingly, references to CDR in its reports are largely confined to BECCS in the context of bioenergy production.

3.2. International Renewable Energy Agency (IRENA)

IRENA is an intergovernmental organisation that aims to support countries in the adoption of renewable energy. In its formation, it aimed to fill an institutional gap as an organisation focused solely on the deployment of renewables and open to all UN member states.

1. **Mission**: “The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy” (IRENA, n.d.-b).
2. **Scope**: IRENA focuses on the sustainable use of renewable energies in all areas of the energy sector.
3. **Leadership, membership**: As of 2024, IRENA has grown from an initial 75 member states to 170 member states and is open to all UN member states. IRENA is comprised of the Secretariat, the Council and the Assembly. The Secretariat is made up of the Director General and associated staff and provides administrative and technical support to the other bodies. The Council is made up of a subset of member states elected for two-year terms, while the Assembly includes a representative from each member state and serves as the final decision-making authority.
4. **Funding**: IRENA is funded by member states through both mandatory and voluntary contributions.
5. **Inception, status**: The initial idea for an institution like IRENA was proposed as early as 1981 during a UN conference focused on renewable energy, reflecting early recognition of the need for global coordination in the sector. While renewables fell within the remit of the International Energy Agency (IEA), many saw the need for a dedicated institution

to drive the energy transition (Urpelainen & Van de Graaf, 2015). Attention on renewables picked up in the 1990s, but efforts to form IRENA wouldn't pick up steam until the 2000s.

As described above, REN21 was formed in 2004. While REN21 served as an objective and well-established knowledge base on renewable energy, it became clear countries would benefit from further institutional capacity building and technical assistance to support their energy transitions. By highlighting best practices and policy successes, REN21 helped make the case for IRENA, effectively laying the informational and institutional groundwork that enabled its founding.

Over three to five years, efforts to establish an institution serving a wider range of governance functions in the renewables sector intensified. These efforts were driven by a small group of determined actors who worked to build support and hammer out key details. While a desire for high membership at the start and some political negotiations, such as where it would be hosted, slowed progress, IRENA was formed in 2009.

6. Governance functions:

- Signal and guidance: IRENA provides guidance on energy transitions such as through renewable energy outlooks on global, regional, and national levels. For example, IRENA recommended a global goal of tripling renewable energy capacity by 2030 to stay on a 1.5°C pathway in its World Energy Transitions Outlook, which was adopted at COP28.
- Implementation, finance, and capacity building: Through programmes such as the Energy Transition Accelerator Financing Platform and Climate Investment Platform, IRENA facilitates finance and implementation of renewable energy projects. Additionally, it provides capacity building for government officials and private sector stakeholders (e.g., Project Finance Capacity Building Workshop for Pacific SIDS).
- Data, knowledge, and learning: IRENA provides analysis on the socio-economics of energy transitions, cost trends of energy technologies and fuels, market research, and other knowledge products. IRENA also leads and contributes to the regular tracking of progress in the energy sector. It serves as the official custodian of the annual report series tracking progress towards global renewable energy and energy efficiency goals. It further tracks other energy transition indicators through the IRENASTAT tool and reports such as the Tracking SDG7 progress reports.
- Policy analysis: IRENA conducts analyses of policies and regulatory measures supporting the energy transition, the ambition of national targets, renewable energy markets, etc.
- Convening and coordination: Serving as coordinator and facilitator, IRENA supports engagement and collaboration between governments, civil society and private sector actors through multilateral initiatives and platforms (e.g., Coalition

for Action, SIDS Lighthouses Initiative, Global Geothermal Alliance, Global Offshore Wind Alliance, etc.)

7. **CDR linkages:** IRENA currently contributes to the knowledge base around CDR as it relates to renewable energy and decarbonisation scenarios, particularly BECCS and DACCS.

3.3. International Energy Agency (IEA)

The IEA, established in 1974 under the OECD framework, monitors and analyses global energy trends across all fuels and technologies, publishes influential reports like the *World Energy Outlook*, and advises governments on energy policy. The agency also coordinates strategic oil stockholding, promotes energy efficiency, and supports the deployment of low-carbon technologies such as renewables, hydrogen, and carbon capture. It plays a key role in facilitating international cooperation, enhancing data transparency, and guiding the global shift toward sustainable and secure energy systems.

1. **Mission:** “The IEA works with governments and industry to shape a secure and sustainable energy future for all” (IEA, 2026b).
2. **Scope:** IEA works across the entire energy sector, covering all fuels and technologies.
3. **Leadership, membership:** As of January 2026, the IEA consists of 32 member countries, 13 association countries, and 4 accession countries seeking membership. To be a member, a country must be part of the OECD and meet other criteria, such as minimum oil reserves. The IEA engages with non-member countries through its Association program, extending its influence to major emerging economies.
4. **Funding:** The IEA is funded by its member countries and receives voluntary contributions from non-member countries and stakeholders.
5. **Impact, status:** The IEA was established in 1974 under the OECD framework in response to the 1973–74 oil crisis, with an initial mandate focused on ensuring energy security among industrialised nations. Its core functions included coordinating emergency responses to oil supply disruptions, requiring member countries to maintain strategic oil reserves equivalent to 90 days of imports, and promoting energy conservation and alternative energy development. Over time, the IEA’s role expanded significantly to encompass the entire global energy system.
6. **Governance functions:**
 - **Signal and guidance:** Through keystone products such as the *World Energy Outlook*, the IEA provides guidance on how energy systems may develop under different scenarios and policy goals on global, regional and national levels.
 - **Rules, standards, and transparency:** A core mission of the IEA is to ensure security of global oil supply. One way this is achieved is through oil stockholding obligations and demand restraint programmes during supply disruptions. The IEA also contributes to transparency and accountability through standardised data collection questionnaires disseminated to countries on an annual basis.
 - **Implementation, finance, and capacity building:** The IEA provides a wide range of training for various audiences, including policymakers, energy statisticians, other analysts, and private sector actors.

- Data, knowledge, and learning: The IEA is one of the leading providers of energy data and analysis. Products such as the *World Energy Outlook*, *World Energy Balances*, and *Oil Market* reports and many others provide key data on energy systems. It supports research across various energy technologies, for example through the Technology Collaboration Programme.
 - Policy analysis: The IEA both analyses and tracks global energy policies. Their Global Energy Policies Hub is an open-source dataset of energy-relevant policies. The IEA further produces scenarios reflecting different future energy systems based on adopted and planned energy policies.
 - Convening and coordination: The IEA supports international dialogue through fora such as the Group of Seven (G7) and the United Nations Framework Convention on Climate Change (UNFCCC) and serves as host or facilitator for multilateral organisations such as the Clean Energy Ministerial (CEM), Energy Efficiency Hub and the BioFuture Programme. Additionally, the IEA coordinates emergency responses to oil supply disruptions.
7. **CDR linkages**: The IEA has engaged with CDR as it relates to energy innovation (e.g., BECCS) and its role in decarbonisation pathways. To some extent, it has tracked some data pertaining to CDR, such as the number of start-ups and venture capital funding in selected CDR technologies. As early as 2012, the IEA has hosted events and workshops on different CDR technologies.

3.4. Mission Innovation (MI)

Mission Innovation (MI) is a global intergovernmental initiative aimed at accelerating clean energy innovation. It seeks to make these solutions affordable and widely accessible by significantly increasing public investment and strengthening private sector engagement. At its core are collaborative “Missions” focused on ambitious, outcome-driven goals such as scaling green hydrogen or decarbonizing industry that mobilise governments, industry, and research institutions around shared innovation priorities. MI also facilitates global knowledge-sharing through its Discovery Zone, fosters public-private investment pathways, and collaborates with major institutions like UNIDO, the European Investment Bank, and the World Bank to support cleantech innovation, especially in emerging economies.

1. **Mission**: MI’s mission is to serve as “a global initiative catalysing a decade of action and investment in research, development and demonstration to make clean energy affordable, attractive and accessible for all”, with the aim to “accelerate progress towards the Paris Agreement goals and pathways to net zero” (Mission Innovation, n.d.).
2. **Scope**: MI is an intergovernmental initiative with a global scope focused on clean technology innovation.
3. **Leadership, membership**: By 2025, MI has evolved into a robust intergovernmental platform comprising 23 countries and the European Commission. High-level leadership is provided by MI members’ Ministers with responsibility for clean energy innovation. Ministers come together annually at the MI Ministerial to assess progress and discuss with key private sector and international actors how to further accelerate innovation and bring affordable clean energy technologies to market. Further guidance is provided by the

MI Steering Committee, comprised of member representatives, and the Technical Advisory Group, which provides an independent review and advise for MI activities to help member governments maximise their impact.

4. **Funding:** Member countries make voluntary contributions by funding the Secretariat or hosting events. For example, the UK has provided the Head of the Secretariat in recent years.
5. **Inception, status:** MI was founded in November 2015 during the COP21 climate summit in Paris as a global initiative to accelerate clean energy innovation. Spearheaded by President Obama and supported by leaders such as Bill Gates, President Hollande, and Prime Minister Modi, the initiative began with 20 countries committing to double their clean energy R&D investments over five years. In 2021, Mission Innovation formally entered its second phase, relaunching with new goals for 2021–2030. MI 2.0 shifted the emphasis from just funding levels to achieving specific innovation outcomes through Missions.
6. **Governance functions**
 - **Signal and guidance:** MI organises collective commitments and goals for clean energy R&D. At its launch in 2015, 20 member countries pledged to double their public clean energy R&D investment over five years—a concrete commitment signalling increased ambition. Under “Mission Innovation 2.0”, MI also creates public-private Missions that set ambitious innovation targets.
 - **Rules, standards, and transparency:** There is partial evidence that MI fulfils some functions in this category, namely through enhancing transparency as members are required to report R&D investments.
 - **Implementation, finance, and capacity building:** MI supports implementation by fostering public-private partnerships that mobilise investment, accelerate demonstration projects, and enable demand for clean energy technologies. While MI does not directly fund projects, members commit to increased public R&D investments and coordinate efforts to unlock private capital and institutional finance in support of innovation deployment.
 - **Data, knowledge, and learning:** Through its Innovation Platform, MI tracks clean energy innovation progress, shares country-level Innovation Pathways, and facilitates data-driven learning across members. Members commit to transparent reporting of R&D investments and collaborative development of tools and insights to inform national strategies and global innovation priorities.
 - **Convening and coordination:** Mission Innovation serves as an international forum for clean energy innovation, enabling countries to share R&D insights and collaborate. Members capitalise on collective expertise, capability and interests to accelerate the development of innovative solutions.
7. **CDR linkages:** One of MI's seven alliances is the CDR Mission (MI-CDR), focussing on enabling development and deployment of novel CDR through international cooperation and innovation. For a full analysis of MI-CDR, see section 4.11.

3.5. Clean Energy Ministerial (CEM)

The Clean Energy Ministerial (CEM) is a ministerial-level collaboration among major economies aimed at accelerating the global clean energy transition. It provides a forum for

energy ministers to meet annually, share experience, and advance cooperation on clean energy deployment and policy frameworks through non-binding, member-led initiatives. CEM works closely with MI, whose ministerial meetings are often co-located, creating a complementary ecosystem in which MI focuses on clean energy innovation and R&D, while CEM supports policy coordination and the scaling of solutions.

1. **Mission:** “The CEM aims to accelerate the global clean energy transition through a voluntary, efficient, global partnership of the world’s largest and most forward-leaning economies” (CEM, 2016).
2. **Scope:** The CEM’s scope is global but concentrated on major economies and high-impact clean energy solutions, using a ministerial-level forum to coordinate action between members. It works through member-led initiatives and campaigns in areas of shared interest, often engaging other stakeholders through those workstreams.
3. **Leadership, membership:** As of 2025, CEM membership consists of 28 national governments (typically represented by energy ministries) and the European Commission, including major economies across all continents such as the United States, China, India, Brazil, South Africa and Saudi Arabia. Leadership rotates: each year a member hosts the ministerial meeting and typically co-chairs with the previous host; strategic guidance is provided by a Steering Committee.
4. **Funding:** The CEM is financed through voluntary member contributions, including support for the Secretariat, and in-kind support such as hosting meetings. The Secretariat is hosted at the IEA.
5. **Inception, status:** CEM was founded in 2010 to promote policies and programs that advance clean energy deployment. The concept was championed by U.S. Energy Secretary Steven Chu and Deputy Secretary David Sandalow, who sought a forum for major economies to cooperate on clean energy outside the formal UN climate negotiations (Sandalow, 2016). A significant development in the CEM’s evolution was the formalisation of its Framework in 2016, which established the Steering Committee and the hosting of the Secretariat at IEA.
6. **Governance functions:**
 - Signal and guidance: CEM leverages voluntary campaigns and goals to raise ambition. One illustration is the EV30@30 Campaign, launched under the CEM’s Electric Vehicles Initiative, which sets a collective aspirational target of 30 percent electric vehicle sales by 2030 among participating countries.
 - Rules, standards, and transparency: CEM partially supports this government function, for example, by promoting common definitions, methodologies and standards related to industrial decarbonization via its voluntary Industrial Deep Decarbonization Initiative (IDDI).
 - Implementation, finance, and capacity building: The CEM is an implementation vehicle that helps its members (and non-members) to achieve specific domestic clean energy objectives, for example by providing technical assistance and capacity-building tools. For instance, the CEM Solutions Center offers no-cost expert advice to governments on energy policy design and has handled hundreds of requests from over 90 countries.
 - Data, knowledge, and learning; Convening and coordination: The CEM is a bottom-up, government-led platform for exchanging knowledge and insights,

building networks and partnerships, and facilitating coordinated actions on clean energy. CEM members help shape the global clean energy agenda and advance the deployment of specific clean energy technologies and solutions.

- **Policy analysis:** CEM invites high-level policy input from the private sector, develops and disseminates resources to inform policies and planning, and promotes policies that advance clean energy technology. We thus find partial evidence of its role in this governance function.
7. **CDR linkages:** CEM works closely with MI, in particular through collaboration between CEM Carbon Capture, Utilisation and Storage (CEM-CCUS) and MI-CDR. Further details can be found in section 4.11.

3.6. Sustainable Energy for All (SEforALL)

Sustainable Energy for All (SEforALL) is a global initiative that works at the intersection of energy, climate, and development to advance Sustainable Development Goal 7 (universal access to affordable, sustainable energy). It partners with governments, businesses, and civil society to end energy poverty, double the rate of energy efficiency improvement, expand renewable energy, and help tackle climate change. With operations in emerging and developing countries worldwide, SEforALL’s vision is a world where everyone can live a dignified life powered by sustainable energy.

1. **Mission:** SEforALL’s mission is to accelerate the clean energy transition globally by pushing for “higher ambition, stronger policies, greater finance flows, increased localization and green jobs, and faster results toward an energy transition that leaves no one behind” (SEforALL, n.d.).
2. **Scope:** The initiative’s content focus spans energy access (electrification, clean cooking), renewable energy deployment, and energy efficiency improvements, all as means to mitigate climate change and spur development. Geographically, SEforALL operates globally with a focus on developing regions in Africa and Asia.
3. **Leadership, membership:** While not a member-based treaty organisation, SEforALL convenes a broad network of partner countries, international agencies, financiers, and NGOs aligned with its sustainable energy objectives. SEforALL is led by a Chief Executive Officer who also serves as the UN Secretary-General’s Special Representative for Sustainable Energy and as Co-Chair of UN-Energy.
4. **Funding:** SEforALL receives voluntary financial and in-kind commitments from governments, multilateral agencies, private foundations, corporations, and non-governmental organisations. Major donors include national aid agencies (e.g., from Austria, the UK, Iceland, Switzerland), multilateral institutions (e.g., EU, OPEC Fund), and philanthropies (e.g., Rockefeller Foundation, ClimateWorks Foundation).
5. **Inception, status:** Launched in 2011 by the UN under the leadership of then-Secretary-General Ban Ki-moon, SEforALL was initially established as a UN initiative and later formalised in 2016 as a Quasi-International Organization under Austrian law. In 2024, it transitioned to become an entity hosted by the UN Office of Project Services (UNOPS), in response to growing operations and expanded geographical footprint. SEforAll is headquartered in Vienna.
6. **Governance functions:**

- Signal and guidance: SEforALL helps countries develop roadmaps (e.g., for participating in carbon markets or electrifying underserved health facilities in Madagascar), facilitates voluntary commitments (e.g., over 160 countries have submitted Energy Compacts; and the G20 New Delhi’s Leader Declaration, which called for a doubling of annual energy efficiency), and other forward-looking planning documents (e.g., an energy transition plan for Ghana and investment plans for Kenya).
 - Implementation, finance, and capacity building: SEforALL works with a range of partners on initiatives and projects that help countries secure the finance and technical assistance they need to implement their energy transitions. Initiatives focus on developing solutions that can be applied across multiple countries, such as providing results-based grants or establishing local carbon markets. Projects focus on providing targeted country support in various areas, such as policy and regulatory reforms, or improving local energy data and insights. SEforALL also advises countries on strengthening national climate and energy commitments, including through Nationally Determined Contributions (NDCs) and UN-Energy Compacts.
 - Data, knowledge, and learning: SEforALL generates and disseminates up-to-date, transparent data and analysis to support evidence-based action toward SDG7. SEforALL identifies gaps in existing knowledge, commissions targeted research and works with partners to produce accessible insights that help benchmark progress, diagnose challenges, and set priorities for the global energy transition.
 - Policy analysis: SEforALL also plays a partial, supporting role in policy analysis by interpreting, amplifying, and coordinating policy analysis (i.e., synthesizing evidence, translating analysis into actionable frameworks, framing policy narratives around SDG7, and convening policymakers).
 - Convening and coordination: SEforALL engages in high-level global advocacy and diplomacy to build political will and align energy, climate, and development priorities, for example by convening stakeholders at the SEforALL Global Forum. SEforALL works through the UN system, G20, and other global platforms to catalyse commitments across state and non-state actors.
7. **CDR linkages**: SE4All has not engaged extensively in the topic of CDR; however, there have been some areas of overlap. For example, SE4All launched the African Carbon Markets Initiative at COP27 to support the development of voluntary carbon markets in Africa, including guidance on the use of removal credits.

3.7. Race to Zero

Race to Zero is a global campaign, led by the UN Climate Change High Level Champions, in which non-state actors—including companies, cities, regions, financial, educational, and healthcare institutions—pledge to reach net zero GHG emissions as soon as possible and by 2050 at the latest, set interim targets and take immediate action. Partner initiatives, subject to their own governance structures and decision-making process apply to be part of Race to Zero campaign and commit to support their members to make progress in line with Race to Zero criteria. An Independent Group of Experts (EPRG) reviews the initiatives and their alignment with Race to Zero making a recommendation to the High-Level Champions.

1. **Mission:** Race to Zero aims to drive “rigorous and immediate action that contributes to halving global emissions by 2030 and deliver a healthier, fairer, net zero world” (Climate Champions, n.d.).
2. **Scope:** Race to Zero is a global campaign focusing on non-state actors and climate change mitigation across all sectors of the economy.
3. **Leadership, membership:** Race to Zero is led by the UN Climate Change High-Level Champions. However, Race to Zero is not a formal organisation, it’s a campaign anchored in the UNFCCC’s Climate Action apparatus. Partner initiatives play a leadership role in the campaign and are responsible to support and manage their members to meet robust science-aligned criteria in line with the Race to Zero campaign. Currently, there are more than 17,000 members, including businesses, cities, regions, universities and financial institutions.
4. **Funding:** Race to Zero as a campaign does not itself fund projects or receive membership fees; instead, it is financed as part of the work of the UN Climate Champions and their partners.
5. **Inception, status:** Launched in 2020 by the UN High-Level Climate Champions ahead of COP26, it aims to serve as a mechanism for driving ambition and implementation beyond national governments.
6. **Governance functions:**
 - Signal and guidance: Mobilise commitments and action by non-state actors in line with the goals of the campaign; convening and aligning existing initiatives and developing partnerships with net zero experts and leaders to advance action and influence global understanding of credible non-state actor action.
 - Rules, standards, and transparency: Facilitate convergence on shared net zero methodologies and pathways, including criteria alignment and developing starting line criteria and leadership practices.
 - Implementation, finance, and capacity building: Race to Zero works through its partner networks to enable members to act on their commitments. The campaign coordinates 25 official Partner initiatives and 35 “Accelerators” which provide sector-specific guidance, training, and capacity-building to members.
7. **CDR linkages:** Race to Zero provides guidance and recommends additional criteria beyond their minimum requirements for members in developing their net zero targets, including guidance on removals.

3.8. Climate and Clean Air Coalition (CCAC)

The Climate and Clean Air Coalition (CCAC) is a voluntary partnership of over 200 governments, intergovernmental organisations, businesses, scientific institutions, and civil society organisations to reduce short-lived climate pollutants (SLCPs), notably methane, black carbon, tropospheric ozone, and hydrofluorocarbons (HFCs). By targeting these “super pollutants”, the Coalition aims to slow near-term warming while delivering significant air-quality, public health, and development co-benefits.

1. **Mission:** CCAC’s mission is to “put the world on a pathway that rapidly reduces warming in the near-term and maximises development, health, environmental and food

security benefits...by catalysing fast action to reduce short-lived climate pollutants” (CCAC, n.d.).

2. **Scope:** CCAC has a global scope and is a voluntary international partnership between governments, intergovernmental organisations, and non-governmental organisations. Its project portfolio strongly emphasises supporting implementation in developing countries.
3. **Leadership, membership:** The CCAC is led by its state and regional integration organisation partners. The over 100 state partners drive the CCAC's decision making and play a crucial role in ensuring the adoption and implementation of policies, regulations, and practices to reduce short-lived climate pollutants. The CCAC governance model distributes governing and advisory responsibility among several entities, including annual Ministerials, annual stakeholder meetings, a Board for strategic guidance and a Scientific Advisory Panel for scientific support.
4. **Funding:** CCAC’s activities are supported through the CCAC Trust Fund, administered by the Secretariat (hosted by UNEP). Countries contribute to the Trust Fund on a voluntary basis. Contributions to the Trust Fund by country partners count towards Official Development Assistance (ODA) and climate finance targets.
5. **Inception, status:** The CCAC emerged in the early 2010s following a scientific report led by the UN Environment Programme (UNEP) and the World Meteorological Organization demonstrating that readily available measures to reduce SLCPs could deliver fast climate benefits while also reducing air pollution. This evidence, combined with growing frustration over slow progress in international climate negotiations after COP15 in Copenhagen (2009), helped motivate a group of governments (Bangladesh, Canada, Ghana, Mexico, Sweden and the United States) and UNEP to launch the Coalition in 2012, with UNEP hosting its Secretariat and Trust Fund. Initially viewed by some as potentially competing with UNFCCC processes and distracting from CO₂ mitigation, the CCAC is now widely regarded as a complementary governance initiative (Unger et al., 2020).
6. **Governance functions:**
 - Signal and guidance: The CCAC provides strategic direction and policy signalling on short-lived climate pollutant mitigation through its strategies, high-level messaging, and practical guidance. This includes guidance for integrating non-CO₂ pollutants and air-quality considerations into national climate planning, particularly NDCs.
 - Rules, standards, and transparency: While the CCAC does not promulgate binding international rules, it supports the development, strengthening, and implementation of national policies, regulations, and standards related to SLCPs. Through technical assistance and project-based work, it helps countries operationalise transparency, monitoring, and reporting practices and improve the treatment of non-CO₂ pollutants within national planning and reporting frameworks.
 - Implementation, finance, and capacity building: Through its Trust Fund and project portfolio, the Coalition provides financial resources, technical assistance, and targeted expert support to address barriers to SLCP mitigation. It also builds institutional and human capacity by supporting national planning processes, policy enforcement, and sectoral mitigation efforts, particularly in developing countries.

- Data, knowledge, and learning: The CCAC generates, synthesises, and disseminates scientific and policy-relevant knowledge on SLCPs and their mitigation. This includes assessments, targeted research, and regular science-policy dialogues that connect researchers, policymakers, and practitioners, as well as tools and resources that support evidence-based decision-making.
 - Policy analysis: CCAC maintains a database of policies relevant to SLCP mitigation.
 - Convening and coordination: As a partnership platform, the CCAC convenes and coordinates actors across levels of governance and sectors. Through its Working Group, ministerial meetings, thematic hubs, and side events at major international forums, it aligns efforts, facilitates the exchange of best practices, and helps maintain political momentum for collective action on short-lived climate pollutants.
7. **CDR linkages**: CCAC has not engaged extensively on CDR, as it focuses largely on the mitigation of non-CO2 gases.

4. Assessing governance capacity in CDR initiatives

Identifying gaps in global CDR governance requires an understanding of the institutional landscape and the extent to which existing and proposed initiatives can supply core governance functions. We thus identify relevant CDR initiatives¹ and assess their roles in governance according to our six-function framework adapted from Otto and Oberthür. We assign partial marks (◐) to institutions with planned, partial, or indirect roles in supplying governance for a given function; and assign a full mark (●) for those for which there is robust evidence for their role in supplying a given function (see *Table 4*). We assign these labels based on expert review and evaluation of organisational activities.

Initiatives were selected qualitatively based on their geographic and portfolio scopes, perceived influence, stated objectives, functions, and relevance for governance, or some combination of these factors. With the exception of CDR-ITSI, we limit our analysis to initiatives with intergovernmental backing or participation. Hence, many private-sector, civil society, and trade- and advocacy-based organisations are relevant for CDR governance but are out of scope for our analysis. The resulting selection of 12 CDR initiatives is not exhaustive; rather, it is designed to reflect a cross-section of diverse governance suppliers with varying levels of legitimacy, implementation, funding, and membership. To facilitate comparison across initiatives at different stages of development and implementation, we group them into three categories: proposed, early activity, and advanced activity (see *Table 3*). It should be noted that our analysis represents a snapshot in a highly dynamic ecosystem; as such, elements are subject to change.

We relied on a combination of white papers, grey literature, publicly available information (e.g., websites), and personal communications to catalogue these initiatives and assess their role in governance. Where data was insufficient, especially for proposed and early-stage initiatives, we infer governance functions based on available information and explain our rationale in the “analysis” subsection.

Grouping	Criteria (indicators)
<i>Proposed</i>	Initiatives not yet established, usually characterised by lack of firm funding, partners, signatories, etc.
<i>Early activity</i>	Initiatives that are less than 2 years old, but are operating in some capacity; usually characterised by a small team of actors
<i>Advanced activity</i>	Initiatives that are greater than 2 years old

Table 3. Grouping criteria for CDR initiatives showing the criteria used to determine stage of activity.

¹ In this paper, the term “initiative” refers to an institution, organisation, coalition, network, or informal group that is advancing some aspect of CDR governance. Initiatives may refer to more well-established institutions or emergent ones and may be entirely or only partially dedicated to CDR as part of their overall mission.

	Governance functions (GF)					
	(1)	(2)	(3)	(4)	(5)	(6)
Initiative	<i>SIGNAL</i>	<i>RULES</i>	<i>IMPLEMENTATION</i>	<i>DATA</i>	<i>POLICY ANALYSIS</i>	<i>COORDINATION</i>
Proposed						
<i>AMC</i>	◐	◐	◐			◐
<i>ARC</i>	◐	◐	◐	◐	◐	◐
<i>CDR-ITSI</i>			◐	◐		
<i>KX Hub</i>		◐	◐	◐	◐	◐
Early						
<i>CDRANet</i>	◐	◐	◐	◐	◐	◐
<i>CDR in UNEP</i>		◐	◐	●		●
<i>CityCDR</i>	●		●	●	●	●
<i>CDR30</i>	●	◐	◐	●		●
Advanced						
<i>CMC</i>	●	◐	●	●	●	●
<i>GONE</i>	●		◐	◐	◐	●
<i>G-ZERO</i>	●					●
<i>MI-CDR</i>	●	◐	◐	●	◐	●

Table 4. Assessment of governance supply for select CDR initiatives according to six functional criteria. Framework adapted from Otto & Oberthür (2024). “●” means we find robust evidence for the governance function within an initiative’s demonstrated activities. “◐” means there is some evidence for the governance function within an initiative’s activities, but it is planned, indirect, or partial. AMC: Advance Market Commitment; ARC: Atmospheric Restoration Centre; CDRANet: CDR Action Network; CDR-ITSI: CDR Intensive Training School Initiative; CityCDR: City CDR Initiative; CMC: Carbon Management Challenge; GONE: Group of Negative Emitters; KX Hub: Trans-Atlantic Knowledge Exchange Hub; MI-CDR: Mission Innovation CDR Mission; UNEP: UN Environment Programme.

4.1. Advance Market Commitment (AMC) for CDR

Rocky Mountain Institute (RMI) defines an advanced market commitment (AMC) as “a financial mechanism designed to stimulate the development and deployment of new technologies by guaranteeing a future market for them” (Deich et al., 2025). Through an AMC, “multiple governments would agree in advance to purchase (or similarly drive demand for) a certain amount of carbon removal (in tons or dollars) over a specified time frame,” creating powerful global demand signals to spur development and deployment while ‘crowding in’ private sector finance (Deich et al., 2025).

1. **Mission:** As envisioned by RMI, an AMC fosters public-private partnership to catalyse demand for carbon removal that grows to gigatonne-scale by mid-century while delivering benefits to the governments that lead it.
2. **Scope:** A government-led AMC could achieve international scope by engaging multiple governments, though the specific participating countries would ultimately depend on the initiative’s design and relevant political dynamics. The AMC is likely to target a broad portfolio of carbon removal methods, although which approaches are eligible would ultimately depend on how the AMC is designed and its members’ priorities. Determining which CDR methods are eligible is one of four key design decisions with outsized impact

discussed in section 4.2.1 of RMI’s discussion paper (Deich et al., 2025). For instance, the AMC could limit allowable CDR methods—risking benefit to the overall CDR industry—or require certain performance criteria be met (e.g., durability, co-benefits) or custom-tailor eligibility criteria to each AMC member. There are trade-offs associated with each design however a balanced and broad eligibility policy that maintains high standards would perhaps be the most inclusive and effective way to maximise benefit to the industry overall, despite the complexities it would entail. Draft planning documentation for the AMC suggests its scope will support all CDR methods with an initial focus on engineered removals before expanding to accommodate nature-based (conventional) CDR.

3. **Leadership, membership:** Membership could include government or corporate members, philanthropic donors, CDR suppliers, technical advisers, members of the public, NGOs, or AMC staff. Still more design considerations must be weighed within those membership options:
 - What level of government(s) is permitted as a buyer?
 - What eligibility constraints are imposed upon suppliers?
 - Can governments qualify as suppliers?
 - Are corporations allowed to participate as full members and make eligible purchases?
 - Which geographies are eligible to supply CDR (e.g., any geography, just member governments, or just domestic procurement)?
 - What role can academia and NGOs play in the design, launch, and operations of the AMC?

To date, conceptualisation of a global AMC for CDR has been led primarily by a coalition of organisations: RMI, Stripe, Carbon Gap, Breakthrough Energy, and Frontier.

4. **Funding:** There are many funding considerations inherent in designing and launching an AMC:
 - **Pre-launch, conceptualisation:** RMI’s discussion paper was funded by the Hewlett Foundation.
 - **Operational:** Operational funding (e.g., for a Secretariat) could be sourced from grants, membership fees, transaction-based and expenditure-based fees, and carbon regulations; while philanthropy may be best positioned to fund the design, launch, and initial operations. Draft estimates suggested a need of USD 5 to 10 million per year to sustain a Secretariat.
 - **Market commitments:** Different constraints could be placed on the kinds of funding permitted to count toward AMC market commitments; for example, pay for performance (e.g., credit purchase), subsidy for performance (e.g., credit subsidy), or pay for practice. Preliminary targets suggest a goal of USD 100 million per year in collective government purchase commitment, a doubling of public funding for CDR by 2030, and a target of USD 1 billion or more from the private sector between 2030 and 2035.
 - **Other funding considerations:** Whether cross-border funding is allowed is another consideration with significant implications for participation and supply.
5. **Inception, status: Proposed.** The AMC is in mature phases of conceptualisation, but pre-implementation (i.e., it has not yet launched despite previous plans to launch at COP30). CDR investment writ large is facing recent setbacks in public spending from its largest

historical backer, the United States; as such, the near-term outlook for securing billion-dollar-scale funding for an AMC is uncertain and may delay launch until the funding landscape improves. A multistakeholder process initially funded by philanthropy and coordinated by NGOs is one recommended pathway to launching an AMC.

6. **Governance functions:** We find evidence for GF(1) signal and guidance; GF(2) rules, standards, and transparency; GF(3) implementation, finance, and capacity building; and GF(6) convening and coordination. Since the AMC is classified as “proposed,” all governance functions are considered “planned or partial.”

Analysis of governance functions

RMI identifies nine critical gaps for scaling CDR and predicts that a global AMC could fill all but one (shared infrastructure), though four gaps would only be addressed by the AMC under certain conditions. This analysis serves as a fertile starting point for assessing the AMC’s role according to the six governance functions in our assessment.

Owing to its core function in aggregating and stimulating demand, we find clear evidence of the AMC’s role in GF(1) signal and guidance such that “[w]hen the public sector signals that it is committed to building the carbon removal market, investors and companies may view carbon removal investments and purchases as less risky, catalysing additional private-sector activity” (Deich et al., 2025). As governments and philanthropies legitimise and bear the risk of CDR purchases (e.g., through investment matching schemes and philanthropic contributions), they build investor confidence, signal support for CDR, and provide a template for transactions.

An AMC could support development and harmonisation of standards and methodologies, and address measurement challenges because “[i]f multiple governments agree on a high bar for carbon removal, voluntary and domestic markets may follow suit as well, driving the overall harmonisation of standards” (Deich et al., 2025). The standards and practices determined fit-for-purpose by governments provide a reference point for voluntary markets. Thus, the AMC has high potential to support GF(2) rules, standards and transparency. The AMC could opt to create its own standards or rely on existing ones, the latter of which confers additional legitimacy to existing standards frameworks. Similarly, the AMC could rely on existing methodologies or design new ones, though leveraging existing methodologies is seen as a more expedient option given the technically-intensive process of designing new ones (Deich et al., 2025). Whether an AMC adopts existing frameworks or designs new ones, it would ultimately influence rules, standards, and transparency frameworks.

Facilitating financial flows to eligible CDR projects through demand stimulation is at the core of an AMC’s purpose. There is thus evidence to suggest an AMC would contribute toward GF(3) implementation, finance, and capacity building, a function concerned with lowering financial barriers. RMI predicts that a global AMC would fill gaps in cost reductions (e.g., via economies of scale, a central procurement mechanism, and learning by doing), deployment (e.g., via shared deployment commitments), and funding (i.e., aggregated, advanced demand). Moreover, an AMC can further advance capacity building by setting a high bar for community engagement and safety as a requisite for eligible purchases and projects.

An AMC would enable structured, efficient, and centralised coordination “[r]ather than loosely coordinated information sharing among governments interested in carbon removal” (Deich et al., 2025), illustrating an apparent role in GF(6) convening and coordination. For example, participating governments would be in a better position to engage in multilateral negotiations, strengthen working relationships with other governments, and shape outcomes arising from multilateral fora (e.g., cross-border funding and operations, standards alignment, and international development). However, an AMC’s ability to facilitate “collective action and planning issues typically resolved by governments through other means” is limited (Deich et al., 2025).

RMI’s analysis finds that “no single mechanism is guaranteed to fill all the critical gaps in scaling carbon removal” (Deich et al., 2025). Along the same lines, no single institution is likely to comprehensively fill the governance gaps alone. However, a government-led AMC has potential to deliver meaningful value toward three to four of the most critical gaps, depending on how it is designed and implemented.

4.2. Atmospheric Restoration Centre (ARC)

The Atmospheric Restoration Centre (ARC) is a proposed international agency for CDR to enable responsible development and deployment of CDR methods and address a wide range of issues facing the sector. ARC aims to take a ‘coalition of the willing’ approach by formalising intergovernmental partnerships—ostensibly between the UAE and the UK—to champion its launch.

1. **Mission:** The principal aim of ARC is “to support the responsible development and deployment of techniques to remove greenhouse gases from the atmosphere, enabling future generations to benefit from a stable climate and healthy oceans.”
2. **Scope:** ARC aims to scale a broad portfolio of CDR methods. However, as with the AMC, its scope is subject to change as it evolves beyond early-stage conceptualisation.
3. **Leadership, membership:** ARC is led by Oxford University researcher Tim Kruger and associates at the Bridge Institute, a British charity. ARC aims to position the United Arab Emirates (UAE) as its state champion. The initiative aims to recruit buy-in for a co-lead role from at least one other country. The Bridge Institute has convened over 100 key stakeholders in the UAE to develop a roadmap for deploying proposed CDR techniques. ARC is also supported by HSBC, and the UK’s Foreign Commonwealth and Development Office.
4. **Funding:** The initial phase is funded by the Bridge Institute and as of late 2025, ARC was seeking financial backing to support its launch, implementation, and sustained operation.
5. **Inception, status: Proposed.** meeting was held in Abu Dhabi on in November 2025, which included an announcement by the UAE Ministry of Energy & Infrastructure describing current thinking on the initiative followed by open discussion. ARC plans to convene workshops in cities around the world and leverage events like Abu Dhabi Sustainability Week and ADIPEC to gather input. **Governance functions:** We find evidence for all governance functions, however, because ARC is classified as “proposed,” all governance functions are considered “planned or partial.”

Analysis of governance functions

The ultimate design and objectives of ARC will be the product of a series of collaborative and cross-sectoral workshops held in cities around the world as well as political decisions made by its state sponsors. As such, there is still ample room for its structure and mission to shift as it takes shape. Initial documentation envisages five strategic pillars for ARC’s mission: (1) research and development; (2) standards and policies; (3) finance and trading; (4) social engagement; and (5) removals readiness reports.

These strategic pillars enable broad analysis of the governance functions that ARC might deliver:

- GF(1), signal and guidance, may be complemented by ARC’s fifth pillar, removals readiness reports;
- GF(2), rules, standards, and transparency, by ARC’s second pillar—standards and policies—which encompasses international coordination of standards and “defining what counts as appropriate removals”;
- GF(3), implementation, finance, and capacity building, by ARC’s third pillar, finance and trading;
- GF(4), data, knowledge, and learning, by ARC’s first pillar, research and development;
- GF(5), policy analysis, by ARC’s second pillar, which, in addition to setting standards, encompasses developing policies to incentivise removals; and
- GF(6) convening and coordination, could be served by ARC’s fourth pillar, social engagement, which is designed to “engage stakeholders on a location-specific basis to understand what is acceptable” with an emphasis on governance and collaboration and by ARC’s broader approach of soliciting buy-in and participation from member-states in a manner that mirrors IRENA’s development and implementation.

Taken together, ARC’s five pillars envision an Abu Dhabi-based entity whose governance role could span all six governance functions considered in our framework. Successful launch and implementation of this vision have the potential to deliver meaningful benefit to the CDR governance landscape, plugging key gaps.

4.3. CDR Intensive Training School Initiative (CDR-ITSI)

The CDR Intensive Training School Initiative (CDR-ITSI) at the Euro-Mediterranean Center on Climate Change (CMCC Foundation) is a proposal to develop, deliver, and support future iterations of a curriculum on CDR that trains educators in the Global South and equips them with the knowledge and resources to train stakeholders in their communities, creating a virtuous cycle of CDR education and enabling proliferation of knowledge hubs.

1. **Mission:** The CDR-ITSI aims to build and bridge CDR knowledge capacity across the Global North and South through a five-year, two-stage approach: intensive training followed by full integration into local research and innovation ecosystems, and replication of training. Among its goals are fostering North-South research partnerships, supporting climate innovation and entrepreneurship, and developing a regional, scalable, and impactful model for knowledge transfer.
2. **Scope:** CDR-ITSI has an initial proposal that would connect Global North CDR experts with researchers and practitioners in the Global South, particularly Kenya and Nigeria.

Based on current proposals, CDR-ITSI’s geographic scope may be considered international but remains limited to a few countries with potential to expand to a larger swath of Global South countries in the future. The CDR portfolio covered by its curriculum is broad, ranging from “industrial to nature-based CDR.”

3. **Leadership, membership:** The Euro-Mediterranean Center on Climate Change (CMCC) Foundation is leading the initiative with support from CMCC’s Integrating Planetary & Industrial Carbon Cycle (ICC) Program and its Advanced Training and Education Center (ATEC). The ICC houses experts on CDR and related disciplines and already coordinated the 2025 *CDR for Net zero Future* academic course. Participation in CDR-ITSI will include a cohort of stakeholders from Nigeria and Kenya across academia (2), government (1), business/industry (1), and civil society (1) who will be trained up to self-administer the subsequent trainings. The proposal anticipates a total of 40 trained students upon project completion, new research programs at two research institutions in each country, and contributions from 10 cross-disciplinary instructors.
4. **Funding:** CDR-ITSI is currently seeking funding to support a USD 1 million budget to cover all expenses of its five-year proposal, including travel, training, and a final conference. The CMCC is supported by the Italian Ministry of Education, University and Research, while its predecessor, the *CDR for Net zero Future* course, is supported by Equinox Process, an organisation dedicated to development and transfer of climate knowledge.
5. **Inception, status: Proposed.** CDR-ITSI is still in early development, building partnerships and shopping its proposal with various funders. CMCC was established in 2005 in Italy and has been operational since 2006. The Foundation received an “Equivalency Determination” qualification, rendering it equivalent to a U.S. 501(c)(3) public charity in terms of its ability to receive donations (*The CMCC Foundation (About Page)*, n.d.). The 2025 *CDR for Net zero* course was offered by the Future Earth Research School (FERS) at the University Residential Center of Bertinoro (CE.U.B.) in the Forli-Cesena province in Italy.
6. **Governance functions:** We find evidence for GF(4) data, knowledge, and learning; and GF(3) implementation, finance, and capacity building. Since the CDR-ITSI proposal is classified as “proposed,” all governance functions are considered “planned or partial.”

Analysis of governance functions

An international, independent, and multi-disciplinary non-profit research institution, the CMCC is dedicated to managing and promoting scientific and applied activities in the field of international climate change research. The Foundation’s stated mission is to investigate and model the climate system, its interactions with society, and to deliver scientific insights toward mitigation, adaptation, sustainable development, and environmental protection. The ICC is one of the CMCC’s four strategic research programs that aim to work in an integrated, cross-cutting manner across CMCC institutes (*Strategic Programs*, n.d.).

Nested within the ICC, the ATEC has demonstrated success implementing high-level training programs for professionals, researchers, and institutions, focusing on the Global South. ITSI will build on successful delivery of a previous curriculum, titled “CDR for a Net zero Future,” delivered at the Future Earth Research School (FERS). Taught in 2025 in Bertinoro, Italy, the course introduced CDR concepts to students and explored cross-cutting issues like governance,

public perception, and MRV frameworks (*Carbon Dioxide Removal for a Net-Zero Future - FERS*, n.d.).

The CDR-ITSI program is focused on capacity building and knowledge transfer. To that end, the ITSI will co-develop locally relevant CDR curricula, provide in-kind services to advise and support domestic deployment of locally owned training programs, and administer seed grants to establish CDR-focused research groups, “CDR knowledge hubs,” at local institutions. Thus, CDR-ITSI delivers on governance function (4), knowledge and learning, through its core mission. While CDR ITSI does not envision providing direct financial support for project development, it will provide resourcing for knowledge hubs to support sustained local capacity for research programs and stakeholders across the CDR stakeholder landscape. These hubs will equip communities with local expertise designed to administer trainings to larger cohorts of CDR stakeholders and could, in theory, administer technical assistance to project developers. Thus, there is some evidence to suggest that CDR-ITSI may play a role in GF(3) implementation, finance, and capacity building, too.

4.4. Trans-Atlantic CDR Knowledge Exchange Hub (KX Hub)

The Trans-Atlantic Knowledge Exchange Hub (KX Hub), whose name is subject to change, is an informal collaborative effort proposed to connect Canada, the UK, and California for the purpose of sharing lessons, knowledge, and best practices for successful development and deployment of CDR in varying jurisdictional contexts.

1. **Mission:** The KX Hub seeks to foster collaboration between California, Canada, and the UK to share lessons learned—best practices and “what works”—across four areas of collaboration (AOC): (1) business model support as a means for crowding in private capital; (2) place-based case studies; (3) market data infrastructure for new asset classes; and (4) cross-cutting knowledge exchange. The KX Hub is designed to facilitate cross-pollination of ideas across all four topic areas.
2. **Scope:** The Hub’s geographic scope is international and spans multiple levels of government. The Hub aims to include a broad suite of CDR methods within its scope.
3. **Leadership, membership:** The KX is designed to be co-developed and co-led by California Council on Science & Technology (CCST), Canada, and the UK. Its value proposition is designed to benefit governments (e.g., national, subnational, municipal), innovators (e.g., CDR start-ups), and sectors with high energy-intensity or reliance on transportation and storage infrastructure (e.g., CCS). Initial plans suggest it will be coordinated by a Secretariat, which could be supported by CO₂RE. Preliminary project partners representing California include representatives from Lawrence Livermore National Laboratory, the Stanford Doerr Sustainability Accelerator, CCST, Gobiz, Project 2030, the California Air Resources Board (CARB), ClimateWorks Foundation, and Stripe Climate. From Canada, the United Nations University (UNU) and Carbon Removal Canada are engaged. The UK is represented by members of CO₂RE, Innovate UK, Progressive Energy, and Kana. State of CDR is also engaged in a coordinating and supporting role.
4. **Funding:** A draft budget for seven months of operations predicts USD 154,000 in expenditure; an additional USD 146,000 is estimated for preparing and executing a

workshop in California. Operational support to set-up a Centre of Excellence is further estimated to cost USD 100,000, bringing total anticipated costs to approximately USD 400,000. Phase 3 of the KX is expected to be self-funded through several possible mechanisms. These figures provide gross, conditional estimates for the scale of funding to support Phase 1 and Phase 2 of the Hub’s development. Funding for Phases 1 and 2 would likely come from philanthropic foundations and possibly subnational and national governments.

5. **Inception, status: *Proposed*.** Development of the KX Hub is conceptualised to follow a three-phase approach: (1) coordination and convergence (e.g., establish Secretariat, seek funding); (2) transition: a “sharing of success” conference (i.e., soft launch of the KX Hub and inflection point marking transition to final phase); and (3) emergence and engagement (i.e., self-funded, Hub comes online, is operational, and begins delivering value). This framework emerged from a roundtable hosted in March 2025.
6. **Governance functions:** We find evidence for GF(2) rules, standards, and transparency; GF(3) implementation, finance, and capacity building; GF(4) data, knowledge, and learning; GF(5) policy analysis; and GF(6) convening and coordination. Since the Hub is classified as “proposed,” all governance functions are considered “planned or partial.”

Analysis of governance functions

We find some evidence for the KX’s role in serving GF(2) within its strategic aims to address “language and standards” and “MRV needs...” though a lack of detail and substantive evidence limits confidence.

Similarly, we find some evidence for the Hub’s role in GF(3) implementation, finance, and capacity building. For instance, the Hub aims to crowd in private capital by learning from and replicating successful, innovative investment models such as the UK’s Hynet Cluster. The Hub aims to inform cost reduction strategies, maximise workforce benefits, build community trust, and establish a “Centre of Excellence”—all of which constitute other possible ways the Hub may eventually contribute toward GF(3). While the Hub itself is unlikely to directly supply capacity building, financial resourcing, or deployment support at scale, its core functions—knowledge exchange and sharing success stories—may inform and support GF(3) as well.

The Trans-Atlantic KX Hub would contribute toward GF(4) data, knowledge, and learning through its stated aims to deliver: virtual and physical data-sharing infrastructure; cross-border research charters; a repository of best-in-class CDR data for policymakers; knowledge transfer workshops and conferences; elevating and replicating successful place-based models; and related educational efforts and communication campaigns.

Preliminary drafts of the KX Hub task the CCST and Lawrence Livermore National Lab with “[c]onducting a landscape analysis of policy makers needs around [the] CDR space possibly prioritised around a decisions support tool such as a Marginal Abatement Cost Curve,” indicating the Hub’s intention to play a role in GF(5) policy analysis. The Hub also seeks to compare and exchange policy interventions across jurisdictions as part of its knowledge-sharing efforts.

Finally, we find sufficient support for the Hub’s contribution to GF(6) by virtue of its intergovernmental, trilateral structure and operations. The Hub’s role in GF(6) is further

elucidated by its aim to address the persistent issue of generating CDR initiatives in isolation and limited opportunities for cross-jurisdictional exchange.

Despite limited participation, the Hub could lend meaningful value to three governments at the forefront of CDR policy and deployment, helping to realise synergies and foster collaboration.

4.5. CDR Action Network (CDRANet)

The CDR Action Network (CDRANet) aims to build a network of interdisciplinary organisations, governments, and experts seeking to mobilise global action on CDR policy and deployment by developing “the world’s first global policy for CDR” (CDRANet, 2025).

1. **Mission:** CDRANet seeks to foster global partnerships across countries, industries, and institutions to “immediately, safely, equitably, and effectively” integrate CDR into our global climate policies (Hampson, 2025). CDRANet emphasises action-oriented results, the role of governments, and the importance of building nimble frameworks (CDRANet, 2024a).
2. **Scope:** CDRANet would be global in scope and aims for both multilateral and multisectoral engagement across countries, industries and institutions. CDRANet is designed to encompass “all CDR approaches—not just specific natural or engineered solutions” and thus can be characterised with broad portfolio scope though it may be more focused on more durable, novel solutions as one of its [slide decks](#) implies: “while temporary carbon removal solutions like trees are good, permanent solutions are better (because in our increasingly hot climate, trees are more likely to burn)” (Hampson, 2025).
3. **Leadership, membership:** CDRANet is led by Glenn Hampson and is managed by the Science Communication Institute (SCI), a US-based 501(c)(3) nonprofit public charity. Its members, called “network delegates,” are intended to represent high-level, authoritative offices in governments and institutions to empower the network with agency. At the time of writing, Sierra Leone is the sole government to sign on, and the organization lists the Negative Emissions Platform (NEP), American University’s Institute for Responsible Carbon Removal (IRCR), and Clean Air Task Force (CATF) as serving in “expert advisor agency” roles. Government engagement is designed to be “flexible, modular and scalable.”
4. **Funding:** CDRANet is currently seeking funding.
5. **Inception, status: *Early implementation.*** CDRANet began sometime in 2025 and plans to hold an inaugural summit, “CDR26,” in October 2026 in Vancouver to sign the Vancouver Declaration. The inaugural conference is slated to feature expert presentations, panels, and networking opportunities. CDR26 will mark a significant inflection point in this initiative’s development, possibly enhancing the network’s buy-in and legitimacy.
6. **Governance functions:** We find evidence for all governance functions, however, since CDRANet is classified as “proposed,” all governance functions are considered “planned or partial.”

Analysis of governance functions

Provisionally known as the Athens Declaration, the Vancouver Declaration would be a non-binding, soft-law agreement and international policy instrument intended to commit global governments and leaders to a set of values-based principles and political intent. Its companion document, the *Vancouver Declaration Policy Framework*, offers policy recommendations to operationalise the declaration's principles. Additional objectives describe how CDRANet's operations would support implementation, such as technical support for governments, policy tools and templates, and promotion of open-access knowledge (CDRANet, 2024b).

Since CDRANet's central document commits global leaders and governments to certain principles and a direction of travel for CDR, there's a clear potential contribution toward GF(1), signal and guidance.

The Vancouver Declaration Policy Framework lists “[establishing] credible global MRV standards” as one of ten key priorities, suggesting a role in GF(2) rules, standards, and transparency. Section 3 of its framework also calls for transparent governance and accountability of CDR through “national and international CDR standards and targets...a three-track strategy for CDR standards and MRV development...improved mechanisms for net zero accounting...long-term storage safety, responsibility, and oversight...embedded transparency and public access...[and protection of] environmental and human rights” (Science Communication Institute, 2026). We thus infer evidence for CDRANet's proposed role in GF(2).

CDRANet seeks to design and identify credible financing pathways and instruments for large-scale CDR, including public and private sources of capital, green bonds, trust funds, and performance guarantees; and “align investments with just transition and sustainable development principles” (CDRANet, 2024a). These objectives suggest the Network will contribute directly to GF(3) by helping to increase access to financial resources of various kinds. The organisation's intent to offer technical support to governments also furthers this function.

We infer a role for CDRANet in GF(4) through the network's stated objective to “improve public understanding of CDR through clear, accessible communication,” and efforts to broaden engagement and enthusiasm for CDR. Since knowledge and learning were central to SCI's mission there is reason to believe CDRANet will also serve these functions.

CDRANet's role in GF(5) policy analysis is articulated by the Vancouver Declaration's companion document, or *Policy Framework*, and by its intention to deliver or promote policy tools and templates. According to its website, “CDRANet is developing adaptable legal frameworks, MRV protocols, and governance templates that can be used or adapted by jurisdictions at different stages of readiness.” Thus, we see evidence for the potential of CDRANet's to deliver on GF(5).

CDRANet states that “there is no single goal for this work, no organizing body, no mobilizing plan of action, and...no policy focus or institutional uniformity.” In response to this challenge, it plans to build “the infrastructure, institutions, and governance mechanisms needed for the urgent, responsible, and equitable” CDR (Hampson, 2025). CDRANet also plans to foster collaboration between countries on integrating and implementing CDR into domestic and international policy

frameworks and to “build a robust organization which will fast-track actions between governments” (CDRANet, 2024a). We thus infer a role in GF(6) convening and coordination. The CDR26 conference provides a concrete example of how CDRANet will facilitate multilateral coordination by way of international convenings.

Taken together, CDRANet envisions contributions toward all governance functions. While it is still early days for CDRANet, its vision for global cooperation, focus on government action, and the Vancouver Declaration position it as a key convening organisation in the global CDR governance landscape. Still, CDRANet faces the dual challenge of securing funding at a time when U.S. federal support for carbon removal is receding (Gallucci, 2025; Hiar, 2025), venture capital investment is stalling, especially for new entrants and early-stage tech (Sightline Climate, 2026; Temple, 2025), and experts are heralding a contraction of the sector and its philanthropic support (Deich, 2026; Höglund, 2025)—all while recruiting buy-in from governments around the world to commit to scaling CDR. It remains to be seen what kind of influence CDRANet will ultimately exert on countries’ climate ambitions and the CDR governance landscape writ large, but its goals would directly address the governance gap.

4.6. CDR at United Nations Environment Programme (UNEP)

The UN Environment Programme (UNEP), a UN body focused on tackling climate change, has recognised and elevated the role of CDR in addressing climate change for several years, most notably through its Emissions Gap Reports (EGR). Moreover, a CDR-focused team is incipient within the Climate Change Division. Its role as a widely trusted science communicator and convener of governments and multilateral actors positions it as a potential leader in the CDR governance landscape, especially as its CDR work formalises.

1. **Mission:** UNEP is considered the United Nations’ global authority on the environment, focused on tackling climate change, biodiversity loss, and pollution and waste.
2. **Scope:** UNEP is a multilateral organisation with membership of more than 190 States. UNEP’s CDR portfolio is not clearly articulated in public documents but in practice appears method-agnostic.
3. **Leadership, membership:** UNEP is composed of 193 Member States. CDR efforts within UNEP are led by the Climate Change Division with cross-cutting support across its science, finance, and sectoral solutions teams.
4. **Funding:** UNEP depends on voluntary contributions from Member States for more than 95 percent of its funding. UNEP has four main funding sources: the UN Regular Budget, the Environment Fund, and Earmarked Funds, and Global Funds (UNEP, 2025b). However, recent changes in U.S. policy toward multilateralism and international cooperation, coupled with delinquency in its 2025 dues, may jeopardise UN financing. (Lynch, 2026).
5. **Inception, status: *Early implementation.*** UNEP was founded in 1972 and its CDR team is emerging from its Climate Change Division. At COP30 (2025), UNEP played an active role in CDR-relevant dialogues and presentations at the UNEP Buildings and Cooling Pavilion and the CDR30 Pavilion. In December 2025, UNEP hosted a carbon management-focused consultation alongside the UN Environment Assembly (UNEA7),

“the world’s highest-level decision-making body on the environment, with a universal membership of all 193 United Nations’ Member States” (UNEP, 2026).

6. **Governance functions:** Robust evidence for GF(4) data, knowledge, and learning; and GF(6) convening and coordination. Partial/planned evidence for (2) rules, standards, and transparency; and GF(3) implementation, finance, and capacity building;

Analysis of governance functions

Research and development of CDR cuts across all three of UNEP’s strategic workstreams: science and transparency, finance, and sectoral solutions. Preliminary drafts suggest UNEP aims to advance CDR governance by:

- Continuing to act as a trusted convener for countries and partners on CDR;
- Providing clear, science-based guidance on CDR pathways, opportunities, and risks;
- Supporting the development of high-integrity global standards, MRV systems, and accounting rules;
- Expanding capacity building efforts, particularly for lower-income and vulnerable countries;
- Ensuring equity and just transition principles are embedded across all CDR work;
- Helping countries navigate and connect nature-based and technological CDR options; and
- Supporting the integration of CDR into priority sectors such as buildings, construction, agriculture, and national climate plans.

On the “science” side of UNEP’s *science and transparency* workstream, UNEP hosts the IPCC and publishes the annual Emissions Gap Report (see next section), both of which are widely regarded as authoritative sources of information on climate science and CDR. On the “transparency” side, UNEP provides technical assistance to support countries in implementing the Enhanced Transparency Framework (ETF) established under Article 13 of the Paris Agreement to standardise and report progress toward NDCs through Biennial Transparency Reports (BTRs). This workstream lends evidence toward UNEP’s partial role in supporting GF(2) rules, standards, and transparency; and GF(3) implementation, finance, and capacity building; and a more direct, robust role in supplying (4) data, knowledge, and learning.

UNEP’s *Capacity-building Initiative for Transparency* (CBIT) further supports UNEP’s potential to deliver capacity building and transparency support functions to the CDR ecosystem in the future. Jointly led by UNEP and the Global Environment Facility (GEF), CBIT aims to strengthen transparency-related activities at national institutions, provide resourcing to meet Article 13 requirements, and improve transparency (UNEP & GEF, 2022).

UNEP’s contribution to GF(4) data, knowledge and learning is evidenced by its high-impact scientific reports (e.g., the EGR) and discussion papers. For example, the “Global Status Report for Buildings and Construction,” a product of UNEP’s *sectoral solutions* workstream, is published jointly with the Global Alliance for Buildings and Construction (UNEP & GlobalABC, 2025). Another example, titled “How to Get to the Net? A discussion paper on CDR,” is a product of its *finance* workstream, and was published jointly with the UN Finance Initiative and the Net Zero Asset Owners Alliance (NZAOA) (NZAOA & UNEP Finance Initiative, 2025). Together, these reports present credible information that national negotiators can leverage in multilateral climate negotiations (i.e., at COP).

UNEP also contributes to GF(6) convening and coordination through its convening power. For example, UNEP convened a working group on CDR investment with the NZAOA and convened a multi-government consultation on carbon management at the 7th session of the United Nations Environment Assembly (UNEA-7). As stated, UNEP also hosts the IPCC. The NZAOA, “a signatory-led group of institutional investors committed to individually transitioning their own investment portfolios to net zero greenhouse gas emissions by 2050,” has 87 signatories across 19 countries and represents USD 9.2 trillion in assets under management (UNEP Finance Initiative, n.d.). However, the NZAOA’s target-setting protocol prohibits the use of CDR for sub-portfolio or sector target achievement prior to 2030 to reduce the risk of mitigation deterrence and underscore near-term urgency for decarbonisation (NZAOA & UNEP Finance Initiative, 2025).

A closer look at UNEP’s Emissions Gap Report (EGR)

In November 2025, UNEP released the 16th edition of its signature, annual Emissions Gap Report (EGR), which coincided with the tenth anniversary of the Paris Agreement and the submission of 2035 NDCs. It finds that nations are far from reaching Paris Agreement temperature goals and that new NDCs have done little to change that (UNEP, 2025a). The authors estimate the need for reductions to annual emissions of 35 and 55 percent by 2035, compared to 2019 levels, to achieve 2°C and 1.5°C pathways, respectively. Moreover, they find, returning to 1.5°C of warming by 2100 will be “extremely challenging,” overshoot is virtually inevitable, and likely to begin in the next decade.

With a strong institutional focus on supporting global mitigation efforts and pathways to net zero, UNEP has increasingly recognised the role of CDR in its reports. The role of CDR has been featured in the Emissions Gap Report since 2023, when a full chapter was devoted to exploring the “the role, status and scope for CDR in achieving the long-term temperature goal of the Paris Agreement” (UNEP, 2023). The report highlights the uncertainties, risks, and costs of CDR, such as that “the technical, economic, and political requirements for large-scale deployment may not materialise in time” however, the EGR maintains that CDR should be developed alongside deep CO₂ and GHG emissions reductions to accelerate the path to net zero, reverse global warming thereafter, and potentially deliver a state of sustained net-negative emissions. Thus, through its most influential report, UNEP has begun to deliver meaningful credence to the science-based argument for deploying CDR and educational value to its audiences.

4.7. City CDR Initiative (CityCDR)

The City CDR Initiative (CityCDR) is an accelerator program to advance CDR innovation and deployment within urban settings through research and capacity building.

1. **Mission:** The initiative aims to promote the need for CDR governance at multiple levels of government, including municipalities. The organisation envisions an outcome wherein 100 or more cities adopt a CDR strategy to become agents of carbon removal and redundancy is achieved by 2030 (i.e., CityCDR’s functions are integrated into operations

of mainstream governance bodies, eliminating the need for its existence as a standalone entity).

2. **Scope:** As a global non-profit bringing together cities around the world and bridging national and subnational governance, the initiative demonstrates a multilateral (and multi-level) geographic scope. Its CDR portfolio is broad, encompassing all pathways that may have a nexus—whether via supply or demand—to urban centres. Examples of “urban CDR” include biochar applications in community gardens, ocean alkalinity enhancement deployment in desalination plants or wastewater treatment facilities, distributed direct air capture deployment (e.g., in HVAC systems), and carbon-negative building materials (*[FAQ] Frequently Asked Questions*, n.d.).
3. **Leadership, membership:** City CDR Initiative is led by Founder and Executive Director Christiaan Gevers Deynoot. Its member-cities are Amsterdam, Atlanta, Baltimore, Boulder County, Bristol, Copenhagen, Curitiba, Flagstaff, Glasgow, Hamburg, Helsinki, Minneapolis, New York City, Quito, San Diego, San Francisco, Santiago, Stockholm, Sydney, Zurich (City CDR Initiative, 2025).
4. **Funding:** Funding for CityCDR comes from philanthropic grants (e.g., Breakthrough Energy, Kuehne Climate Center, and X-Prize). Approximately USD 200,000 had been secured by late 2025. CityCDR is in the process of fundraising to support 2 pilot programs in 2026 with an eye toward philanthropic sources. In the future, CityCDR expects increasing reliance upon public funding (e.g., municipal budgets).
5. **Inception, status: *Early implementation.*** The inception of City CDR Initiative can be traced back to a study published by South Pole and commissioned by the City of Amsterdam. In turn, this study led to further engagements with other cities with net zero targets. In 2024, X-Prize funded another study (“Pathways to net zero cities...”), which ultimately led to the formal establishment of the City CDR Initiative in 2025. CityCDR is currently filing for 501(c)(3) status with plans to establish a parallel entity in Europe. The initiative has already signed an MoU with a multilateral CDR coalition and may pursue additional MoUs in the future (e.g., with Mission Innovation). In 2026, the organisation is expected to transition to a stronger focus on capacity building.
6. **Governance functions:** Robust evidence for GF(1) signal and guidance; GF(3) implementation, finance capacity building; GF(4) data, knowledge, and learning; GF(5) policy analysis; and GF(6) convening and coordination.

Analysis of governance functions

The City CDR Initiative aims to support knowledge-sharing, technical assistance, capacity building, financing pathways, and advocacy to scale CDR in urban settings. CityCDR also provides research tools and insights for municipalities such as assessments of the most viable CDR approaches in urban environments, project assessment frameworks, and analysis of what is needed to fill persistent gaps.

In 2025, CityCDR published three reports, detailing its vision, the need-gap analysis for urban CDR, and implementation guidance for cities seeking to build urban CDR capacity. We find evidence for CityCDR’s role in GF(1), signal and guidance, through its efforts to support cities in understanding their readiness and potential to deploy carbon removal.

Paired with its goal to deliver technical assistance to cities, the implementation guide and city-specific case studies (i.e., for Stockholm, Helsinki, and San Francisco) evidence the organisation’s interest in supporting GF(3), implementation, finance, and capacity building.

The initiative has developed urban CDR fact sheets for biochar, mineral- and bio-based CDR in the built environment, and soil organic carbon enhancement in urban settings. However, generating and disseminating educational materials on urban CDR is just one way that CityCDR delivers a data, knowledge, and learning benefit to the field. The knowledge that the initiative generates may also contribute to a broader research agenda for CDR in urban environments. For instance, a forthcoming report from the IPCC, the Special Report on Climate Change and Cities, will “provide a timely assessment of the latest science related to climate change and cities, including climate impacts and risks, as well as adaptation and mitigation solutions that can be taken to minimise them” (IPCC, 2025b; UK Government, 2025). Expected in March 2027, the report suggests a growing interest in the role of cities in combatting climate change, underscoring the value of CityCDR’s mission and perhaps providing a high-impact forum for some the initiative’s research findings.

As part of its need-gap analysis, CityCDR surveyed 15 cities on topics that included policy and regulation, offering insights into which cities have policies in place or in development to incentivise CDR. In general, the initiative advocates for the advancement and integration of CDR policy within cities. For these reasons, we find that CityCDR plays a role in advancing the fifth governance function, policy analysis, too.

At COP30 (2025), CityCDR signed a memorandum of understanding (MoU) with Denmark to join the Group of Negative Emitters (GONE) and work to advance multi-level CDR governance. The IPCC defines multi-level governance as “the dispersion of governance across multiple levels of jurisdiction and decision-making, including, global, regional, national and local as well as trans-regional and trans-national levels” (IPCC, 2023a). CityCDR may sign additional MoUs with other related multilateral organisations in the future. Considering the initiative’s emphasis on bridging horizontal and vertical hierarchies of governance—between cities and across national and subnational regimes—we find considerable evidence for CityCDR’s role in GF(6) convening and coordination.

Thus, the City CDR Initiative is positioned to deliver on five out of six governance functions.

4.8. CDR30

CDR30 is a coalition of organisations and businesses seeking to elevate CDR, and centre its role in climate policy, at and beyond the UNFCCC’s annual global climate Conference of the Parties (COP). The CDR30 Pavilion at COP30 was the first CDR pavilion in the Blue Zone at COP.

1. **Mission:** CDR30 aims to elevate carbon removal at COP30 in Belém (2025), at future COP meetings, and beyond COP—helping stakeholders across climate and government domains understand the importance and urgency of carbon removal in meeting global temperature goals.

2. **Scope:** CDR30’s portfolio scope is wide-ranging and does not exclude any pathways across novel or conventional spectra. In contrast, the primary organisation behind CDR30, Negative Emissions Platform (NEP), has a narrower scope, focusing on “technology-enabled” (mostly novel) CDR. And while NEP has a mostly regional focus on Europe, CDR30 has a markedly global scope, platforming CDR leaders from around the world.
3. **Leadership, membership:** CDR30 is led by NEP Secretary General Chris Sherwood. At COP30, the initiative engaged more than 145 organisations, including NGOs, universities, think tanks, private companies, and project developers. CDR30 received financial support from 35 organisations in varying amounts, and about ten contributed to the steering committee. CDR30 invited stakeholders across the CDR spectrum to participate in elevating CDR at COP30: project developers, technologists, advocates, investors, researchers, and community leaders. To ensure equitable and inclusive participation, the pavilion did not offer advantages or preferential treatment of any kind to NEP members, despite NEP’s lead role in organizing. In planning for COP31, the steering group for CDR31, as it will be called, is made up of more than 20 individuals representing organisations such as the International Biochar Initiative, Puro.earth, Isometric, the UN Climate High Level Champions, and the Germany Association for Negative Emissions (DVNE).
4. **Funding:** CDR30 aimed for about half a million euros in funding to support its pavilion at COP30. Funding was sourced from a patchwork of philanthropic and industry contributions, some in exchange for promotional opportunities at the CDR30 Pavillion. For COP30, just over half of the contributions came from philanthropic sources. Coalition members were also requested to contribute between €1,000 and €10,000 with most organisations contributing €3,400 on average and totalling €70,000, according to the organisers. With a contribution of €150,000, *Carbon Drawdown Initiative* was reportedly among their largest donors. CDR30 estimated a minimum requisite budget of €155,000 and, ultimately, raised approximately €300,000. The coalition’s expenses amounted to €200,000, leaving the organisers with a €100,000 surplus, an amount that the steering committee will put towards COP31 planning. Ultimately, the group aims to establish a clearer funding model at future COPs and to secure a larger budget to allow for a bigger pavilion and more robust programming.
5. **Inception, status: *Mature implementation.*** CDR30 started as a conversation at an Isometric-hosted lunch at COP29. CDR30 builds on previous work led by Carbon Removals at COP, which created virtual CDR pavilions at COP through online programming, and on previous successes delivering CDR-relevant events in the Blue Zone at COP 27, 28, and 29. CDR30 successfully established the first CDR pavilion at COP, creating a locus of community for carbon removal in the Blue Zone.
6. **Governance functions:** Robust evidence for GF(1) signal and guidance; GF(4) data, knowledge, and learning; and GF(6) convening and coordination. Partial evidence for GF(2) rules, standards, and transparency and GF(3) implementation, finance, and capacity building.

Analysis of governance functions

CDR30 marks a significant inflection point in legitimising and elevating CDR in international climate fora. The CDR pavilion aids in building enthusiasm around carbon removal, increasing

awareness of its challenges and opportunities, promoting a positive narrative, dispelling common misconceptions, and creating a physical platform from which CDR can be meaningfully integrated into COP negotiations. The programming and community-building at the pavilion also helps to unlock national action on CDR such as incorporating removals into national climate pledges submitted to the UNFCCC (e.g., NDCs, BTRs) and to inform and motivate negotiators to recognise the role of removals in internationally negotiated frameworks such as Article 6 of the Paris Agreement.

CDR was elevated to the Action Agenda for the first time at COP30, wherein three collaborative platforms (“launchpads”) were launched to accelerate CDR implementation toward newly announced near-term targets (UNFCCC, 2025). The near-term targets aim for 100 megatonnes of durable (novel) CDR by 2030 and 3 billion tonnes nature-based (conventional) CDR by the same date. The three launchpads, dubbed the “CDR Mutirão,” are corporate demand (led by the World Business Council for Sustainable Development), government policy (led by GONE), and industrial integration (led by industry partners). This collaboration was led by UN Climate High-Level Champion and Carbon Removal Lead, Chris Neidl, as part of the UN’s “Systems Transformation” priority action area.

There is clear evidence that CDR30 influences GF(1) signal and guidance, particularly through its close working relationship with the UN Climate High Level Champions. For example, the near-term implementation targets for novel and conventional CDR, launched at COP30, send a clear signal to state and non-state actors that there is both a need and an interest in accelerating CDR development through corporate and government action, including industrial integration and policy. Beyond amplifying the UN’s implementation targets, the pavilion’s success in securing funding and delivering CDR programming in the Blue Zone implies an increasingly recognised and legitimised role for CDR in climate negotiations, perhaps suggesting a departure from previous trends wherein “CDR methods other than afforestation/reforestation and soil carbon sequestration have only played a minor role in UNFCCC negotiations so far” (Patt et al., 2022).

CDR30 plays a role in informing negotiations of international rules, standards, and mechanisms for transparency and accountability through its nexus with COP negotiations, with the UN Climate High-Level Champions, and its physical presence in the Blue Zone. Thus, we find some—albeit limited—evidence for CDR30’s role in GF(2) rules, standards, and transparency.

Similarly, we find partial evidence for CDR30’s role in supporting GF(3) implementation, finance, and capacity building by creating a space and community where deals can happen. Bringing buyers, suppliers, and governments together through the CDR30 community and pavilion helps facilitate transactions, increasing access to public and private funding for CDR. Thus, there’s some evidence that CDR30 indirectly facilitates implementation, finance, and capacity building, too.

We find robust evidence for CDR30’s role in advancing GF(4) data, knowledge, and learning; and GF(6) convening and coordination. Through its programming, content development and sharing, and core function as a platform for communicating about CDR, it contributes to global data, knowledge and learning of CDR. As the primary convener and facilitator of CDR-focused programming at COP and as an informal conduit for carbon removal to COP’s negotiating

rooms, there's a strong case that CDR30 also directly influences multilateral coordination efforts to scale carbon removal.

4.9. Carbon Management Challenge (CMC)

The Carbon Management Challenge (CMC) is a non-binding, government-level initiative to advance carbon management projects, including CCS and CDR.

1. **Mission:** The CMC challenges its members to collectively manage at least 1 billion tonnes of CO₂ annually by 2030.
2. **Scope:** CMC's geographic scope spans seven major world regions (East Asia-Pacific; Europe; Latin America and the Caribbean; the Middle East and North Africa; North America; South and Southeast Asia; and Sub-Saharan Africa), 22 governments and the European Commission. With a focus on carbon management, the CMC's portfolio scope is broader than CDR alone, encompassing technologies like CCS, too. However, it is less clear about the specific CDR pathways the program seeks to support. At a glance, the lack of specificity implies a very broad technology portfolio scope, but in practice this may bias novel CDR if high-durability methods—largely engineered and novel methods—are prioritised.
3. **Leadership, membership:** The CMC is led by the Global CCS Institute, which provides secretariat services to the CMC, and has 24 participants worldwide with ongoing efforts to expand. Current participants include the European Commission and 23 governments: Australia, Bahrain, Brazil, Canada, Denmark, Egypt, Iceland, Indonesia, Japan, Kenya, Kuwait, Mozambique, Mauritania, the Netherlands, Nigeria, Norway, Romania, Saudi Arabia, Senegal, Sweden, the UAE, United Kingdom (UK), and United States (*Keep 1.5°C Within Reach*, n.d.). One government is assigned to represent each of the seven world regions (*CMC Governance Structure*, 2025).
4. **Funding:** Funding for the CMC is decentralised and voluntary. The secretariat provides services on a not-for-profit basis, and CMC participants may provide funding for the secretariat on a voluntary basis. Any changes to the initiative's funding arrangements must be approved by CMC participants by consensus (*CMC Governance Structure*, 2025).
5. **Inception, status: *Mature implementation.*** The CMC was launched at the Major Economies Forum on Energy and Climate (MEF) in April 2023 and was further elevated at COP28 in Dubai (2023) where six additional countries joined the challenge (*COP28 Presidency Highlights Role of Carbon Management in Keeping 1.5°C within Reach*, 2023; *Launch of the Carbon Management Challenge*, 2024).
6. **Governance functions:** Robust evidence for GF(1) signal and guidance; GF(3) implementation, finance, and capacity building; GF(4) data, knowledge, and learning; GF(5) policy analysis; and GF(6) convening and coordination. Partial evidence for GF(2) rules, standards, and transparency.

Analysis of governance functions

The CMC is subdivided into three workstreams: (1) supporting developing country project finance; (2) creating resources for project deployment tracking that are additional to existing tools (e.g., global CO₂ storage tracking tool; global public policy knowledge-sharing repository);

and (3) facilitating strategic communication and engagement (*CMC Governance Structure, 2025; Keep 1.5°C Within Reach, n.d.*)

CMC delivers on governance function (1), signal and guidance, through its core premise: creating a voluntary commitment (“challenge”) that participants “take voluntary actions to advance a pipeline of carbon management projects by 2030, that when fully operational, will collectively manage 1 gigatonne (Gt) of CO₂ or more annually” (*CMC Governance Structure, 2025*). Certainly, this challenge can play a role in steering activity and policy direction for its members—and non-members that aspire to join—and is advanced through the cross-cutting workstreams that undergird the CMC.

Through future activity areas outlined under workstream 1, we see evidence that CMC intends to support harmonisation of carbon management technology methodologies globally, lending some evidence toward its role in GF(2), rules, standards, and transparency, too.

Workstream 1 includes objectives like “(a) accelerating financial support for carbon management in developing countries...; (b) supporting legal and regulatory capacity building to ensure developing countries have appropriate governance structures in place to enable projects; [and] (c) evaluating potential geologic storage capacity in developing countries.” Workstream 2 suggests its future work may include “[addressing] key obstacles towards carbon management project development and deployment” (*CMC Governance Structure, 2025*). These objectives signal a clear intent for CMC to play a role in supporting governance function (3), implementation, finance, and capacity building, through increasing access to financial resources, facilitating capacity building, and directly addressing barriers to implementation, including regulatory frameworks and geologic storage (i.e., infrastructure).

We find evidence that CMC delivers against governance function (4) through workstream 2, which includes objectives “(b) supporting policy and business model guidance and knowledge sharing to support the build out of projects and associated infrastructure; and (c) tracking progress towards the CMC goal...including policy and project development, leveraging and coordinating with existing tracking efforts by other organizations.” Moreover, the workstream’s future work may include “[identifying] the technical gaps that need to be addressed to inform research, development and deployment (RD&D) needs.” Workstream 3 provides yet more evidence: “(d) developing public messaging, outreach materials and educational content on carbon management” (*CMC Governance Structure, 2025*). These objectives exemplify just some of the ways CMC is delivering a data, knowledge, and learning benefit to CDR governance.

Governance function (5), policy analysis, finds support from the Carbon Management Challenges across workstreams 1 and 2. Specifically, workstream 1 includes efforts to “advance existing and new financial policies,” and “to identify, advocate for implementation of policies... that expand finance and private investment in carbon management projects and infrastructure in the Global South.” Workstream 2 outlines goals to support policy guidance for project deployment, promote available enabling policies, track policy developments, and prepare policy briefs, including comparative studies of regulatory, permitting and legal frameworks (*CMC Governance Structure, 2025*). These codified activities evidence CMC’s role in policy analysis.

The CMC is designed to build on existing multilateral initiatives, such as CEM-CCUS and MI-CDR. In fact, CMC helps coordinate multilateral action—governance function (6)—through efforts outlined in workstreams 2 and 3. For example, workstream 2 encompasses “providing voluntary guidance for bilateral and multilateral cooperation” while workstream 3 envisions:

- “organising and participating in relevant international fora”;
- aspirations “to convene an annual ministerial event” (e.g., at COP);
- goals to “work alongside existing international partners with shared objectives, such as [CEM-CCUS] and [MI-CDR]”; and
- “build bridges with influential NGOs, industry trade associations, private sector entities, international organisations, civil society organizations, research institutions, academia and others...”

These objectives underscore CMC’s demonstrated and planned contributions toward multilateral coordination through convening leaders in relevant fora, including ministries and existing multilateral coalitions like Mission Innovation.

As the Carbon Management Challenge makes meaningful contributions toward all six governance functions, it holds clear leadership potential in the CDR governance space. Future governance structures for global CDR could look to the CMC’s roster for potential buy-in, though it should be noted that the CMC’s scope encompasses all forms of carbon management, which may present logistical (i.e., how resources are split between CDR and CCS) as well as narrative (i.e., conflated and conflicting narratives about carbon removal vs. carbon capture) drawbacks.

On the other hand, folding carbon removal into broader carbon management strategies can also offer benefits. For example, Canada’s Carbon Management Strategy outlines the government’s goals to promote both technologies as part of a unified strategy (Natural Resources Canada, 2023). In Germany, the Carbon Dioxide Storage Act (KSpG) was amended in 2025—appending “and Transport” to its title—to permit offshore and onshore commercial CO₂ storage under certain conditions, and to enable CCU and CCS for heavy industries (Entwurf eines Gesetzes zur Änderung des Kohlendioxid-Speicherungsgesetzes, 2025). This is one example where successful CCS policy advocacy can yield benefits for CCS alongside storage-dependent CDR. In the United States, Republicans in Congress supported expanding the 45Q tax credit—an economic incentive for CCS and, by extension, CDR pathways that include CCS—for certain applications. The expanded credit created full parity between carbon utilization and permanent geological sequestration (Global CCS Institute, 2025; A. C. Jones & Marples, 2023). However, CCS does not enjoy unanimous support from U.S. Republicans (George, 2025a). Thus, depending on the context, CMC’s broad focus on carbon management rather than CDR alone may detract from, or lend support to, its ability to shape global CDR governance.

4.10. Group of Negative Emitters (GONE)

The Group of Negative Emitters (GONE) is a voluntary, informal alliance between eight governments, led by Denmark, centred around a shared commitment to go beyond net zero to net-negative emissions.

1. **Mission:** GONE's purpose is to promote global collaboration on net-negative emissions by pushing for higher ambitions in climate targets and broadening its membership over time (Danish Ministry of Climate, Energy and Utilities, 2024). The group's eight member-countries aim to remove more CO₂ from the atmosphere than they emit through emissions reductions, forest expansion practices, and novel technologies.
2. **Scope:** As an alliance of governments, GONE is inherently multilateral, though its participation is limited to eight countries. GONE's portfolio scope is broad, spanning conventional and novel CDR.
3. **Leadership, membership:** GONE is led by the Danish Ministry for Climate, Energy and Utilities and has eight country members: Denmark, Ethiopia, Finland, Kenya, the Netherlands, Panama, Suriname, and Sweden. GONE also boasts a formal partnership with the City CDR Initiative and an endorsement from Germany.
4. **Funding:** There is no publicly available information detailing how or if GONE has been formally allocated funding to date. Future funding could come from government budgets, authorizing new funding programs, or reallocation of existing programs for climate, governance, or carbon removal.
5. **Inception, status: *Mature implementation.*** GONE was launched at COP28 (2023) in Dubai by founding members Denmark, Finland, and Panama. The group announced five additional members—Ethiopia, Kenya, Suriname, Sweden, and the Netherlands—at COP29 (2024) in Baku, bringing its total membership to eight. At COP30 (2025) in Belém, GONE added City CDR to its membership via a MoU. After a period of perceived dormancy, GONE has recently reemerged as an active and high-potential launchpad for intergovernmental coordination on CDR.
6. **Governance functions:** Robust evidence for GF(1) signal and guidance and GF(6) convening and coordination. Partial evidence for GF(3) implementation, finance, and capacity building; GF(4) data, knowledge, and learning; and GF(5) policy analysis.

Analysis of governance functions

GONE's self-described functions include advocating for net-negative ambitions in NDCs, facilitating knowledge-sharing and capacity building for member states, and fostering intergovernmental collaboration and cooperation (Danish Ministry of Climate, Energy and Utilities, 2024). GONE delivers a straightforward benefit towards GF(1) signal and guidance and (6) convening and coordination by uniting countries and subnational governments around a shared commitment to net negative emissions and by partnering with organisations like City CDR Initiative to bridge governance across vertical hierarchies. In terms of signalling, GONE itself does not publish roadmaps and strategies but its member countries do, and the ambitions GONE sets may help reinforce such efforts. For example, the Netherlands has published a CDR Roadmap, which aims to give CDR a “clear place” in emissions accounting and the Paris Agreement, to support a climate-neutral European market, and to enable Dutch businesses to participate in it (Netherlands Ministry of Climate Policy and Green Growth, 2025). Also, GONE advocates for “the inclusion of net-negative ambitions in the updated climate plans in as many countries as possible,” a role that further establishes GONE's contribution to GF(1).

While GONE's stated objectives describe intent to deliver on GF(3) implementation, finance, and capacity building; and (4) data, knowledge, and learning, there is little evidence yet that it has meaningfully done so. For instance, GONE stated aims include “[facilitating] knowledge-

sharing and capacity building on matters such as regulation, technical development and [MRV]” in addition to providing technical assistance (Danish Ministry of Climate, Energy and Utilities, 2024). As GONE matures, so too may its ability to deliver on GF(3) and (4).

We find some evidence for GONE’s role in GF(5) through its participation in the global Mutirão for CDR, announced at COP30. GONE is set to co-lead the second launchpad, titled Government Policy & Regulation, with aims to facilitate “a structured space for national and subnational governments to discuss policy pathways and enable knowledge-sharing on topics of critical interest such as policy integration” (Toporas, 2025). This announcement reveals an emergent focus on enabling CDR policy through trans-boundary knowledge-sharing and policy discussions.

Finally, there is clear evidence to support GONE’s role in GF(6), as coordinating action and ambition across governments is the central focus of its work.

A closer look at GONE member countries’ climate action

By advancing robust domestic policy initiatives, GONE’s member countries bolster the coalition’s standing as a credible and reliable voice for climate action. GONE’s four European member countries have enacted laws that bind them to their net zero targets, satisfying a key criterion in assessing the credibility of national climate pledges (Lamb & Reynolds, 2025). For instance, the Netherlands has enshrined a goal to reach 95 percent reductions from a 1990 baseline by 2050 in its Dutch Climate Act (Klimaatwet) (Grantham Research Institute at LSE & Climate Change Laws of the World, 2019). Denmark set ambitious targets for reaching net zero and net-negative by 2045 and 2050, respectively. The country’s net zero target, and a 70 percent reduction from 1990 levels by 2030 target, are enshrined in law by the 2020 Danish Climate Act (Grantham Research Institute at LSE & Climate Change Laws of the World, 2020). At COP30 (2025), Denmark committed to an additional target, 82 percent cuts from 1990 levels by 2035 (Gratton & Argus Media, 2025). The Danish government also passed an ambitious carbon tax in 2022 that is additional to the EU’s emissions trading scheme (ETS) (U.S. Dept. of State & Bureau of Economic, Energy, and Business Affairs, 2024). Denmark also approved its first commercial geologic storage site for CO₂ in late 2025 (George, 2025b). Like Denmark, Sweden is aiming for net zero by 2045, and its target is codified by Sweden’s Climate Act (Carbon Gap, 2025b; Grantham Research Institute at LSE & Climate Change Laws of the World, 2017). Finland’s national Climate Act holds it to carbon neutrality by 2035, which would make it the first high-income nation to reach net zero—and net negative by 2040 (IEA, 2026a). Finland is also subject to the EU’s obligations to reduce its emissions by half in 2030 in relation to the 2005 level and a minimum net removal level of 17.8 megatons for the LULUCF sector by 2030. Finland’s Climate Act ups the ante, striving for 60 percent reductions by the same year—a target it appears on track to meet (Shine & World Economic Forum, 2023). Finland has also implemented many measures to support its net zero and carbon removal goals, including funding infrastructure development and innovation, proposing reverse auctions for CDR, introducing tax incentives for CCS, and supporting pilot projects. While Kenya and Ethiopia have not yet enshrined a net zero target into law, Kenya’s 2024 Energy Transition and Investment Plan signifies its commitment to net zero by 2050—though implementation hinges upon about USD 600 billion in capital investment—and Ethiopia’s Long-Term Low Emissions and Climate Resilient Development Strategy (LT-LEDS) submitted to the UNFCCC in 2023 envisions three

scenarios that could lead to net zero by 2050 or sooner (Climate Action Tracker, 2025; Sustainable Energy for All & Republic of Kenya Ministry of Energy and Petroleum, n.d.). Meanwhile, Panama and Suriname have already self-declared net-negative status though such claims remain challenging to verify (see section 4.11).

The highly forested countries—Panama and Suriname—plan to meet and maintain most or all emissions reductions and removals targets through sustainable forest management practices, while less-forested nations like Denmark intend to rely more heavily upon novel CDR and CCS technologies. Finland sits somewhere in the middle with plans to expand forest cover, while investing in CCS and a broad suite of CDR pathways—the latter of which will be necessary for Finland to meet its 2035 target (Carbon Gap & Sweco Finland, 2025). Historically, Finland’s forests helped to offset its GHGs but in recent years have become a source (IEA, 2026a). A Carbon Gap analysis finds that the most realistic CDR pathways for Finland are likely to incorporate high levels of conventional and novel CDR, including pasture and cropland management, forest management, biochar, ERW, durable bio-based products, DACCS and BECCS. However, land use and storage capacity could constrain deployment of some methods. Ethiopia and Kenya—where most early-stage DAC development on the African continent has taken place so far—possess ample geothermal potential and basaltic rock, key enabling conditions for DACCS deployment. In fact, RMI estimates “an additional 400 MtCO₂e/year is possible via synthetic methods such as DAC” in the African continent. Further, “tapping about half of East Africa’s ~20 GWe geothermal unutilized potential at today’s typical DAC efficiency could generate about 20 [percent] of the global [CDR] projected for 2035” (Allee et al., 2025). Thus, there’s great potential for Africa to play a leading role in CDR deployment, underscoring the importance of Ethiopia and Kenya’s participation in GONE. And Africa’s CDR potential is not limited to DACCS, either: early-stage deployments in Cameroon, Nigeria, Kenya, and the Sahel region span biochar, ERW, reforestation and ecosystem restoration. Despite high geologic, land, and labour resource potentials, African nations often lack the capital to fund early-stage infrastructure and development, an issue that global partnerships could attenuate. Sweden predicts its residual emissions to represent around 15 percent of its current emissions and intends to offset them with a combination of emission reduction credits and CDR, mostly forest management and BECCS.

Many GONE member-countries are also participating in other global coalitions focused on carbon removal, including Mission Innovation, G-ZERO, and the Net zero Government Initiative (NZGI). For instance, the Netherlands is a member of MI’s CDR Mission. Suriname and Panama are both party to the G-ZERO, an alliance of countries that already claim carbon neutrality. Denmark, Finland, and the Netherlands are also party to the NZGI, which commits countries to achieving net zero emissions from government operations by mid-century, publishing roadmaps to outline pathways to net zero, and identifying interim targets (Council on Environmental Quality (CEQ), 2023). Of those, Finland and the Netherlands have published NZGI roadmaps detailing how the governments intend to meet their targets. And while Denmark has published a whole-of-economy roadmap for decarbonisation, it has yet to publish a government-specific roadmap to satisfy the NZGI requirement (Lund et al., 2021). Some countries are already cooperating on global carbon management frameworks, such as a bilateral agreement signed between Norway and Sweden, Denmark, the Netherlands and Belgium that authorises cross-boundary transport and storage of CO₂ under the seabed, consistent with Article 6 of the London

Protocol (Carbon Gap, 2025b; Government Offices of Sweden, 2024). Given such engagements, it's evident that the GONE coalition is broadly engaged across various multilateral efforts to scale CDR.

Taken together, GONE's member-countries represent governments with ambitious climate targets and a diverse array of CDR pathway potentials. Made up of many key players in the CDR governance landscape, GONE provides a glimpse into what can be achieved through a “climate club” for CDR, mirroring the Climate Club launched by the G7 in 2023 for industrial decarbonisation (Climate Club, 2023). Although substantive activity at GONE has waxed and waned, it remains one of the most high-level and most legitimised coalitions focused on negative emissions. Accordingly, emerging governance structures for CDR may arise from—or be strengthened by engagement—with GONE.

4.11. G-ZERO

G-ZERO, the Alliance of Carbon Negative Countries, is a small alliance of four low-emitting countries in the Global South—Bhutan, Madagascar, Suriname, and Panama—that already claim to have achieved net zero (or net-negative) emissions status, although such claims are difficult to verify.

1. **Mission:** The G-ZERO forum is aimed at demonstrating the feasibility and imperative of carbon neutrality through intensified climate action and greater international cooperation, especially between developing and developed countries. Among its stated objectives are shared commitments to scale ambition in national climate pledges, to remain carbon neutral permanently, to foster global cooperation and innovation, to exchange knowledge and policy designs, to amplify unique and diverse voices—especially developing nations and vulnerable populations—in climate policy dialogues, and to implement “policies that limit greenhouse gas emissions and conserve and enhance vital carbon sinks such as forests, wetlands and other ecosystems” (Republic of Suriname, 2024).
2. **Scope:** As one of the few alliances comprised exclusively of low-emitting nations in the Global South, G-ZERO occupies a unique position in the global governance landscape. It's tailored membership of highly forested, low-emitting, developing nations helps to distinguish the bloc's interests from high-emitting emerging economies (e.g., the ‘BASIC’ countries) and small island developing states (SIDS) (Chin, 2025). We categorise G-ZERO as multilateral in geographic scope (though participation is limited to a few qualifying nations) and narrow in CDR portfolio scope due to an implicit focus on conventional CDR.
3. **Leadership, membership:** The coalition's founding members are Bhutan, Madagascar, Panama, and Suriname—all countries that claim “carbon neutral” or “carbon negative” status. The forum operates with a rotating presidency among its members. G-ZERO's Secretariat is based in Bhutan.
4. **Funding:** At time of writing, no funding has been publicly reported for the G-ZERO forum or its Secretariat in Bhutan.
5. **Inception, status: *Mature implementation.*** G-ZERO was launched at COP29 (2024) in Baku and little has been officially announced since (Republic of Suriname, 2024). The G-ZERO forum represents a rebranded iteration of its predecessor, the Alliance of Carbon

Negative Countries, which included all the same members except Madagascar and was launched at COP26 (2021) in Glasgow.

6. **Governance functions:** Robust evidence for GF(1) signal and guidance and GF(6) convening and coordination.

Analysis of governance functions

As a high-level, intergovernmental forum of climate-ambitious countries, G-ZERO—like GONE—demonstrates the potential gains of institutionalising a “climate club” for CDR. G-ZERO's primary role is to establish shared commitments around net zero, climate resilience, and “nature-positive solutions” while setting an example for other nations to follow. Since its membership is made up of countries that already claim carbon neutrality, the coalition demonstrates the feasibility of achieving net zero through intentional environmental stewardship and the value of global partnerships toward achieving shared climate goals. The forum also establishes a new bloc within international negotiating fora to champion issues that are unique to its members’ interests, such as flows of financial and technical support to the Global South. In the future, the coalition may also leverage collective action among its members to secure economic benefits like more competitive trade deals or exemptions from carbon taxes. Some have suggested preferential climate finance be earmarked for net zero countries as a means of rewarding progress and providing much-needed support to developing nations seeking to maintain their status while advancing development goals (Burke-White & Sung, 2024; Goering, 2021).

Baked into the coalition’s shared commitment and core purpose, there is robust evidence that G-ZERO can shape GF(1) signal and guidance; and GF(6) convening and coordination. As with GONE, intergovernmental political commitments can yield cascading, domestic policy responses (i.e., implementing legislation) that effectuate or sustain the multilateral commitment. G-ZERO creates a signal for its current members to maintain their status as carbon neutral, and an incentive for non-member countries to strive for net zero to be eligible for this exclusive climate club. Such signals can go beyond state actors, too, communicating the country’s intent to uphold its carbon neutrality to industry and other non-state actors. Since the G-ZERO unites low-emitting, developing nations in the Global South through a shared commitment to carbon neutrality, it also serves a clear role in multilateral coordination.

Some speculate whether island nations like Niue and Comoros may also qualify as carbon neutral or carbon negative countries. Other likely candidates for G-ZERO additions include Guyana and Gabon, both of which have already self-declared net negative status (Cooperative Republic of Guyana, 2021; UNDP, 2023).

All four of the G-ZERO member countries share common enabling conditions: low population densities, high forest cover, and reliance upon hydropower for a significant portion of energy production. The throughline of high forest cover highlights the forum’s reliance upon sustainable forestry management (i.e., conventional CDR) as a means to achieving and maintaining carbon neutrality and beyond.

The G-ZERO represents a multilateral coalition of countries leveraging conventional CDR, mostly forestry, to achieve, or go beyond, net zero; it’s an exclusive benefits club that could

grow in relevance and influence as more countries make good on their pledges and as frameworks to verify country-wide carbon neutrality claims evolve.

A closer look at G-ZERO's carbon neutral claims

It's important to note that no binding, consistent, and transparent framework exists for validating and certifying national claims of carbon neutrality or net-negative emissions status, though independent tracking efforts exist for state actors (e.g., the [Net zero Tracker](#), the Climate Watch [Net zero Tracker](#), and [Climate Change Laws of the World](#)) and non-state actors (e.g., SBTi and the UNFCCC [NAZCA Portal](#)). According to the UN, “the growth in net zero pledges has been accompanied by a proliferation of criteria with varying levels of robustness” (United Nations, n.d.). Thus, it's impossible to verify G-ZERO member country claims to achieving (and maintaining) their carbon neutrality, undermining the credibility and legitimacy of the group.

Despite the lack of an authoritative certification mechanism, several countries have unilaterally self-declared such titles. Bhutan's claim to carbon negativity is widely-regarded as credible, possibly rendering Bhutan the first—and perhaps the only—carbon-negative country in the world (Net Zero Tracker, n.d.-a; World Population Review, 2026²). In contrast, Madagascar's claims of carbon neutrality are more widely disputed due in part to its lack of robust annual reporting mechanisms for GHG emissions, competing land-use pressures, implementation hurdles caused by natural disasters, and rampant deforestation (Cerra et al., 2022; Global Forest Watch, n.d.; Net Zero Tracker, n.d.-b). While the country's 2030 NDC reaffirms the claim that, as of 2020, Madagascar is a carbon sink, it also warns that without strengthened mitigation actions the country will become a net source of GHGs shortly after 2025 (Republic of Madagascar, 2024). Madagascar has not submitted a 2035 NDC.

4.12. Mission Innovation: Carbon Dioxide Removal Mission (MI-CDR)

Mission Innovation (MI) is a state-led forum designed “to make clean energy affordable, attractive and accessible” by catalysing public and private investment in research and development. The CDR Mission (MI-CDR) is one of seven agenda-specific and innovation-oriented alliances under MI, focussing on enabling development and deployment of novel CDR through international cooperation and innovation.

1. **Mission:** MI-CDR seeks to enable CDR technologies to achieve net removal of 100 million metric tons of CO₂ per year globally by 2030. To that end, the Mission also seeks to enhance understanding of local and global CDR potential.
2. **Scope:** MI-CDR is focused on a narrow set of novel CDR technologies: DACCS, biomass with carbon removal and storage (BiCRS), and enhanced mineralisation (EM). With participation from 15 governments, the CDR Mission's geographic scope can be characterised as high-level, international and multilateral.
3. **Leadership, membership:** The parent organisation, Mission Innovation, has 23 member countries plus the European Commission. The CDR Mission is co-led by the United States Department of Energy, Saudi Arabia's Ministry of Energy, and Natural Resources Canada. In addition to its lead countries, Australia, China, the European Union, the Netherlands, India, Japan, Norway, and the United Kingdom are members as of

December 2025. Observers include Bahrain, Germany, Iceland, and Switzerland, bringing total participation to 14 countries plus the EU.

4. **Funding:** All work done under the mission is in-kind by the Members directly.
5. **Inception, status: *Mature implementation.*** MI was first announced at COP21 in Paris (2015) and relaunched as Mission Innovation 2.0 at COP26 in Glasgow (2021) when the CDR Mission was also launched. The CDR Launchpad, an implementation-focused commitment, was launched a year later at COP27 in Egypt. In October 2024, MI-CDR and CEM’s CCUS Initiative launched a joint goal, the “Gigatonne by 2030 Campaign,” to accelerate action on carbon management innovation and deployment and coordinate knowledge exchange across the innovation ecosystem.
6. **Governance functions:** Robust evidence for GF(1) signal and guidance; GF(4) data, knowledge, and learning; and GF(6) convening and coordination. Partial evidence for GF(2); rules, standards, and transparency; GF(3) implementation, finance, and capacity building; and GF(5) policy analysis.

Analysis of governance functions

Born out of the larger Mission Innovation framework and its predecessor the Clean Energy Ministerial (CEM), the MI CDR Mission is fundamentally an ambition-setting coalition whose primary role is to galvanise global leadership and collaboration to accelerate research and development of CDR technologies. MI’s stated functions include knowledge-sharing, capacity building, and frameworks for tracking progress. It has demonstrated success in convening governments, industry, and civil society on carbon management.

MI-CDR’s work advances GF(1), signal and guidance, by aligning international CDR research and development agendas through shared commitments and projects such as the CDR Launchpad and the Gigatonne by 2030 Campaign.

Although MI-CDR contributes to global knowledge of MRV—a function closely associated with GF(2) rules, standards and transparency—it does not directly influence rulemaking, standard setting, or the bodies that oversee these processes. While MI-CDR’s contribution to GF(2) is not deemed ‘robust’ for the sake of this analysis, publications like the *MRV for CDR* report signal that the coalition is contributing to enhanced and shared understanding of MRV for some CDR methods (MI-CDR Mission, 2024).

MI-CDR convenings help to inform policymakers, researchers, and other decision-makers about lessons learned in other regions—delivering significant value towards GF(4) data, knowledge, and learning. In fact, MI-CDR exemplifies the archetypal identifiers of GF(4): “disseminating best practices, facilitating stakeholder collaboration and networking” and “advance cross-country learning and collaboration.” Examples include knowledge-sharing summits (e.g., Gassnova Knowledge Sharing Summit 2026), workshops (e.g., MI-CDR hybrid workshop in Tokyo, 2025; annual CEM-MI Ministerial convenings), and reports (e.g., aforementioned MRV report) (MI-CDR Mission & METI, 2025).

We find partial evidence for MI-CDR’s role in GF(5) policy analysis through outputs like the *Developments with Carbon Management (CCUS and CDR) Programmes* publication (CEM CCUS Initiative & MI-CDR Mission, 2025), which summarises policy and programme

developments across CEM-CCUS and MI-CDR member countries. MI-CDR also facilitates policy-focused discussions between state and non-state actors.

While MI-CDR does not itself administer funding for CDR research and deployment projects, it can indirectly address barriers to deployment, resourcing, and financing—delivering a benefit toward GF(3) implementation, finance, and capacity building. The justification for this score comes from MI-CDR’s role in encouraging member governments to increase public investment in CDR RD&D, providing a platform to align funding priorities across countries, and spotlighting innovation investment gaps. The platform’s activities in GF(4) data, knowledge, and learning, also help to reinforce its role in capacity building: facilitating workshops and knowledge-sharing platforms enables sharing best practices, roadmaps, and technical insights, all of which support capacity building in member countries.

MI-CDR delivers a clear multilateral coordination and convening benefit—governance function (6)—to the CDR field through its convenings that bring together high-level delegates to align and coordinate development of CDR technology and policy (e.g., the annual MI ministerial meetings which often coincide with CEM ministerial meetings) (CEM Secretariat, 2025).

A closer look at MI-CDR’s operations and influence

Mission Innovation fills a crucial niche within the CDR landscape. Alongside CEM, MI is uniquely positioned to convene government delegations and ministers working on decarbonisation and elevate the role of carbon management strategies, including CCS and CDR, within such fora. For example, at the CEM16/MI10 ministerial gathering, MI-CDR and CEM-CCUS hosted a joint Minister-CEO roundtable on carbon management (Mission Innovation, 2026). The roundtable featured interventions from governments like China, the United States, Canada, and the United Kingdom as well as industry and research groups like the Carbon Capture & Storage Association and State of CDR. Among its outcomes were the release of the *Developments with Carbon Management (CCUS and CDR) Programmes* publication and the launch of the CEM-MI Carbon Management Project Recognition (CMPR), a showcase of successful carbon management projects (CEM CCUS Initiative & MI-CDR Mission, 2025; CEM & MI, 2025). Such convenings deliver meaningful value to the CDR governance landscape, creating a space for government delegates—sometimes ministers themselves—to foster transboundary collaboration, exchange ideas, establish shared commitments, and identify synergies.

MI-CDR operationalises its mission through a series of “technical tracks” and “sprints.” The former category includes a dedicated track for each of the Mission’s three CDR technology focus areas plus a track dedicated to lifecycle analysis (LCA) and techno-economic analysis (TEA). The sprints include a mapping initiative, which ceased operations, the SMART-CDR Competition, the Gigatonne by 2030 Campaign, and the CDR Launchpad. The Launchpad aims to accelerate CDR technology development through investments in demonstrations, data sharing, and accelerating the learning curve. Launchpad members commit to:

- (1) at least one project supporting at least 1,000 tonnes or more of CDR annually by 2025;
- (2) contributing to USD 100 million in funding for CDR demonstrations and pilot projects by 2025;
- (3) sharing data and information on demonstrations; and

(4) supporting an MRV working group, mapping of projects, and LCA case studies. The Launchpad encourages MI-members and non-members to join. Its membership includes Canada, Japan, Norway and the United States, Iceland, the United Kingdom, and the European Commission. As of 2024, the Launchpad saw 30 projects—half of which were in the United States—with participation from all members. Projects in Denmark and Sweden comprised EU participation (Mission Innovation, 2024, 2026; Smith et al., 2024).

It may also be noted that MI-CDR’s 100 MtCO₂/yr by 2030 target was adapted and reaffirmed by the UN High Level Climate Champions at COP30, where two new near-term (2030) “implementation” targets were provisionally announced for CDR, one of which was 100 Mt novel CDR by 2030. Deference to MI-CDR’s targets underscores its legitimacy, influence, and the trust it has built globally.

To date, not all member countries have made commitments to demonstration funding (State of CDR Ed. 2 Report). However, MI serves as a platform for shared learning and setting of parallel goals to increase research, development, and demonstration; it could also play vital role in tracking investments and funding across the public and private sectors (State of CDR Ed. 2 Report). Taken together, CEM-CCUS and MI-CDR represent one of the longest-running and most highly participatory (by government count) coalitions. The role of CEM and MI in governing CDR is significant, bridging global research, development, and deployment agendas on CDR and CCUS and creating opportunities for multilateral collaboration.

5. Priority functions for CDR governance

Section 5 considers the gaps that emerge from analyses of institutional governance capacities across climate and CDR initiatives (Sections 3 and 4). Toward addressing such gaps, we identify and explore strategies for launching new institutional structures. Relevant institutional design considerations are discussed in Section 5.5.

5.1. Lessons learned from international climate organisations

We derive the following insights from the analysis in Section 3 above.

5.1.1. Opportunities and committed actors for establishing new institutions

Over the years, a vast network of international institutions has emerged to provide services and fill governance gaps to address climate change, with varying scopes and functions. Given the increasing urgency to mitigate climate change, understanding past barriers and enablers to establishing and developing these institutions can inform efforts to fill the governance gap identified for CDR. We find that the successful formation of institutions is usually driven by a dedicated group of actors to fill gaps in governance. Additionally, the membership and functions of institutions often expand over time, as they deliver benefits to members and build their expertise.

In lieu of a significant catalysing event, such as the 1970s oil crisis in the case of the IEA, the formation of new institutions is generally driven by a small group of committed actors, or political champions, and often in reaction to perceived shortcomings of existing governance landscapes. One driver for the creation of IRENA, for example, was the view that a technology neutral institution like the IEA would not drive progress in renewables quickly enough (Mengi-Dinçer et al., 2021). Similarly, momentum for the CCAC grew following stalled progress in climate negotiations at COP15 in Copenhagen (Unger et al., 2020). While some initially viewed the emerging role of the CCAC as redundant to UNFCCC processes, it is now generally viewed as complementary, with the two institutions working closely together.

5.1.2. Coalition building by delivering multiple benefits

While the formation of a new institution is often pushed by a small group, the potential impact of an organisation is in part determined by achieving a large, far-reaching coalition of members. This, however, can result in a trade-off between the initial membership and swift establishment of an institution. For example, the desire for high membership slowed the creation of IRENA in the early stages of its formation. After its ratification in 2009, however, IRENA saw one of the fastest expansions of membership for an international institution of the time (Urpelainen & Van de Graaf, 2015). Given the accelerated urgency of mitigating climate change, the cost of delaying action in exchange for high buy-in should be weighed carefully, remembering that membership can expand as an organisation develops.

To foster a broad coalition, integrating multiple goals or benefits into the mission and functions of an institution emerged as a clear lesson from our analysis of existing institutions. This is exemplified by the CCAC's Multiple Benefits Pathway Framework, which integrates actions to mitigate climate change and reduce air pollution and achieve their co-benefits (Unger et al.,

2020). This approach can appeal to a diversity of political interests and priorities and earn buy-in from actors not solely motivated by mitigating climate change. In addition to the falling costs of renewables and rising political momentum leading up to COP15, IRENA's membership was likely driven by high oil prices, as countries sought energy affordability and security, rather than solely climate benefits. The IEA's broad scope similarly can appeal to a wide range of interests.

Compared to many mitigation approaches that target emissions reductions, the co-benefits of CDR methods, particularly technological CDR, are often less obvious and straightforward. In fact, a mapping of CDR literature found that studies more often assessed negative side effects of CDR rather than positive side effects (i.e., co-benefits) (Prütz et al., 2024). This presents a communication challenge which would need to be addressed to broaden buy-in for advancing CDR. We explore the role of co-benefits in CDR further in Section 5.4.1.

5.1.3. Evolution of governance functions

As with membership, the functions fulfilled by institutions often develop and expand over time. The more mature institutions reviewed, such as IRENA and the IEA, tended to cover more functions than newer institutions, such as MI and Race to Zero. As an institution builds trust and legitimacy with its members and expands its expertise, it can be called upon to fill new functions. Further, as governance landscapes and sectoral needs shift, well-established institutions can fill new gaps as they emerge.

5.2. The state of international CDR governance

The following section summarises insights from analysis of the 12 CDR initiatives sampled in Section 4.

5.2.1. Assessment of governance functions among CDR initiatives

Some trends emerge from analysis of CDR initiatives that exhibited “robust” evidence (●) for supply of governance functions. Across the 12 initiatives included in our assessment, we find the highest abundance of supply for GF(6) convening and coordination and GF(1) signal and guidance which were found to be robust across seven and six initiatives, respectively. GF(4) data, knowledge, and learning has the third highest level of supply—present across five initiatives. We find lower levels of supply across our sample for GF(3) implementation, finance, and capacity building; and GF(5) policy analysis, which are robust in just two initiatives each (CityCDR and CMC). We find the least evidence of supply for GF(2), rules, standards, and transparency, which does not have robust support from any initiatives within our sample. Thus, GF(2), a role broadly dedicated to upholding integrity for the sector, exhibits the largest governance gap among our sample of 12 initiatives. However, this conclusion should be validated using external evidence since our analysis is constrained by a small sample size ($n = 12$) that risks inadvertently excluding initiatives that supply GF(2), some of which are discussed in Section 5.2.2. Our finding is consistent with a similar analysis, which looked at accounting methodologies, technological readiness, incentives, and accountability mechanisms, to identify areas within the CDR field that would most benefit from international cooperation. The authors found that “implementation of large-scale CDR is unlikely...until there are clearer accounting rules and financial incentives” for CDR (Maher & Symons, 2022).

If indicative of a broader trend, our finding suggests a governance gap may exist for standard-setting, rulemaking, and mechanisms that uphold transparency and accountability. Despite an apparent dearth of institutional capacity for harmonising MRV, there exists an abundance of more than 100 MRV protocols across the CDR ecosystem (Smith et al., 2024). Convergence and harmonisation of such protocols are thus desirable to facilitate interoperability, standardisation, and transparency. As such, a larger quantity of initiatives focused on supplying GF(2) is not necessarily desirable; rather, one or more tightly coordinated initiatives effectively facilitating convergence is sufficient.

Considering supply of governance functions classified as “partial or planned” (●) reveals additional insights. Notably, GF(3) implementation, finance, and capacity building is planned or partially delivered across nine initiatives. GF(2) rules, standards, and transparency is planned or partially delivered at eight initiatives, while GF(4) and (5) are planned or partially delivered at five. We infer that functions with high levels of planned and partial supply, especially GF(2) through (5), indicate areas of governance that may strengthen and grow over time as initiatives evolve. If proposed initiatives secure funding and deliver on their stated objectives and early-stage initiatives continue or expand operations, many instances of supply currently classified as “partial or planned” could merit reclassification as “robust.” For instance, the presence of partial or planned rules, standards, and transparency governance at eight initiatives suggests that activities pertaining to this function may be “in the pipeline” across emerging actors.

Across our sample, there are an equal quantity of initiatives classified as proposed, early activity, and advanced. Given that our analysis represents a snapshot of current governance trends in a dynamic landscape, supply is subject to change, driven in part by the evolution of existing and proposed initiatives. Notably, all initiatives older than 2 years (i.e., those labelled “advanced”) demonstrate robust evidence for supplying GF(1) and GF(6) while none exhibit robust supply of GF(2). This suggests that, to date, there has been a stronger focus on signalling and coordination among the most established initiatives and coalitions. The relative abundance of similar governance functions among early-stage initiatives suggests this trend will persist. However, it should be noted that the relative strength, efficacy, and credibility of signals and coordination is not assessed here, may vary substantially, and has implications for governance.

Because our sample size is limited and represents initiatives at varying stages of growth, our findings should not be construed as a comprehensive assessment of gaps. Instead, these results can indicate where some of the key institutional players are supplying governance at present, or will supply governance if implemented successfully, and point us toward potential, emerging gaps. Also, our methodology advances the framework used by Otto & Oberthür (2024) by adapting it for the CDR governance landscape, advancing future research of CDR governance, including institutional capacities and case studies.

5.2.2. Relevant initiatives toward addressing governance gaps in rules, standards, and transparency

As Otto and Oberthür note for the industrial decarbonisation landscape, “international institutions are also well placed to harmonise existing accounting and monitoring frameworks, to ensure cross-comparability or reduce regulatory burdens for transnational actors” (Otto & Oberthür, 2022). Indeed, initiatives within the decarbonisation space like the CEM Industrial

Deep Decarbonisation Initiative (IDDI) and the IEA Working Party on Industrial Decarbonisation (WPID) can serve as informative models for how to bring together governments and other stakeholders to advance interoperability of definitions, methodologies, and standards. The IDDI, for instance, has created a standard environmental reporting mechanism for cement, concrete, and steel; and fostered adoption of consistent definitions and standards for low and near-zero emissions cement, concrete, and steel products (UNIDO, 2026).

In the CDR landscape, we discuss relevant intergovernmental efforts in the broader carbon market ecosystem that may help address outstanding gaps related to rules, standards, and transparency: the Coalition to Grow Carbon Markets, the UN Article 6.4 Supervisory Body, the IPCC, and proposed ‘climate clubs’ for CDR. Additional, complementary efforts to align private sector standards and principles, such as the Science Based Targets Initiative (SBTi) and the CDR Industry Commitments, are relevant to GF(2) but are beyond the scope of this paper given their lack of intergovernmental participation.

The intergovernmental Coalition to Grow Carbon Markets has proposed shared principles for high-integrity carbon credits to standardise voluntary use across jurisdictions. Importantly, the coalition also commits its members to “pursuing national guidance, incentives, policies, and/or regulations aligned with these Shared Principles, to foster international consistency and incentivise high-integrity demand for carbon credits.” (Coalition to Grow Carbon Markets, 2025). The coalition was launched in 2025, is co-chaired by the Governments of Kenya, Singapore, and the UK, and totals eleven member-countries across the Global North and South: Canada, France, Indonesia, Panama, Peru, Switzerland, New Zealand and Zambia. The Voluntary Carbon Markets Integrity Initiative (VCMI) serves as the coalition’s secretariat and works in partnership with other prominent standards bodies like the ICVCM and the International Emissions Trading Association (IETA) as well as the World Bank and the WBCSD. The coalition encourages governments to go beyond the principles in supporting demand for high-integrity credits by “clarifying the legal nature and expectations for accounting of carbon credits, strengthening certainty and transparency for climate claims, considering the application – and, where appropriate, endorsement – of the criteria of key integrity initiatives, and considering opportunities to mandate or incentivise carbon credit use” (Coalition to Grow Carbon Markets, 2025). Given its broad intergovernmental membership, its partnership with prominent carbon credit standards bodies, and its publication of common principles, this initiative represents a meaningful advance toward addressing a lack of international governance capacity on standards, rules, and transparency for carbon markets generally, for removal credits in particular, and with a focus on leveraging government actions to influence private sector activity. However, these standards are limited in that they are voluntary and, at present, apply only to eleven countries.

The Article 6.4 Supervisory Body, established by the Paris Agreement, also contributes toward advancing governance function (2) by operationalising the Paris Agreement Crediting Mechanism (PACM), a UN facilitated voluntary carbon market (UNFCCC, 2015). Among the Body’s mandates is “developing and/or approving methodologies, registering activities, accrediting third-party verification bodies, and managing the Article 6.4 Registry” (UNFCCC, 2026). The Article 6.4 mechanism establishes a legal basis for voluntary cross-border carbon credit trading and financing. The Supervisory Body has contributed meaningfully to international

harmonisation of standards and transparency for CDR. For instance, at COP29, it approved a standard on activities involving removals, including consideration of monitoring reporting and accounting, reversals, leakage, and avoidance of negative impacts (Carbon Gap, 2025a; UNFCCC, 2024). The standard entered into force in October 2024. The Body is also working to develop and implement an official registry for PACM following the decision to retire its predecessor, the Clean Development Mechanism Registry, at COP30. While such standards are binding for projects seeking accreditation under the PACM, the overall impact of this Body on CDR governance is limited to actors operating within this system, leaving open the door for further efforts to ensure consistency with rules for the broader VCM ecosystem. Also, much of the credits traded to date on the UN facilitated mechanisms have been limited to conventional CDR, pointing toward a need to further integrate novel CDR projects.

The IPCC also plays a role in governing standards, rules, and transparency for CDR by establishing internationally agreed methodologies for estimating anthropogenic emissions by sources and sinks. These methodologies serve as technical references for countries in developing and submitting national GHG inventories and NDCs to the UNFCCC in alignment with treaty obligations under the ETF and BTRs. Thus, development of such standards has significant implications for national policymaking. While methodologies to date have focused on removals through LULUCF (i.e., conventional CDR), a methodologies report for CDR and CCUS is expected in 2027 and will include methodologies for some novel methods (IPCC, 2025a). As of 2021, the IPCC had published accounting guidance for afforestation, soil carbon, and bioenergy (irrespective of whether it includes CCS) (Maher & Symons, 2022). Considering the governance gap for GF(2), it is important to note that while the IPCC boasts high scientific credibility and legitimacy (i.e., epistemic authority), it lacks regulatory or enforcement authority.

Minilateral action through small groups of highly motivated CDR ‘clubs’ may also facilitate overcoming international cooperation challenges, especially for CDR which is largely held back by a lack of momentum rather than active opposition (Maher & Symons, 2022). The ‘Umbrella Group’, for example, could form a core negotiating bloc or club focused on technology-enabled CDR. The group initially formed to counterbalance the EU’s powerful climate negotiations influence and includes many former and current CDR champions with high CDR potentials such as Australia, Canada, Iceland, the United Kingdom, and the United States. See section 5.4.7 for further discussion on how climate clubs can help address gaps.

Taken together, these efforts demonstrate emerging signs of convergence around shared principles, methodologies, and standards, facilitating partial—albeit nascent—harmonisation. There is thus still more work needed to institutionalise an authoritative, comprehensive, and coherent system of governance. For example, the current landscape can be strengthened by creating a mechanism for globally binding or widely-enforced rules that fully align standards across UN systems, voluntary standards bodies and frameworks, private sector registries, national regulations and compliance systems, and other principles arising from intergovernmental arrangements. Moreover, these efforts are designed for the broader carbon markets ecosystem with more effort needed to tailor them to CDR-specific needs, such as method-specific MRV, and especially for novel CDR. Key outstanding questions include how government-led and private-sector efforts will be integrated; how to ensure interoperability

across registries; and how to harmonise MRV methodologies across jurisdictions and accounting systems.

5.2.3. Overlapping governance creates robust systems; consolidation

As mentioned, operational initiatives are contributing to a redundancy in governance supply of signal and guidance and institutional coordination. As the ecosystem matures, some consolidation of overlapping initiatives is likely, much like in crowded startup environments. Consolidation of governance can of course be beneficial for simplifying and streamlining the landscape, reducing complexity, duplication, and misaligned standards and incentives. However, we find that there is some evidence to suggest redundancy can play a beneficial role in governance when sufficiently coordinated. That’s because initiatives with overlapping governance roles may reinforce one another, provide a backstop if another falters (e.g., loses funding or credibility due to shifts in public perception, political salience, or scientific integrity), or complement existing efforts—as was the case for the CCAC and the UNFCCC (see section 3.8).

For instance, the concept of *regime complexity* asserts that institutions and agreements with overlapping remits or jurisdictions (“regime complexes”) can create a more robust, resilient system that is better able to absorb shocks and contribute to enhanced cooperation; however, how such institutions are managed and coordinated is key to ensuring efficiencies are realised (Gómez-Mera, 2021). Similarly, scholarship on *polycentricity* reveals that having multiple centres of semiautonomous decision-making that “take each other into account in competitive and cooperative relationships and have recourse to conflict resolution mechanisms” can deliver benefits to the governance system, such as “enhanced adaptive capacity...and mitigation of risk on account of redundant governance actors and institutions” (Carlisle & Gruby, 2017). We extend these ideas to the CDR governance context, suggesting that redundant or overlapping supplies of GF(1) and (6) can realise enhanced efficiency and resilience, so long as institutions are well-coordinated.

5.3. Recommended roles for new or expanded CDR institutions

Our findings point to governance capacity for rules, standards, and transparency as a key priority for future governance efforts. This includes institutional capacity to develop, promote, and promulgate rules and policy mixes that facilitate collective action or prohibit detrimental activity and other actions that enforce and uphold transparency and accountability. As discussed in Section 5.2.2, efforts are emerging to fill this gap, but remain fragmented. The second largest need, according to our analysis, is for governance that contributes toward accelerating implementation, finance and capacity building. The need for policy analysis and data, knowledge, and learning trails close behind. See **Table 1** for examples of these functions in practice.

While we find the most robust supply of governance for signal and guidance and convening and coordination, there may yet still be room for additional coordination and strengthening of such functions. In particular, the quality, credibility, and efficacy of signals matter greatly for effective governance. Although a multiplicity of weak signals may suffice in some jurisdictions or markets, others require aligned and authoritative mandates. Thus, despite robust evidence of

signalling activity across six initiatives, there remains a clear need for more coordinated, authoritative, and durable policy and market signals—especially in jurisdictions such as the United States, where government support for CDR has recently faltered.

We posit that governance functions that are already demonstrated across multiple initiatives may prove more feasible to develop and replicate in new institutions while those lacking supply are likely to require more time to develop. By this logic, burgeoning initiatives have the opportunity to build on governance capacities that are presently in high supply (i.e., GF(1) and (6)) during early-stage development before transitioning to cover a broader set of functions, as suggested by Section 5.1.3. In the near-term, this would mean prioritising coordination functions and delivering credible signal and guidance. We also suggest that function (4) data, knowledge, and learning is well-suited for early-stage delivery as was the case for the transition from REN21 to IRENA. In the medium to long-term, new governance institutions can progressively expand to deliver benefits such as financing, capacity building, and policy analysis before ultimately supporting integrity governance. **Figure 5***Error! Reference source not found.* illustrates one possible pathway for developing these functions in parallel at a new institution. Our progression aligns with comments from the State of CDR concept paper v1.0 and recommendations from our Advisory Board, which highlighted the need to build legitimacy and trust before activities associated with GF(2) can be adequately supplied (see Appendix Section 6.5). However, our recommended sequence of institutional development is intended to be non-prescriptive; rather, it's meant to be iterative and evolve based on subsequent engagement with broader stakeholders.

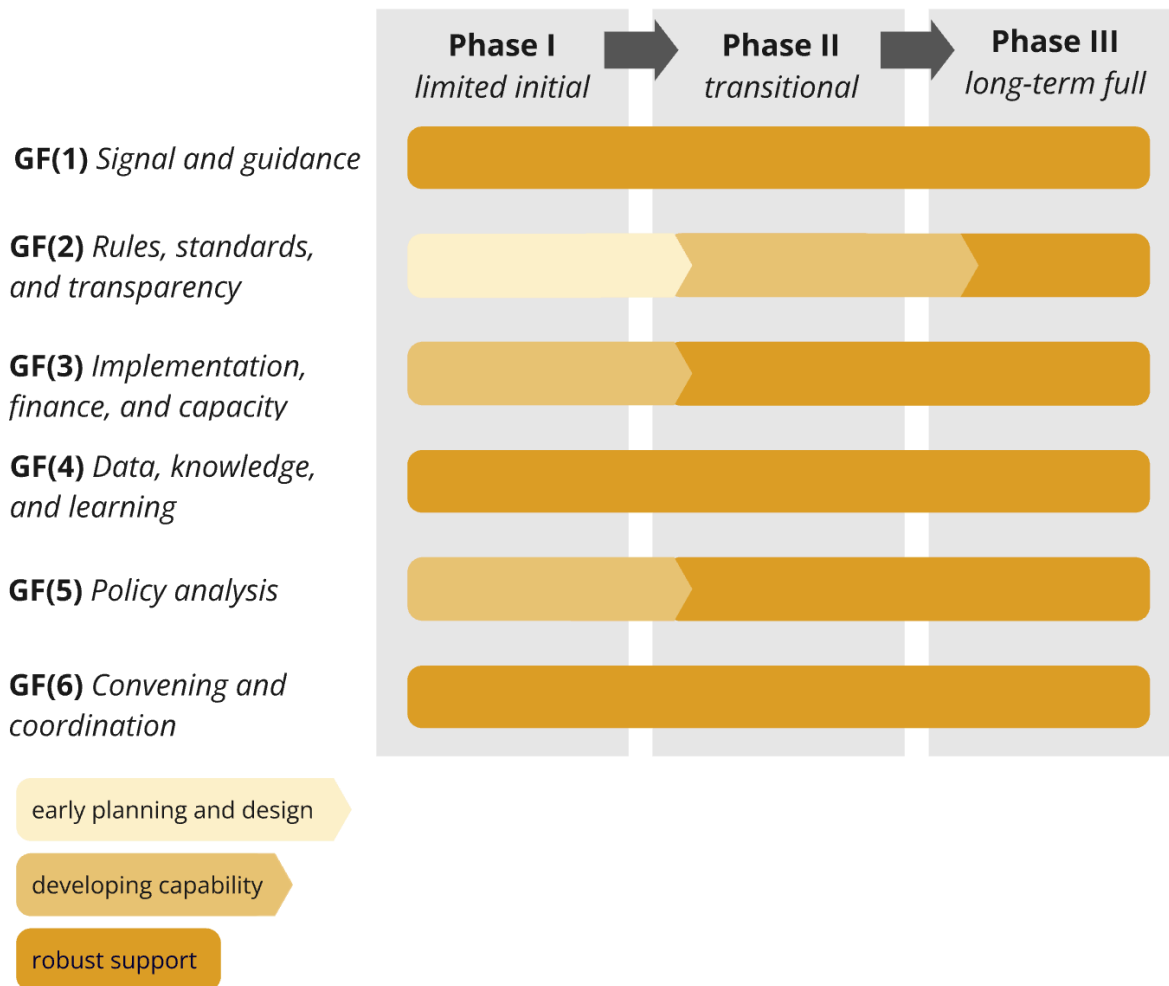


Figure 5. Progression of functional coverage for CDR governance across three phases of development.

A forthcoming “roadmap” companion paper will explore more granular implementation and design considerations (e.g., structural, logistical) for new institutions to fill governance gaps.

5.4. Institutional strategies to address the governance gap

The following eight strategies emerged from our assessment of CDR governance across our sample of 12 CDR initiatives; these strategies also take into account the lessons learnt from the assessment of broader climate organisations. As these strategies arise from established and emerging initiatives, they can be viewed as both observations and as recommendations to consider taking forward in the establishment of novel institutions. However, these recommendations are not intended to be static or prescriptive; rather, they are intended as flexible insights that should evolve and adapt with future outreach and robust, cross-sectoral stakeholder engagement, a process that will follow publication of this paper.

5.4.1. Elevate the role of co-benefits

Lessons from international climate organisations suggest CDR governance institutions may enjoy broader membership and influence as their missions widen to incorporate a broader set of goals and benefits. Within the CDR field, there is already growing recognition of the importance of communicating, delivering, and even centring, positive outcomes of CDR beyond their climate benefits. Economic benefits like job creation, regional economic development, and industrial competitiveness are commonly cited co-benefits across many methods, while adaptation and resilience, cost savings, enhanced product performance, and mitigation of ocean acidification are relevant only for some (Bower et al., 2025; Wang et al., 2023).

Political advocacy groups exemplify this growing recognition of the importance of co-benefits since their success depends upon buy-in from broad, stable coalitions of policy champions and their constituencies. For example, U.S.-based Carbon180 aims to centre narratives that are considered politically salient and popular—such as the idea that ERW can deliver enhanced crop yields for farmers—to muster support from lawmakers with agricultural constituencies. Similarly, Carbon Removal Alliance, a trade and advocacy organisation for the CDR industry, “support[s] the development of practices, policies, and programs that centre community benefits and mitigate potential risks” (*Carbon Removal Alliance*, 2026). For these organisations as for the field writ large, recognising benefits beyond climate mitigation is increasingly important—particularly as climate action becomes more polarised and other policy priorities (such as affordability, national security, and migration) take precedence over emissions abatement (Chaudhry, 2026). In a world where strictly climate-centred narratives are falling out of favour, measuring and communicating non-climate benefits become increasingly important.

We also find examples of this recognition among initiatives included in our assessment, such as CityCDR, which argues that by “delivering co-benefits, such as economic development, urban resilience and financial innovation,” CDR can better integrate into planning, infrastructure and governance, “rather than being treated as a standalone intervention” (Gevers Deynoot et al., 2025). To that end, CityCDR published a framework for embedding CDR planning in urban settings and integrates co-benefits across every dimension of its suitability assessment framework. This approach reflects an awareness of the value of CDR beyond its strict or “standalone” climate benefits. In turn, this strategy can enable uptake of urban CDR across a wider range of cities, illustrating how centring co-benefits can broaden buy-in. We also see evidence of the primacy of co-benefits in legislative frameworks: the EU CRCF states that the framework will purposefully promote CDR methods that deliver co-benefits (see Appendix Section 6.4.1) (Regulation (EU) 2024/3012, 2024).

5.4.2. Design membership criteria to ensure broad participation across diverse actors and forge Global North-South alliances

CDR initiatives with method-agonistic missions can enable broader membership. For example, GONE convenes a group of countries with very different resource, economic, and geopolitical contexts—bridging countries in the Global North and South. Notably, GONE does not discriminate based on how countries intend to achieve a net-negative status. As a result, highly forested, developing countries intending to leverage afforestation and reforestation to achieve net-negative status can form alliances with more affluent and developed nations intending to

leverage higher shares of novel and engineered CDR methods. Connecting developing and developed nations is a challenge that can be initiated early on.

As mentioned, global partnerships can facilitate flows of finance and technology between nations with higher capacity and ability to pay and those that lack capital to fund early-stage infrastructure and development, yet have high geologic, land, and labour resource potentials for the deployment of CDR. Thus, global partnerships between Global North and South countries are not only advisable for ethical reasons (i.e., ensuring common but differentiated responsibilities) but also to optimise the use of global resources and capacities.

In contrast, the G-ZERO has a much narrower set of criteria for membership: only countries that already claim carbon neutrality are permitted to join. Perhaps such rigid eligibility criteria have limited the coalition's membership and, in turn, its influence. Certainly, this does not suggest that there are *no* merits to narrowly designed membership structures, but trade-offs must be weighed carefully—a lack of substantive outcomes from the G-ZERO may evidence the shortcomings of narrow membership structures. However, as more countries achieve carbon neutrality, G-ZERO's membership can expand over time, potentially increasing its influence. In another example, MI-CDR's CDR Launchpad does not limit participation to Mission members, which has enabled Iceland to participate.

The UN High Level Climate Champions is engaging broad and diverse coalitions through the CDR Mutirão and the emergent CDR2030 initiative, which will have three launchpads co-led by WBCSD, a coalition of over 200 businesses; GONE; and partners from hard-to-abate industries like mining and construction (Toporas, 2025). Engaging cross-sectoral actors enables this group to pursue multiple goals at once: increasing voluntary private sector demand, establishing enabling policy and regulatory conditions, and facilitating industrial integration. On the business front, this approach facilitates opportunities to profit from investments in CDR companies and meet sustainability goals. From the perspective of hard-to-abate industries, it presents opportunities to deliver products at lower costs, to make use of existing waste streams, and to improve product performance (e.g., long-lived wood products and concrete). Taken together, the broad set of goals and benefits embedded in the initiatives design enables a broader set of actors to participate.

5.4.3. Launch with narrow scope, expand over time

Our analysis of broader climate organisations finds that the functions fulfilled by institutions often develop and expand over time (see section 5.1.3). In the CDR governance landscape, we observe a similar tension that seeks to balance the desire for expansive mission scopes with the need for nimbleness and efficiency. For instance, narrower scopes and memberships may benefit from reduced complexity and easier decision-making but lack robust participation to adequately address global multilateral coordination and convening needs. Considering resources also highlights this tension. For instance, the specificity and breadth of scope of any governance system have implications for the resources required to implement it. Thus, there is a need to balance tensions of scope, resourcing, and dexterity.

RMI's Advanced Market Commitment recognises this tension among its proposed design considerations, suggesting that the AMC could start with a focus on engineered approaches and

later expand to include land-based CDR methods. MI-CDR operates with a narrower focus on select, engineered CDR methods. Perhaps this more focused approach is partly responsible for enabling MI-CDR to deliver effectively on at least three functions. CityCDR, seeking to expand its mission to a focus on capacity building in 2026, also exhibits a dynamic mission. We observe a multi-phased approach in the Trans-Atlantic Knowledge Exchange Hub, too, which envisions an initial phase of establishing a Secretariat and seeking funding, hosting a conference, followed by a phase characterised by self-sufficiency and delivering value. The EU CRCF, a regulation, is also publishing certifications for CDR methods on a rolling basis (see Appendix Section 6.4.1). The evolution of climate organisations teaches us that starting small and expanding over time offers a sustainable model for institutional development.

An iterative approach to governance—one that is designed to evolve over time—would also allow for necessary evaluation and review processes that continually inform and improve governance mechanisms based on feedback (i.e., adaptive management).

5.4.4. Employ dynamic, voluntary funding models where necessary

Voluntary and in-kind funding were common models across our sample of CDR initiatives. For instance, the CMC, MI-CDR, G-ZERO and GONE leverage voluntary and in-kind funding to support operations and secretariats. The AMC and Knowledge Exchange Hub recommend funding models that evolve over time, starting with support from philanthropies followed by funding from governments or self-funded in the long-term. CityCDR follows a similar path; it relies on lean philanthropic funding for its first few years of operation but aims to rely on public funding over the long term. Similarly, the work to establish an Atmospheric Restoration Centre has thus far been supported by philanthropic funding from the Bridge Institute while it seeks financial support from state actors like the UAE over the longer term. CDR30 relied on a patchwork of funding sources—industry and philanthropic—to secure a spot in the Blue Zone at COP30. We also observe that voluntary funding commitments were recommended for a 30 by 30 campaign proposed as part of the UK’s Independent Review for GGRs (see Appendix Section 6.4.2).

5.4.5. Build on pre-existing efforts, convenings, and publications

Across CDR initiatives, we find a near-universal pattern of building on pre-existing efforts and leveraging high-visibility events, especially COP. There is also evidence that high impact reports can play a role in laying the groundwork for new initiatives.

Tracing the inception of MI-CDR, for example, we find that Mission Innovation—which was launched at COP21—evolved from the Clean Energy Ministerial, and the CDR Mission was not launched until COP26 when “MI 2.0” was announced. The CDR Launchpad was subsequently launched at COP27. This case study illustrates how building on previous efforts can enable long-term success and underscores the value of high-impact events like COP in announcing new initiatives.

In fact, leveraging high-profile events is a feature of almost all initiatives in our sample: GONE, G-ZERO, CDR-ITSI, CDR30, the KX Hub, CDRANet, the CMC, and UNEP. GONE first launched at COP28 with three members before expanding its membership to five countries at COP29. G-ZERO launched at COP29, building on the Alliance of Carbon Negative Countries,

which had been announced at COP three years prior. The CDR-ITSI proposal builds upon previous demonstrated successes delivering CDR pedagogy at the Future Earth Research School. CDR30 similarly built off of previous efforts led by “Carbon Removals at COP,” a now-defunct hodgepodge of NGOs and volunteers that once streamed events and published commentary and news on CDR at COP27, 28 and 29. The KX Hub and CDRANet aim to design and host their own high-impact events—a “success sharing conference” and “CDR26,” respectively—to launch their initiatives. The Carbon Management Challenge, which launched at the Major Economies Forum on Energy and Climate, was designed to build on existing multilateral initiatives like CEM-CCUS and MI-CDR. CMC was further elevated at COP28 when six more countries joined. UNEP, for its part, has leveraged high-level convenings like UNEA7 and COP30 to elevate the role of CDR in international fora.

Just as UNEP and the WMO’s report created the enabling conditions for the CCAC to launch by shedding light on short-lived pollutants, a study led by South Pole spurred the inception of the City CDR Initiative. Reports like the Emissions Gap Report and State of CDR reports can foster a shared understanding of CDR and potentially lay the scientific groundwork for new institutions.

5.4.6. Use tangible and shared targets to foster collaboration and ground initiatives in practical outcomes

In terms of targets, RMI recommends a preliminary goal of USD 100 million per year in collective government purchase commitment, a doubling of public funds for CDR by 2030, and a target of USD 1 billion or more from the private sector between 2030 and 2035. The CMC is rooted in a goal to collectively manage at least 1 billion tonnes of CO₂ annually by 2030. MI-CDR commits its members to achieving net removal of 100 million metric tons of CO₂ per year globally by 2030 alongside its CEM-shared “Gigatonne by 2030” Campaign. The CDR Mutirão builds on MI-CDR’s near-term targets, and calls for “CDR Implementation Targets” of 100 megatonnes of durable CDR and three gigatonnes of nature-based CDR by 2030 (UNFCCC, 2025). Similarly, a ‘30 by 30 Campaign’ proposed in the UK’s Independent Review for GGRs provisionally proposes a target of 30 million tonnes of removal deliveries by 2030.

Shared commitments are also central to GONE (net negative), G-ZERO (carbon neutrality), and CDRANet. However, the lack of binding, consistent, and transparent framework for validating and certifying national claims of carbon neutrality or net-negative emissions status may ultimately undermine the legitimacy and influence of some organisations. Thus, mechanisms for accountability and transparency are needed to verify such claims and to count progress toward shared commitments in the wake of splashy announcements, of which quite a number are likely to partly overlap and be double-counted.

5.4.7. Use existing rosters of active CDR leaders to identify champions for new and expanded initiatives; consider a “climate club” for CDR

We observe a high degree of overlapping participation across initiatives. For instance, both national governments involved in the KX Hub—Canada and the UK—are also members of MI-CDR, while the Netherlands participates in both GONE and MI-CDR. MI-CDR and the CMC share roughly eight member countries, and half of GONE’s membership participates in the

CMC, while half of G-ZERO is also party to GONE. Several initiatives are additionally linked through formal partnerships or shared platforms: GONE has signed MOUs with CityCDR and is connected to CDR30 through COP30’s CDR Mutirão, while CityCDR and CDR30 are likewise linked through COP30. Taken together, these connections indicate a dense network of overlapping actors and institutional linkages across the CDR governance landscape, although further coordination and orchestration may still be needed.

Drawing lessons from the governance landscape for industrial decarbonisation, the concept of a climate club stands out as a noteworthy example of institutional innovation. Proponents of small (or ‘minilateral’) climate clubs made up of highly motivated actors tend to highlight their ability to facilitate international cooperation because such “concentrated interests may achieve outcomes that are impossible in multilateral negotiations where interests are more diverse” and “clubs can cultivate motivation, share information, coordinate national efforts, accelerate technology innovation, develop proof of concepts and establish standards and accounting methods” (Maher & Symons, 2022). An analogous climate club designed for industrial decarbonisation envisions a core function:

“to convene as a high-ambition intergovernmental forum for discussion on facilitating a near zero emissions industrial production transition and serve as an enabling framework for increased cooperation, improved coordination, and potential collective action of its members” (Climate Club, 2023).

This club was originally envisioned as a sanctioning mechanism to address competition and carbon leakage but evolved to become a more feasible, ‘normative’ club focused on shared climate policy ambition (Otto & Oberthür, 2024). The club would promote shared understanding of mitigation policies (GF(4) and (5)), multi- and bilateral cooperation (GF(6)), and aid in development of aligned methodologies and standards (GF(2)) (Climate Club, 2023). It also aims to develop a global matchmaking platform for financial and technical assistance, mirroring activities encompassed by GF(3). On coordinating, GF(6), the club is “well-placed to advance overarching orchestration of the governance landscape given [its] broad membership and mandate, established institutional structures, and political leadership” and could be especially valuable toward advancing crosscutting political discussions on industrial decarbonisation (Otto & Oberthür, 2024). Potential gains of a climate club include offering an alternative to UNFCCC processes, helping to raise policy ambition, and increasing bargaining efficiency. However, hurdles remain for clubs: normative clubs are more feasible but lack legal strength; equity and distributional conflicts persists; tackling the free-rider problem remains untested and difficult to achieve; and they face an international legitimacy deficit that often prevents clubs from enforcing rules (Falkner et al., 2022). Falkner et al. underscore the importance of club design considerations such as size, purpose, principles, legal strength, and relationship to the UNFCCC (2022). These considerations would need to be weighed and negotiated carefully in the design and implementation of a climate club for CDR.

5.4.8. Tailor governance to specific contexts

As mentioned in Section 1.4, CDR governance needs vary by method, geography, jurisdiction, and phase and scale of development. This reality has led to the idea that CDR should be governed on a case-by-case basis, that the immense diversity of CDR methods “should rule out singular grand designs for CDR governance” (Bellamy & Geden, 2019) and that “no single tool

can address all features of complexity implying the need for a diverse suite of tools” (Workman et al., 2026). In fact, many of the CDR initiatives in our analysis echo this call for context- and method-specific governance. For example, CDRANet calls for acknowledging differences in method readiness, arguing that “not all carbon removal methods are equally mature, scalable, or durable. Policy frameworks should recognize these differences and design support mechanisms accordingly, ensuring that risk, readiness, and permanence are considered in planning, funding, and oversight” (Science Communication Institute, 2026). Along the same lines, RMI finds that “no single mechanism is guaranteed to fill all the critical gaps in scaling carbon removal” (Deich et al., 2025). And a report commissioned by the UK Government, the UK Independent Review for GGRs, similarly invites countries, companies, and philanthropy to contribute in ways “tailored to their contexts” emphasising the need for governance that considers differences in CDR potentials, geographies, and resources (see Appendix Section 6.4.2 for more background on the UK report). Our findings support the notion that governance is most effective when it is tailored to geographic and method-specific contexts.

5.5. Considerations for implementation and administration

Implementing novel institutional structures to address governance gaps requires consideration of an array of issues and priorities. As in the development of other organisations, opportunities are likely to emerge through the opening of policy windows and the activities of policy entrepreneurs. Thus, a flexible approach, poised with plans and ready to take advantage of emerging opportunities, is likely to increase the likelihood of adoption and successful implementation. In the review of existing organisations and nascent CDR initiatives, some key priorities have emerged. Among these are equity, the role for capacity building, and more generally, engaging the Global South.

Another will be developing a budget sufficient to establish a secretariat and perform the Phase 1 functions with a pathway to growing support to perform additional functions thereafter. As a comparable analogue, IRENA started with a budget of USD 22 million per year for operations and USD 40 million per year for projects. Establishing a secretariat with limited functionality could perhaps be done for a fraction of the operational budget that IRENA began with. Of course, more funding would be needed to perform the full set of governance functions and to build capacity for later-phase functions as budget needs increase with the scope of functions. More detailed budget estimates will be part of the development of the Roadmap process, which will include considerations of headcount, roles, and location.

Establishing a steering committee would be helpful for strategic guidance. A general approach based on the previous experience described above is to start with a core group of national representatives who can marshal resources and expand membership from there. To that end, we will seek input and consensus on (1) scenarios for full funding and start-up funding; (2) establishing a minimum to proceed; and (3) articulating full funding and a 5-year plan.

Membership and contributions will also be critical issues. Our approach has been to work with partners with similar motivations on CDR, to engage them, learn from their feedback, and socialise the idea. Workshops have been used to develop ideas and legitimacy for the effort by incorporating views from diverse perspectives. Engaging with existing international venues such

as COP30, the Clean Energy Ministerial, and *ad hoc* meetings has proved valuable; continued engagement with these initiatives and an expanded group of stakeholders at high-impact convenings, such as COP31, will be crucial. It will enable a process of stakeholder vetting of concepts and roles as well as catalysing partnerships. One possible follow-up to this concept note will be to survey a diverse set of stakeholders on their perceived prioritisation of governance functions. Effective surveying will hinge upon a shared understanding of governance functions and the activities within them, underscoring the value of publishing and socialising this concept note first.

The pathway to adoption for such an initiative faces the additional hurdle of making this happen faster than historical analogues. It needs to take full advantage of the lessons of previous and concurrent organisations to provide helpful governance functions for CDR while it is still in its fragile formative phase. Above all, finding a way to establish the secretariat and move through the three phases at a faster pace than past examples will be an essential mandate for the organisation. This group plans to use this set of recommendations to begin a process of co-developing these and other implementation issues with partner organisations and other audiences with a *Roadmap to CDR Governance* report to follow.

6. Appendix

6.1. Additional figures

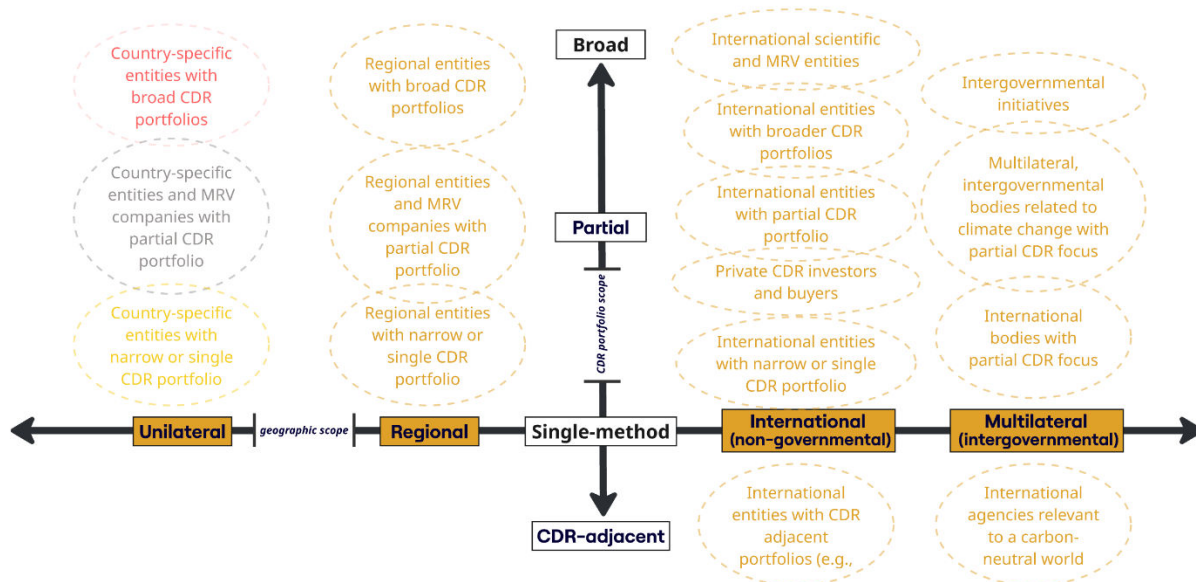


Figure 6. Empty plot of CDR governance analysis against two axes: geographic scope and portfolio scope with clusters.

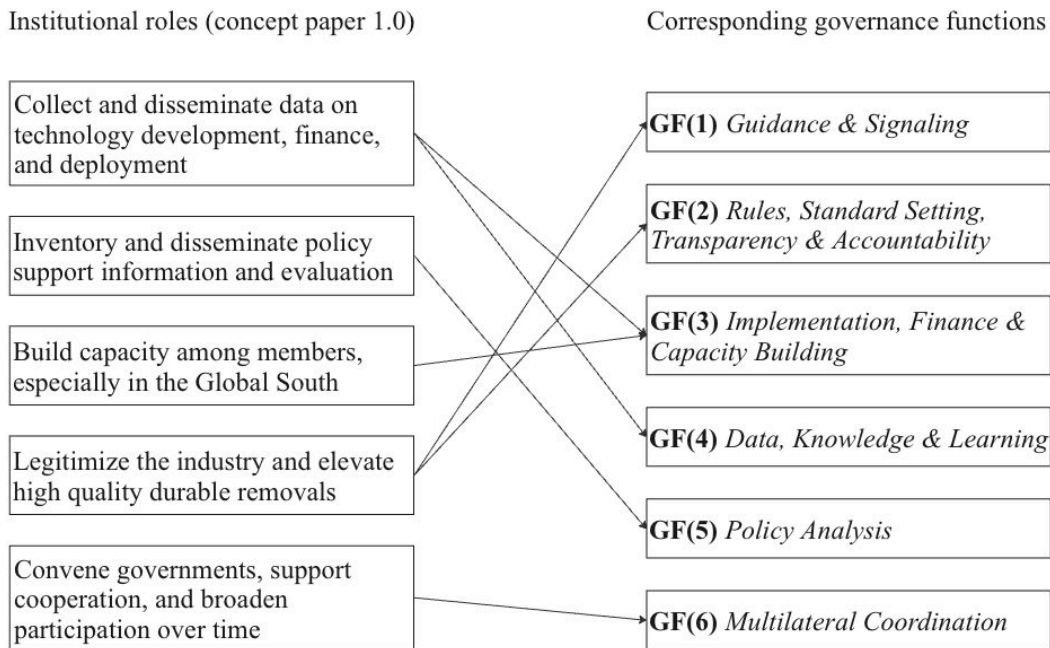


Figure 7. Institutional roles envisioned by State of CDR ICRA concept paper 1.0 mapped onto six governance functions.

6.2. Lists of acronyms

6.2.1. Institutions, initiatives, and programmes

Acronym	Full name (or meaning)
AMC	Advance Market Commitment
ARC	Atmospheric Restoration Centre
CCAC	Climate and Clean Air Coalition
CDR26	2026 CDRANet Conference in Vancouver
CDR30	COP30 CDR Pavilion
CDRANet	Carbon Dioxide Removal Action Network
CDR-ITSI	Carbon Dioxide Removal Intensive Training School Initiative
CEM	Clean Energy Ministerial
CMCC	Euro-Mediterranean Center on Climate Change
CMC	Carbon Management Challenge
COP	Conference of the Parties
CRCF	Carbon Removal Certification Framework (European Union)
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
DESNZ	Department for Energy Security and Net Zero (United Kingdom)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Australia)
DOE	Department of Energy (United States)
EU	European Union
GONE	Group of Negative Emitters
G-ZERO	Group of Zero and Negative Emissions Countries
ICVCM	Integrity Council for the Voluntary Carbon Market
IEA	International Energy Agency
IETA	International Emissions Trading Association
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ISO	International Organization for Standardization
KX Hub	Trans-Atlantic Carbon Dioxide Removal Knowledge Exchange Hub
MI	Mission Innovation
MI-CDR	Mission Innovation – Carbon Dioxide Removal Mission
OECD	Organisation for Economic Co-operation and Development
REN21	Renewable Energy Policy Network for the 21st Century
RMI	Rocky Mountain Institute

SCI	Science Communication Institute
SEforALL	Sustainable Energy for All
SBTi	Science Based Targets Initiative
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VCMI	Voluntary Carbon Markets Integrity Initiative
WBCSD	World Business Council for Sustainable Development

6.2.2. Technical terms

Acronym	Full term
AR6	Sixth Assessment Report (IPCC)
BECCS	bioenergy with carbon capture and storage
BTRs	biennial transparency reports
CCS	carbon capture and storage
CDR	carbon dioxide removal
DAC	direct air capture
DACCS	direct air carbon capture and storage
DOCCS	direct ocean carbon capture and storage
ERW	enhanced rock weathering
ETF	enhanced transparency framework
FTE	full-time equivalent
GF	governance function
GGRs	greenhouse gas removals
MRV	monitoring, reporting, and verification
NDCs	nationally determined contributions
NETs	negative emissions technologies
NGO	non-governmental organization
PACM	Paris Agreement Crediting Mechanism (Art. 6.4)
R&D	research and development
RD&D	research, development, and demonstration
SDG	sustainable development goal
SLCPs	short-lived climate pollutants
TRL	technology readiness level
VCM	voluntary carbon market

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6.4. Excluded CDR initiatives

The following two proposals—one of them a regulation and the other a recommendation stemming from a government-commissioned report—are not comparable with other initiatives included in our analysis, and are thus excluded from our assessment, but are included here for reference due to relevance for governance.

6.4.1. EU Carbon Removal Certification Framework (CRCF)

The EU Carbon Removal Certification Framework (“CRCF” or “Framework”) is the first EU-wide voluntary framework for certifying carbon removal. Arising from the EU Carbon Removals and Carbon Farming Regulation 2024/3012 (“CRCF Regulation” or “Regulation”), the Framework aims to certify, and support development and uptake of, voluntary, high-quality carbon removals and soil emissions reductions in the EU (Regulation (EU) 2024/3012, 2024).

1. **Mission:** The primary objective of the CRCF is “to promote the deployment of high-quality carbon removals and soil emission reductions while minimising the risk of greenwashing” (Regulation (EU) 2024/3012, 2024).
2. **Scope:** The scope of the CRCF is loosely articulated but includes several “permanent carbon removal” pathways: biochar, biomass with CCS (BioCCS), DACCS, ERW, DOCCS, and OAE. According to the Regulation, “its scope should include activities that enhance carbon storage in geological, terrestrial or marine reservoirs, including oceans, and in long-lasting products. Activities should include one or more practices or processes that remove carbon from the atmosphere” (Regulation (EU) 2024/3012, 2024). Eligible removals that rely on carbon storage and sequestration must demonstrate storage for “at least several centuries” likely meaning 200 years or more (Puro.earth, 2025). The scope of methods encompassed by “carbon farming” includes five-year processes that remove or reduce GHG emissions in terrestrial or coastal ecosystems, and in soils (e.g., soil management practices, peatland restoration, soil emissions reductions in agricultural context) (Regulation (EU) 2024/3012, 2024). Avoided deforestation and renewable energy projects fall beyond the scope of the Framework. While long-lived products storing carbon for at least 35 years may qualify as “permanent carbon removal” under the Regulation, captured CO₂ used for enhanced oil recovery does not. Eligibility is also contingent upon compliance with quality criteria set out by the Regulation and on independent verification. The Regulation further stipulates which methods will be prioritised: mature activities that have sustainability co-benefits, carbon farming activities that contribute to sustainable management of terrestrial and marine ecosystems, and activities that store carbon in wood-based and bio-based construction products. Finally, biogas eligibility (i.e., reductions or removals generated from enteric fermentation or manure management) is subject to review in 2026. As for geographic scope, the Framework is binding for all 27 EU Member States (Regulation (EU) 2024/3012, 2024).
3. **Leadership, membership:** The CRCF is a product of the European Commission and applies to all 27 EU Member States and is already cognisant about potential links beyond the EU via Article 6 under the Paris Agreement. An advisory board, the EU Carbon Removal Expert Group (CREG), is tasked with shaping development of methodologies for, and implementation of, the CRCF. The Group has more than 100 members serving in personal capacities, and as representatives of Member States and organisations.
4. **Funding:** According to the Regulation, a fixed-fee payment structure funded by registry users is envisaged to finance registry operations. Revenue generated from such fees is intended to “cover the costs of IT tools, services and security, including the operation and licensing systems, and the costs of staff working on the management of the Union registry” (Regulation (EU) 2024/3012, 2024).
5. **Inception, status:** The authorising regulation for the CRCF was published in the Official Journal of the EU in December 2024 and entered into force later that month (Regulation (EU) 2024/3012, 2024). As of January 2026, the CREG had met eight times since its kick-off in March 2023. A public consultation took place between July and September 2025. An additional public feedback period opened for methodologies of carbon farming (i.e., peatland rewetting, tree planting, agroforestry, soil management, etc.) from late January to late February 2026. Pending rules for methodologies, certification, and registries, the framework is expected to be adopted and operational for some activities in

the first quarter of 2026. At the beginning of February 2026, the first three methodologies for DACCS, BioCCS and BioChar removals have been issued.

6. **Governance functions:** Robust evidence for GF(1) signal and guidance and GF(2) rules, standards, and transparency.

Analysis of governance functions

The CRCF Regulation and its resulting Framework do not represent an “institution” or “initiative” in a traditional sense; nor are they directly comparable to others included in this analysis since they emanate from a government and are better characterised as a policy or a legislative initiative implementing a policy framework.

We find evidence for the CRCF’s supply of GF(1) signal and guidance through its role in shaping market signals. By implementing a high participatory, government-sanctioned certification system, the Framework legitimises certain CDR methods and corresponding methodologies, certification schemes, and registries. While this demonstrates strong support for supply signals—so long as certifications are seen as reliable—demand signals will remain weak until complementary policy measures that define credible uses (e.g., Green Claims Directive, new public credit procurement programmes of Member States like Germany, Buyers Clubs) for certified credits are developed ([Carbon Gap 2025](#)). Thus, since the Framework stops short of requiring buyers to purchase removals from the Framework, its effect on demand remains conditional. However, the newly agreed 2040 target in the revised EU Climate Law already assumes a significant use of CDR credits in the coming decade. (Link: [EU climate law: a 2040 emissions reduction target of 90% for the EU](#)). The Regulation and Framework lend direct and robust governance supply to virtually every dimension of GF(2): rules, standards, and transparency.

On *rules*, the Regulation is in itself a “rule” stipulating, among other things, quality criteria for eligible removals, rules for verification and certification, rules for the functioning and recognition by the Commission of certification schemes, and rules on the issuance and use of certified units (Regulation (EU) 2024/3012, 2024).

On *standards*, the Regulation requires:

- The European Commission to adopt policies that enable harmonisation of rules
- The Commission to establish detailed certification methodologies for eligible CDR methods that build on existing public and private schemes and methodologies
- The Commission to establish and maintain a registry for durable CDR, carbon farming, and long-lived products by the end of 2028 (Art. 12); establishment of an interim certification registry is mandated to track removals certified prior to establishment of an official registry
- Existing and new public and private certification that wish to participate to apply for recognition by the Commission

On *transparency*, the Regulation requires:

- Certification schemes to operate based on transparent rules and procedures, while ensuring fraud-prevention and reliability and integrity of operator information

- The European Commission to adopt policies that ensure reliable and transparent standards for application by certification schemes
- Use of automated systems to make certain information publicly available to ensure transparency and traceability of certified units and avoid double-counting
- Certification schemes report to the Commission regularly and that such reports are made publicly available
- Reporting of quantification uncertainties and publication of non-compliance to registries
- “Robustness and transparency” of certification methodologies
- Transparent and easily accessible fee structures

Despite these provisions, the CRCF has faced some criticism for a lack of transparency and openness in how the delegated acts (methodologies) are being developed (Stoefs & Pavia, 2025).

On *accountability*, the Regulation:

- Advises:
 - Member States to supervise the operation of certification bodies that are accredited by national accreditation authorities and to inform the certification bodies and the schemes about non-conformity findings
 - The Commission to investigate fraud and take appropriate action, including repeal and/or cancellation of units
 - The Commission to “consider the need to ensure sufficient oversight of the trading of certified units”
- Requires:
 - The certification scheme to appoint a certification body to audit and verify that supplier information is accurate, reliable and compliant
 - Certification schemes to submit annual reports detailing operations, instances of fraud, and remediation measures

While the CRCF Regulation delegates some responsibilities² toward GF(3) implementation, finance, and capacity building; and GF (4) data, knowledge, and learning—such as knowledge exchange, training, and financial support—to suppliers, we find no evidence that the Framework itself will supply these forms of governance.

Similarly, there is some evidence to demonstrate the CRCF’s consideration of multilateral coordination in its implementation, however it appears insufficient to credit the CRCF with GF(6). The Regulation states that “all certified removals under the framework are intended to contribute toward the EU’s NDC” evidencing a connection to multilateral mechanisms for a globally coordinated climate response. In contrast, certified removals under the Framework are not intended to count toward international compliance schemes (e.g., CORSIA) (Puro.earth, 2025). To that end, the Regulation mandates assessment and, where appropriate, legislation to align the CRCF with requirements of Article 6 of the Paris Agreement, including corresponding

² Regulation item (30) states that “it is appropriate to require that producer organisations facilitate the provision of relevant advisory services to their members. The common agricultural policy and national State aid, inter alia, can be a means of providing financial support for interactive innovation projects involving farmers and forest owners and managers, and the provision of advisory services, knowledge exchange, training, and information actions” ([EU Journal. 2024/3012](#)).

adjustments, and best practices of the VCM (Regulation (EU) 2024/3012, 2024). While harmonisation with multilateral agreements offers a real governance benefit, we do not find evidence to support that GF(6) is a core function of the Framework.

As the CREG has worked to develop methodologies for some CDR approaches under the CRCF, some critics—such as Carbon Market Watch—have argued that implementation of the CRCF should be halted until methodologies for BioCCS, DACCS and biochar are overhauled to better comply with the underlying Regulation and safeguard environmental integrity (Bellona EU, 2025; Ramón Hernández, 2025). Critics point to concerns related to risk of reversal, long-term monitoring and liability, additionality criteria, feedstock sustainability, rigor of lifecycle assessments, and sufficiency of scientific evidence.

Despite its flaws, the Framework lends a clear benefit toward GF(2) given its direct and robust contributions to rules, standards, and transparency in the 27 jurisdictions in which the Framework applies.

6.4.2. A Global “30 by 30” Campaign for GGRs

The 2025 Independent Review for GGRs (“the Review”), a report commissioned by the UK Secretary of State for Energy Security & Net Zero, reviews the policy and governance landscape shaping Greenhouse Gas Removals (“GGR”) deployment in the UK and makes recommendations to strengthen it (Whitehead, 2025). Among the “low-regret opportunities” and “strategic considerations” contemplated as part of the Review’s assessment of the UK’s GGR portfolio, the authors suggest the UK seek to increase its international collaboration on GGRs to maintain its leadership and to secure supply of internationally sourced removals in the future. To that end, the Review recommends an initiative for international collaboration, or “Global 30 by 30 Campaign for GGRs,” to catalyse deployment and policy alignment for GGRs.

1. **Mission:** As suggested by the Review, a Global 30 by 30 Campaign would seek to foster international collaboration to catalyse deployment and policy alignment for CDR with a goal of achieving, for example, 30 million tonnes of removal deliveries by 2030.
2. **Scope:** The Review envisions a campaign that spans a “diverse mix of [CDR] approaches across geographies”, implying broad geographic and portfolio scopes.
3. **Leadership, membership:** The Review suggests that “an existing coalition such as [GONE] (initiated by Denmark) could potentially serve as a convening platform or host” and that “the campaign could be structured as a contribution-based initiative, inviting countries, companies, and philanthropic actors to contribute in ways tailored to their contexts.”
4. **Funding:** Funding for the campaign could be supplied by its voluntary contributors (e.g., countries, companies, philanthropy).
5. **Inception, status:** The “30 by 30” campaign is put forth as a “strategic consideration” in the Review.
6. **Governance functions:** Robust evidence for ALL governance functions, i.e., GF(1) signal and guidance; GF(2) rules, standards, and transparency; GF(3) implementation, finance, and capacity building; GF(4) data, knowledge, and learning; GF(5) policy analysis; and GF(6) convening and coordination.

Analysis of governance functions

A Global 30 by 30 Campaign for GGR, supported or led by the UK, would send a strong signal to state and non-state actors that participating governments are committed to researching, developing, and scaling CDR. Signalling, GF(1), would thus be one of the primary goals and outcomes of such a campaign.

Part of the proposed remit encompasses “carbon accounting standards harmonization” defined as “aligning methodologies for project-level accounting and national reporting (e.g. NDCs) to support credibility and comparability,” suggesting a contribution toward GF(2) rules, standards, and transparency (Whitehead, 2025).

The initiative’s role in catalysing deployment through a portfolio of “lighthouse projects” i.e., “high-visibility demonstrations of technical feasibility, policy readiness, and market potential” implies a role in reducing barriers to implementation and deployment, GF(3). We find additional evidence for the campaign’s role in GF(3) in its potential to facilitate “collaboration across the public and private sectors to stimulate demand,” encouraging market participation through procurement and investment, funding, and technical expertise (Whitehead, 2025).

We find evidence for the campaign’s role in delivering GF(4) data, knowledge, and learning in its first enabling component, “Monitoring and Reporting Infrastructure,” which envisages building on the work of State of CDR to institutionalise transparent tracking and analysis of CDR deployment. Such activities would further support the campaign’s contributions toward GF(2) in upholding transparency, too.

The Review also envisages a role for coordinating and aligning enabling policies, suggesting contributions toward GF(5) policy analysis; and (6) convening and coordination. The campaign’s fundamental purpose of increasing international collaboration and recommendation to leverage GONE further underscores its potential support GF(6). While there is limited evidence that the campaign would deliver on GF(1), integration with GONE would increase the likelihood.

6.5. Preliminary assessments of the CDR governance gap

This paper builds on previous efforts to identify governance gaps and recommend new institutions to resolve them, including an early concept note, a survey at the 2025 CLIMIT Summit, and suggestions from the State of CDR Advisory Board.

6.5.1. The CLIMIT Summit and concept note v1.0

In February 2025, State of CDR surveyed an audience of industry participants on what they view as the most important gaps that CDR coalitions and institutions can address. Their responses revealed preferences for a wide range of broad concepts, foremost: trust, financing, public acceptance, policy, MRV, and knowledge-sharing (see **Error! Reference source not found.**). These responses inform our approach for devising a typology of CDR governance functions used to analyse governance supply and the institutional landscape writ large (see section 2).

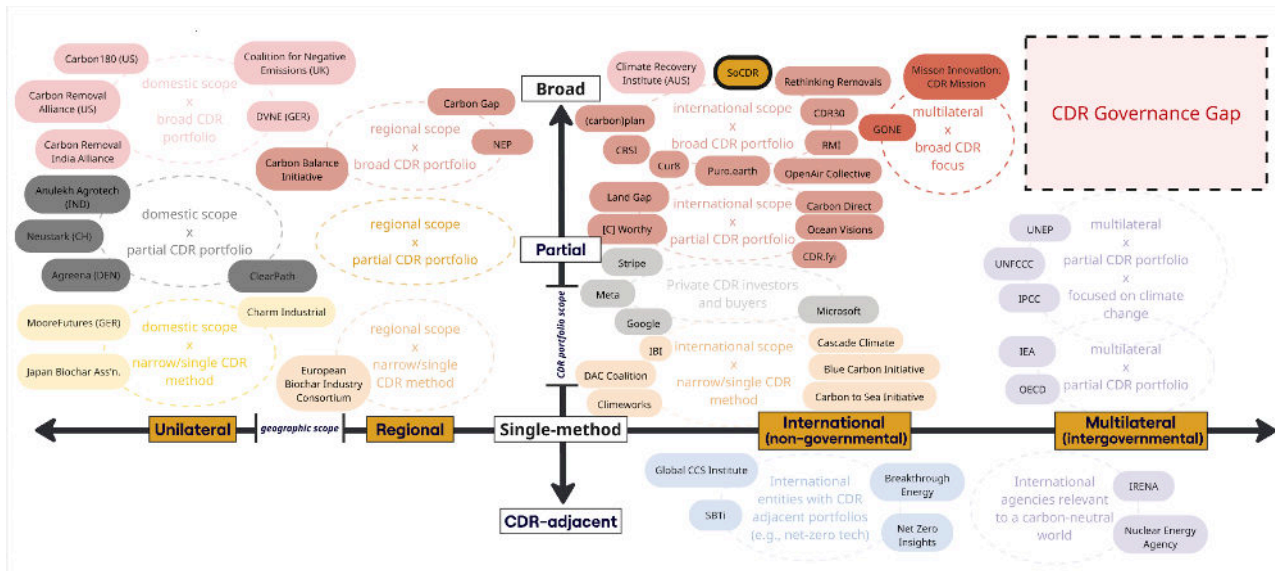


Figure 9. Plot of CDR-focused and CDR-adjacent institutions against two axes: geographic scope and portfolio scope.

In response to this survey, we developed a preliminary version of this concept note (“ICRA concept note v1.0”) the main ideas of which are summarised below. Concept note v.1.0 proposed an institution that evolves in at least two phases: (1) in the near-term, focusing on becoming a trusted source of information and promoting credibility and legitimacy for CDR; and (2) in the medium- to long-term, providing capacity building. The paper also considered possible roles and goals that such an institution may be designed to deliver and the design considerations that ought to be considered to ensure its efficacy. First, institutionalising CDR within or alongside existing, participatory and authoritative institutional structures could produce several benefits, such as building legitimacy and credibility for CDR science and technology and facilitating opportunities to convene governments and broaden international cooperation, participation. Institutionalising this work within a well-respected and participatory structure could enable it to, for example, advise on CDR at COP meetings and in efforts to comply within international reporting frameworks (e.g., NDCs). The agency could also position itself as a clearinghouse or “one-stop-shop” for: conducive policy and governance designs to catalyse policy development; best practices for developers, including community engagement (to enhance social acceptability) and MRV (to elevate high quality, durable removals); funding opportunities and models; maps and inventories of ongoing and planned projects; and other data useful for CDR stakeholders. Among its intended outcomes could be driving down the cost of CDR technologies; comprehensively informing governments and other interested stakeholders about developments in the sector; sharing practical information for supporting removals in countries; and supporting developing nations and the Global South through capacity building and financing strategies. Achieving these outcomes would evoke many practical considerations, too, such as hiring full-time staff and designating or establishing a Secretariat to oversee its administration, funding, and implementation. **Figure 7** provides a visual interpretation of the functions outlined in concept note v1.0 and maps them onto the typology of six governance functions we deploy in this paper (see section 2).

6.5.2. State of CDR Advisory Board suggestions

This concept note also builds on suggestions put forth by the State of CDR Advisory Board in summer 2025. We intentionally assembled an advisory board of diverse perspectives; their feedback informs the systematic approach in this paper.

In summary, State of CDR Advisory Board members called for:

- A better understanding of the governance gap to help clarify what roles are highest value
- Best practices for CDR, especially regarding standard setting, MRV, and policy development
- Neutral, objective, and non-prescriptive structures that minimise conflicts of interest, maximise trust and transparency, and are sufficiently responsive to contextual differences (i.e., geopolitical contexts)
- An emphasis on what works, existing expertise, and practical value
- Mainstreaming CDR into broader carbon management and industrial strategies through open dialogue with stakeholders within and beyond the CDR domain
- Thoughtful framing of CDR with emphasis on co-benefits, including aligning CDR with development-first and/or justice-centred priorities in the Global South
- Highlighting the lack of attention to post-R&D innovation policy

Below, we map recommendations onto our adapted typology of governance functions for CDR.

1. Signal and guidance

- Mainstream CDR into broader climate, land use and industrial policies; align with development-first priorities in the Global South.
- Frame CDR as a business opportunity tied to existing waste streams or emissions.
- Address international momentum behind Article 6 and IPCC calls for durable removals.

2. Rules, standards, and transparency

- Harmonise MRV protocols and develop standardised methodologies for transparency, accountability, and market integrity; convene and coordinate registries to that end.
- Create a centralised mechanism to synthesise and disseminate best practices for standards and MRV.
- Neutral oversight to verify that CDR is real, additional, and permanent (avoid “house of cards” risk).
- Explore scope of CDR methods (industrial vs. nature-based) and implications for standards.
- Consider positioning relative to compliance markets (EU CRCF, UK consultations).

3. Implementation, finance, and capacity building

- Accelerate novel CDR technology development from lower to higher TRLs.
- Facilitate equitable participation and leadership roles for Global South countries.
- Build capacity in countries with less mature science and market engagement.
- Secure government champions to fund scaling and encourage participation.

4. Data, knowledge, and learning

- Collect and share information on international CDR developments.
 - Identify and disseminate best practices (MRV, policy design) across pathways.
 - Provide contextual flexibility for different regional approaches.
 - Serve as a platform for exchange among stakeholders and jurisdictions.
 - Emphasise non-prescriptive, collaborative models for countries to learn from each other's approaches.
5. Policy analysis
- Highlight gaps in innovation policy beyond R&D (valley of death post-R&D).
 - Analyse financial, policy, MRV, and outreach gaps to define the institution's focus and priorities.
 - Advise governments on policy design, including effective policy mixes of regulation, public support programmes and compliance market development.
 - Develop policy evaluation tools promoting effective and efficient policy making.
 - Assess governance implications of TRL differences and technology diversity.
6. Convening and coordination
- Broker international agreement on CDR as governments regulate technologies.
 - Coordinate across jurisdictions to integrate policy and regulatory frameworks.
 - Engage with UN-linked organisations (e.g., SBTi) for alignment and traction.
 - Clarify institutional differentiation, avoid duplication, and complement existing governance efforts (UNFCCC, voluntary markets).
 - Connect with UN bodies (UNFCCC, UNEP) for legitimacy and formal recognition.
 - Outreach and stakeholder engagement to build legitimacy and trust.

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