

POLICY BRIEF

USING CARBON REMOVAL TO DELIVER CLIMATE IMPACT

**From compensation to
compliance and beyond**

October 2024

Authors: **Thibault Aubert,**
Francesca Battersby, Eli Mitchell-Larson

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EXECUTIVE SUMMARY

BROADENING THE USE OF CARBON REMOVAL

How should we use carbon dioxide removal? For compensation? For tackling historical emissions? For corporate social responsibility? Are there other uses out there? While much research into carbon dioxide removal (CDR) has been dedicated to supply-side issues, how CDR gets used and where demand for CDR lies are underexplored topics.

So-called “use cases” for CDR refer to the purpose for and the way in which stakeholders engage with carbon removal activities, ultimately linking to how CDR is paid for. In this policy brief, we argue that diversifying the accepted uses for CDR activities would expand the demand pools available to scale CDR while improving overall environmental integrity. Finding new “use cases”, and thus new markets for CDR, creates more opportunities to direct funds towards CDR scale-up. We examine key use cases and explore the cross-cutting question of how certification can be leveraged to deliver more diverse uses of CDR.

UNDERSTANDING CURRENT AND POTENTIAL CDR USE CASES

This policy brief examines four current and emerging use cases in turn. We consider their significance (their ability to provide a market to drive CDR scale-up), barriers to adoption, as well as explore the governance needed to ensure they are used sustainably and deliver real climate impact.

Use case 1: Voluntary compensation

Compensation is the primary use case for CDR today, bringing much-needed funding to CDR, primarily via the voluntary carbon market. However, CDR-based compensation practices are still not widely used, limiting the market size. Guidance frameworks could address this shortfall by clarifying the near-term role of compensation (rather than framing it as a long-term tool to be used only at the point of net zero), and by promoting the use of CDR over avoided emissions and reduction units. Policymakers should establish a regulated corporate standard to limit greenwashing practices while enabling a wider use of CDR. Compensation practices should be guided by four key principles:

1. Companies or organisations wanting to compensate their emissions (and make a related claim) should only use CDR units.
2. Only permanent CDR should be used to compensate for fossil emissions (like-for-like principle).
3. Only ex-post, publicly retired CDR units should be used.
4. At the point of net zero, CDR should only be used to balance hard-to-abate emissions, but in the nearer-term, CDR may be used more flexibly, provided that corporates have adopted a clear decarbonisation pathway and are fully transparent on the percentage of the emissions reduced vs. those compensated.

Use case 2: Voluntary contribution

Corporates can adopt a “contribution” approach to CDR, directing money towards CDR without making a compensation claim for their emissions. Doing so could reduce the risk of mitigation deterrence associated with tonne-for-tonne claims. Businesses engaging in contribution could approach contributing to CDR as a corporate social responsibility or marketing exercise, or even a financial investment in the CDR sector. However, common guidance is needed to build corporate understanding and steer contributions towards high-impact initiatives.

Use case 3: Compliance frameworks

In the absence of clear economic incentives to invest in CDR, voluntary approaches alone are insufficient to drive CDR scale-up. Compliance markets – mandatory use cases for organisations – would ensure that organisations at different levels engage with, and finance, CDR in a more consistent way. Compliance systems could also set out specific rules on how companies and organisations engage with CDR. Such systems would establish enduring demand and higher predictability for CDR to enable the continued growth of the sector.

Use case 4: Government support

To fund the development and scale-up of CDR, governments and public bodies can support innovation and deployment through a variety of policies – such as direct public procurement of CDR, activity-based (over results-based) incentives, and financial nudges towards the promotion of carbon-removing activities. These diverse policies should be designed to reflect different sectoral needs, establishing a range of markets for CDR.

CONVENTIONAL CDR MUST BE RECONSIDERED

Crucially, not all CDR units are suitable for all uses, especially when it comes to compensation of emissions. Conventional CDR methods, namely CDR associated with nature and land management activities, have naturally lower durability and carry a higher risk of reversal, making them inappropriate for compensating for fossil emissions, in line with the like-for-like principle. Governments should support practices that protect nature and land in their own right – and, where possible, measure CDR as a co-benefit while avoiding “carbon tunnel vision”. In addition, rather than prohibiting conventional CDR units from compensation, policymakers could explore markets for like-for-like compensation.

DIFFERENT CDR USES REQUIRE DIFFERENT STANDARDS

Establishing rules for CDR adoption is crucial to ensuring sustainable CDR deployment, but the choice of rules needs to be viewed as context-specific. Some rules, such as the avoidance of harm to communities and ecosystems, must be applied regardless of the CDR use case. Meanwhile, other rules depend on who is using the CDR activity and how. For example, quantifying measurement uncertainty is a key part of many carbon market methodologies. However, the required level of measurement uncertainty should depend on the use of the CDR activity. Where CDR units are destined for use in compensation claims, rules must ensure that the level of certainty is very high. In other use cases, achieving high levels of certainty may be prohibitively onerous, and a lower standard may be appropriate to reduce the cost and time associated with monitoring, reporting and verification (MRV).

CERTIFICATION CAN ENABLE A WIDE ARRAY OF USE CASES

Europe showed ambition in becoming a global CDR leader by recently adopting the Carbon Removals and Carbon Farming Certification (CRCF) Regulation. But certification is far more than just a tool for enabling a market for carbon units, it can be used for several goals: to identify credible CDR activities for government procurement; as an eligibility requirement for other public, non-CDR-focused funding; or to guide private investments by providing a label of quality and positive impact. To encourage the uptake of CDR activities rather than create new barriers, alternative certification pathways could allow the same type of CDR activity to be certified in several ways according to the use case.

INTRODUCTION

USE CASES MUST FORM PART OF CDR GOVERNANCE

The UN Intergovernmental Panel on Climate Change (IPCC) has stated that “the deployment of carbon dioxide removal (CDR) to counterbalance hard-to-abate residual emissions is unavoidable if net zero CO₂ or GHG emissions are to be achieved”.

Large-scale CDR is a critical component of global climate action and in recent years, efforts to develop CDR have intensified, looking to scale both supply and demand for removals. Voluntary and policy-level guidance is beginning to emerge to establish clear quality standards for CDR supply – culminating in the EU with the adoption of the Carbon Removals and Carbon Farming Certification (CRCF) Regulation. Yet the demand side of the burgeoning CDR market has received inadequate attention.

Three central principles underpin discussions surrounding the sustainability of CDR at large, and must hold true for both the supply and demand for CDR:

- A. **Effective climate impact** – CDR must contribute to the mitigation of climate change and must not hinder efforts to reduce emissions (“mitigation deterrence”).
- B. **Positive environmental and social impact** – The deployment of CDR must be sustainable and target positive impacts for communities and ecosystems.
- C. **Scaling up CDR** – CDR must be scaled substantially, bearing in mind the need for responsible deployment outlined above. Without large-scale CDR, global temperature goals are put in jeopardy.

This policy brief contributes to the underdeveloped debate on the role of these principles on the demand side of CDR.

Crucially, to ensure the principles are upheld, it is not only the characteristics of a CDR activity, but also the way the carbon benefit of the activity is “used”, that will determine whether the principles are realised.

Therefore, to develop CDR in the most climatically, environmentally, and socially beneficial way, a clear set of options and guidelines for the use of CDR should be developed. The EU’s CRCF aims to set quality guidelines for CDR activities, but unfortunately lacks clarity on the rules for using certified CDR units.¹ This European example reflects a wider governance gap regarding the role of CDR in climate neutrality.

UNDERSTANDING THE MEANING OF USE CASES

In this paper, we posit that many different “use cases” exist for CDR. A “use case” refers to the motivation for a stakeholder to engage with carbon removal activities, recognising the circumstances and end goals of said engagements are diverse. Use cases vary in terms of the identity of any user (e.g. a company, a government), the purpose of the use (e.g. demonstrating compliance with a regulation, making a public claim), how it is paid for (e.g. by purchasing a certified unit, investing in project development, donating to non-profit organisations working on CDR) and how the climate benefit is accounted for (e.g. retired to substantiate a claim, counted towards a given country’s nationally determined contribution (NDC), or both where allowed).

In effect, each use case represents a reason for an actor to invest in CDR – each use case constitutes a market in which different actors are willing to pay for CDR to achieve different goals.

This assertion has several implications. **Firstly, a given type of CDR can be used towards different ends.** Given that actors using CDR have different objectives and a different willingness and ability to pay for the activity, having flexible use cases can increase CDR demand.

Secondly, CDR is not solely a private sector undertaking.

The CDR market has thus far been mostly driven by corporate purchases, and in **Sections 1 to 3** we consider how this role could be grown further. However, there is also a large public sector demand base that needs to be exploited, as explored in **Section 4**.

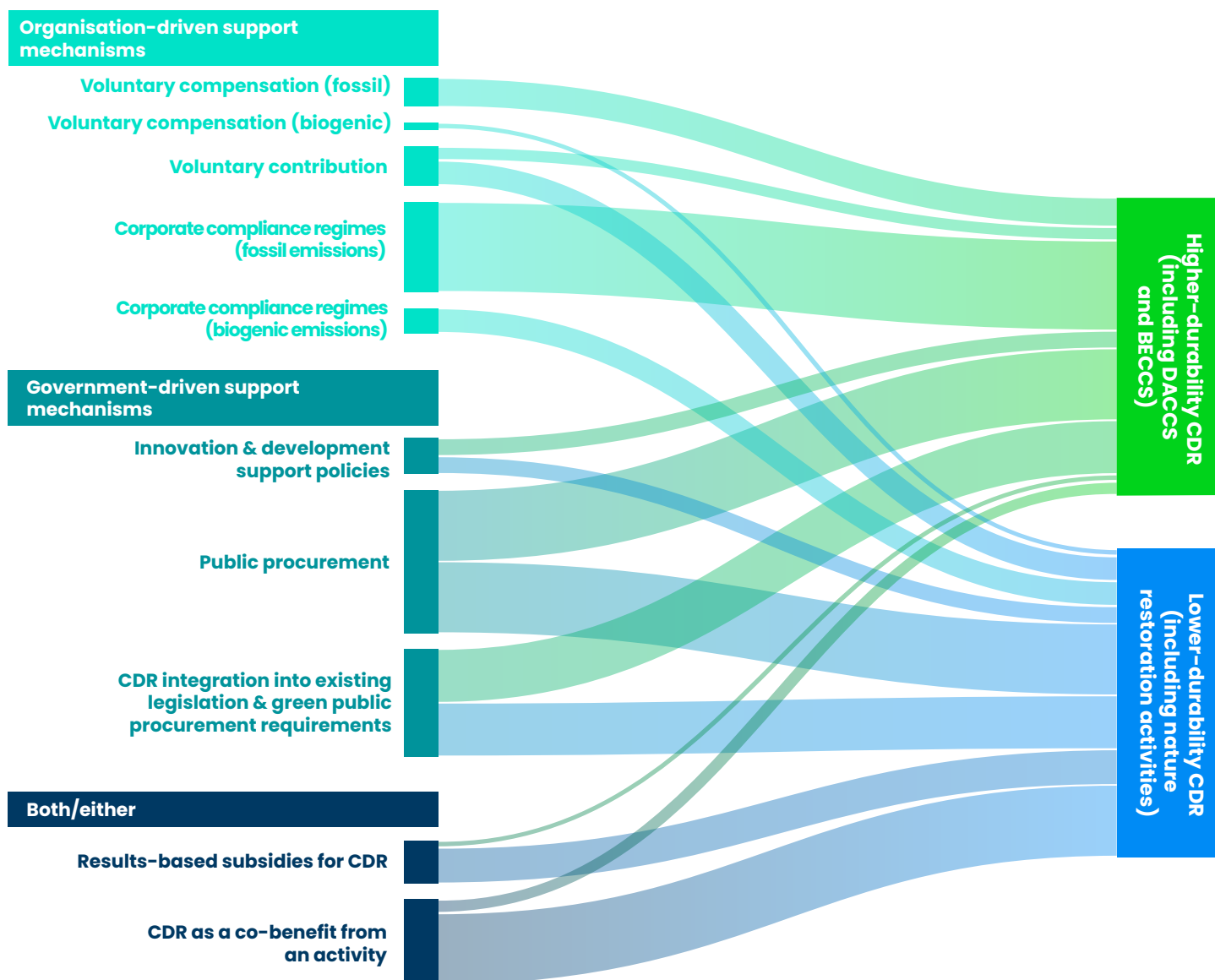
Thirdly, the use case is dependent on the method of CDR available.

For example, because they represent a cheap and scalable source of removals, land- and nature-based activities are often used to deliver CDR units that are then “used” to compensate fossil emissions. This use of conventional CDR for compensation exemplifies a mismatch between the type of CDR activity and the use case. We explain the risks of compensation use cases in Section 1 and alternative uses for “conventional CDR” in **Section 5**.

Thus, the goal of this paper is to broaden the discussion on use cases for CDR. From these three implications, we have envisioned and analysed a wide array of sustainable use cases for CDR. Figure 1 provides an illustration of these use cases, the actor(s) involved in each use case, and the necessary distinctions to be made in the use of lower-durability, “conventional CDR” relying on nature on one side, and industrial, higher-durability CDR on the other.

¹ Carbon Gap (2024). [Carbon Removal Certification Framework final trilogue: EU institutions agree on a more robust voluntary framework, but rely on other EU legislation for further guardrails on uses.](#)

Figure 1: Public and private actors must support CDR through diverse mechanisms



Ultimately, we hope that this paper will clarify the underexplored issues when it comes to using CDR, and enable a concerted effort from policymakers, CDR suppliers and buyers, and civil society to:

1. **Diversify the use cases for CDR** to unlock financial support from a wider range of sources.
2. **Develop better governance of use cases** through stronger regulation and voluntary guidance, to uphold the climate impact of CDR.
3. **Adopt a flexible and innovative approach to certification**, offering different levels of stringency to suit a wider variety of CDR uses.

Figure 1: The visual above represents the full array of use cases for CDR envisioned in this paper. Examples of CDR use cases (left) are matched against the group of CDR methods (right) which is expected to be most appropriate for the given use case. The relative widths illustratively show how much CDR might be deliverable by that use case from now until 2050.

1. USE CASE 1: VOLUNTARY COMPENSATION

Currently, a large share of funding for CDR comes from private sources such as the voluntary carbon market. Any discussion of use cases, therefore, must consider the role of corporate and private sector actors. The voluntary corporate use of CDR should be more strongly incentivised but also stringently governed to ensure it delivers the expected climate benefits.

1.1 COMPENSATION: THE STATE OF PLAY

Today, many organisations are setting targets that guide how they approach climate action over time. This entity-level approach is designed to mirror global pathways to net zero and to net negative emissions eventually. However, creating individual pathways for organisations is not necessarily straightforward and involves judgements about their relative levels of responsibility and resource availability.²

Much of the current corporate guidance on corporate climate action recognises a role for CDR, as evidenced in Table 1. The notion of CDR as a tool for “compensating”, “neutralising” or “balancing” some proportion of organisational emissions is being consolidated as a key use case in voluntary guidance standards.

Table 1: Overview of voluntary guidance for organisations with regard to compensation claims

Source	Type	Key provisions relevant to compensation
Oxford Principles for Net Zero-Aligned Offsetting ³	Academic	• Prioritise emissions reductions • Shift towards compensation via CDR units reaching 100% CDR before the net zero date • Shift to removals with durable storage • Support ecosystem protection and restoration in their own right, rather than through compensation
Fankhauser, S. et al. (2022). The meaning of net zero and how to get it right. <i>Nature Climate Change</i> , 12, 15–21	Academic	• Prioritise emissions reductions (both in volume and speed) • Approach emissions reductions comprehensively, minimising residual emissions • Use CDR to treat residual emissions, but minimise reliance • Use CDR with multi-decadal storage • Ensure social and environmental integrity
Science Based Targets Initiative (SBTi)* *The updated SBTi Corporate Net Zero Standard, currently under revision, could include further guidance on the role of removals in companies' transition to net zero.	Private initiative	• Set a long-term science-based target and prioritise emissions reductions towards the target • Carbon credits of any kind may not count towards the target • After science-based emissions reductions have been delivered, compensate residual emissions with CDR (at the net zero target year) • Accelerate the development of CDR by making investments outside the value chain that do not lead to compensation claims

Continued >

² Fankhauser, S. et al. (2022). [The meaning of net zero and how to get it right](#). *Nat. Clim. Change*, 12, 15–21.

³ Axelsson, K., et al. (2024). [The Oxford Principles for Net Zero Aligned Carbon Offsetting \(revised 2024\)](#).

Source	Type	Key provisions relevant to compensation
Claims Code of Practice – Voluntary Carbon Markets Integrity Initiative (VCMI)	Private initiative	- Develop a carbon credits portfolio that includes CDR - Different tiers of recognition (Silver, Gold, Platinum) depending on what proportion of current emissions are compensated using these credits - Use ICVCM-aligned credits when they become available. In the interim, credits can be approved by CORSIA or internal due diligence - Disclose the number of credits purchased and retired, as well as information on geography, project type, and methodology (inter alia)
Gold Standard – Fairly contributing to global Net Zero – Initial framework for organisational climate mitigation strategies	Private initiative	- Commit to ambitious emissions reduction targets for Scope 1–3 using the latest credible methodologies (e.g. SBTi) - Report and disclose historical emissions, and address these if possible - Set an internal carbon fee and use funds raised to support climate action beyond the value chain, including direct mitigation (reduction and removal) and indirect mitigation (e.g. investing in R&D) - Follow the SBTi approach to neutralisation, making sure all carbon credits are uniquely claimed and no double counting occurs
Empowering Consumers for the Green Transition (EU Directive)	Regulatory framework	- Prohibits use of claims based on offsetting for goods and services, while organisational claims are possible - Prohibits generic and unsubstantiated claims
Green Claims (EU Directive) – Commission proposal, subject to change through legislative negotiations	Regulatory framework (under negotiation)	- Prioritise emission reductions - Disaggregate GHG emissions, reductions and removals - Describe how the purchased units are of high integrity and accounted for correctly to reflect the claimed impact on climate
European Sustainability Reporting Standards (part of the EU Corporate Sustainability Reporting Directive)	Regulatory framework	- Mandatory disclosure of: - GHG reductions or removals from projects within own operations or projects contributed to within the value chain, and how these will contribute to net zero targets - GHG reductions or removals financed through the purchase of carbon credits and how these will not impact the achievement of GHG reduction/net zero targets - Definition of net zero target as neutralising any residual emissions after approximately 90–95% of GHG emission reduction with permanent carbon removals (with the possibility for justified sectoral variations in line with recognised sectoral pathway) - These rules apply to large companies exceeding a certain turnover or number of employees, as well as all companies listed on EU-regulated markets, and non-EU companies with substantial activities in the EU

Today, voluntary compensation claims represent an important, and growing, driver of demand and funding for CDR. The market for durable CDR experienced 18% more transactions in the first half of 2024 compared to the full-year 2023 – though of course not all these transactions are necessarily linked to compensation claims.⁴ Yet despite this growth, they are inadequate as a source of finance for scaling CDR. In 2022, CDR represented only 3% of the volume of credits sold on voluntary carbon markets, with “emissions avoidance” credits forming the bulk of volumes sold.⁵ In addition to their limited scale, compensation markets lack stringent rules leading to some court cases revealing the misleading allegations of several corporates’ claims.⁶

1.2 GUIDANCE GAPS ARE HINDERING THE DEVELOPMENT OF A COMPENSATION MARKET FOR CDR

Stronger guardrails on compensation claims are needed.

Doing so would expand the compensation market for CDR, by substituting avoided emissions credits for CDR credits, but also by increasing integrity and trust, through ensuring compensation does not come at the cost of much-needed emissions reductions.

It can be seen from the rule-setting initiatives summarised in Table 1 that, while some rules are consistently referenced across the guidance, other rules appear in some frameworks but not others. A clear near-term compensation role for CDR, substituting other credit types over time, as promoted by the Oxford Principles, is missing from other frameworks. In addition, the requirement to match the type of emissions to be balanced with specific removals, known as the “like-for-like” principle, is missing altogether. Four key safeguards that should underpin compensation rule frameworks (voluntary and regulatory) are presented in the following subsection.

The lack of a near-term role for CDR in these frameworks is particularly salient. Given the sustainability impacts associated with large-scale CDR and the risks of mitigation deterrence, it has been generally agreed that CDR should only be used to address the “hardest to abate” emissions, and initiatives like SBTi frame compensation as a long-term practice to adopt at the net zero date once emissions have been deeply reduced. **However, this approach is counterproductive to the development of CDR in the near term and can hinder wider climate benefits.**

The demand pool for CDR needs to be expanded as much as possible in the next few years to bring projects forward and allow CDR to reach the scale required to make an impact. Encouraging the adoption of sustainable compensation practices in the near term, would allow those companies with the interest and ability to pay for CDR to participate in the compensation market, limiting their net emissions on the journey to net zero and channelling much-needed funding to CDR scale-up. Those companies should demonstrate that their compensation efforts are accompanied by ongoing deep cuts to gross emissions.

1.3 VOLUNTARY COMPENSATION MUST FOLLOW KEY SAFEGUARDS TO UPHOLD CLIMATE INTEGRITY

To harness the benefits of compensation practices, while avoiding mitigation deterrence, four principles should be integrated into corporate guidance.

1. Companies or organisations wanting to compensate their emissions (and make a related claim) should only use CDR units.

- CDR is the only scientifically sound way of compensating an entity's emissions.
- Avoided emissions and emission reduction credits must not be used for compensation purposes as they do not have the same impact on the atmosphere.

2. Only high-quality, permanent CDR should be used to compensate for fossil emissions (like-for-like).

- According to the “like-for-like” principle, the nature of the emission determines the type of carbon storage required. Consequently, carbon taken from geological reservoirs, previously isolated from the active carbon cycle (such as fossil fuel emissions or process emissions from cement), must be restored to the geosphere through permanent CDR. Similarly, “biogenic” emissions must be restored to the biosphere.
- This principle is particularly relevant for fossil emissions so that the long-term storage of carbon matches the long-term impacts of these emissions.

3. Only ex-post, publicly retired CDR units should be used.

- Any units used for a compensation claim must be issued from activities where carbon has already been removed and stored.
- Any units used for a compensation claim must be retired in a public registry, such as the Union Registry to be established under the CRCF.

⁴ CDR.fyi (2024). [2024 Q2 Durable CDR Market Update](#).

⁵ Carbon Gap (2024). [Carbon credits and compensation claims: the state of the VCM](#).

⁶ Carbon Gap (2024). [From label to court: navigating European case law on corporate climate claims](#).

4. CDR should be allowed to meet intermediate milestones on organisations' transition to net zero.

- At the point of net zero, CDR should only be used to balance hard-to-abate emissions. This limitation is necessary to maintain a focus on gross emissions reductions and avoid mitigation deterrence.
- However, the use of CDR should be allowed to support organisations' transition to net zero. Organisations should be incentivised to adopt interim mitigation targets which rely on CDR to compensate for their remaining emissions, while ensuring commitment to their path to reach net zero.
- Misleading claims, such as claiming carbon neutrality before net zero or planning for excessively large residual emissions to be compensated at the point of net-zero, should be explicitly prohibited.

Full alignment with these principles is not yet observed in current guidance from European public policies and private initiatives or in corporate practices. Integrating these into the EU regulatory framework, starting from the Green Claims Directive, as well as into voluntary and compliance approaches is necessary to uphold the integrity of compensation as a legitimate CDR use case.

1.4 HIGH-INTEGRITY COMPENSATION NEEDS ROBUST CERTIFICATION

Robust certification mechanisms should underpin voluntary compensation practices. To do so, certification frameworks must outline specific requirements on the **supply side** (the operators of CDR activities), as well as the **demand side** (the end-users of CDR). Indeed, sustainable compensation imposes two main requirements for certification:

1. **Accurate quantification** is central to making compensation a viable use case for CDR. Accurate and precise estimates of the CDR volumes delivered from an activity are critical because CDR units are used to address specific volumes of emissions to the atmosphere. If the quantification is inaccurate, then the climate benefit of the CDR activity could be overestimated, and mitigation deterrence may occur.

2. Simultaneously, a **public registry** capturing all necessary information on CDR units is required to ensure said units constitute sustainable uses of CDR. In line with principle 3 above, wherever compensation takes place, units should be retired on a public registry. The registry should disclose information such as the type of emission compensated for by CDR (fossil or biogenic), the CDR method mobilised, and the methodology used for certification. This mandatory disclosure will uphold principle 2 above (like-for-like principle) and enable better oversight and scrutiny of CDR use.

In that regard, the effort by the EU to adopt the CRCF is an important step forward and could be a great improvement for voluntary compensation compared to current standards. The CRCF aims to build its certification on four "quality" criteria for CDR: accurate **quantification** – certified units must deliver a measurable net climate benefit; **additionality** – units must stem from activities that go beyond "standard practice"; **long-term storage** – operators must monitor the storage of carbon over a predefined period to ensure the lasting climate benefit of certified activities; and **sustainability** – activities must do no significant harm and contribute to the wider sustainability objectives of the EU.

However, beyond those core principles, guaranteeing sustainable use of CRCF units for compensation will require continued vigilance and improvements. Indeed, as the Commission is now tasked with designing the certification methodologies for each type of CDR method, it must show exemplary caution and stringency when it comes to the quantification of carbon removed and stored – even if this means excluding some methods that can't provide sufficient precision in quantification from being used for compensation purposes. Finally, the requirements of the CRCF registry should be improved to include the mandatory disclosure of the nature of the user's emissions, when the CDR unit is used for compensation.

1.5 THE LIMITATIONS OF COMPENSATION

With stringent rules, wider adoption of compensation can be appropriate. Yet it is also important to recognise the limitations of compensation. When appropriate rules are not set and enforced, the compensation use case risks undermining climate action. A separate paper by Carbon Gap has outlined the various pathways through which CDR could lead to "mitigation deterrence", and the temperature targets of the Paris Agreement could be endangered.⁷

⁷ Carbon Gap (2023). [Discussion paper: How to avoid carbon removal delaying emissions reductions](#).

In addition, even an expanded voluntary compensation market will not be big enough to drive large-scale CDR. Today, rates of CDR from higher durability novel methods including BECCS, biochar, and enhanced rock weathering are estimated to be 1.3 MtCO₂/year.⁸ Average estimates suggest a need to scale CDR activities by a factor of 1,300 by 2050. Thus, **while compensation remains important, there is a clear need to look beyond voluntary compensation when thinking about CDR use cases.** New use cases with clear rules can help develop the supply of CDR, establish a strong demand signal, and avoid the unsustainable use of carbon removal.

Overreliance on compensation to drive CDR adoption towards climate neutrality overlooks the need to engage in other activities – such as practice-based incentives, investing in early-stage solutions, or pilot procurement programmes – where the quantification and attribution of tonnes may be difficult. The following sections explore these use cases and examine the challenges and opportunities these alternative uses may bring.

KEY TAKEAWAYS

- A.** Currently, voluntary compensation claims represent an important driver of demand and funding in the absence of CDR compliance markets. Yet most compensation approaches today do not deliver climate integrity, nor do they adequately support the scaling of CDR.
- B.** To ensure voluntary compensation claims made by organisations deliver real climate impact and support near-term scale-up of CDR, compensation must follow four core principles: (1) compensation should only use CDR units; (2) compensation practices must follow the like-for-like principle; (3) any CDR units must be ex-post and retired in a public registry; and (4) corporate interim milestones on their way to net zero should be incentivised, while net-zero claims must only allow the compensation of hard-to-abate emissions. At the EU level, incorporating these principles into the Green Claims Directive would fill this gap, complementing the CRCF and leading the way in global standard-setting for compensation.
- C.** Robust certification practices are needed to underpin compensation claims. Namely, for compensation use cases there is a critical need for precise and accurate quantification (whereas quantification requirements may be lowered for other use cases). Such quantification should be accompanied by a public registry that captures information about the compensation claim and the CDR units used.
- D.** Despite its importance in scaling up CDR, voluntary compensation is unlikely to drive adequate scale-up of CDR, meaning other use cases are needed.



⁸ Smith, S.M., et al. (2024). [The State of Carbon Dioxide Removal 2024 – 2nd Edition](#).

2. USE CASE 2: VOLUNTARY CONTRIBUTION

2.1 FROM COMPENSATION TO CONTRIBUTION CLAIMS

Organisations can invest money in CDR without making a compensation claim. Instead, organisations may turn to “contribution” claims. Through a contribution claim, an organisation invests in climate mitigation activities, including CDR, but does not make a claim against its emissions. Instead, the organisation claims to have “contributed” to the global climate effort.

Using contribution claims can circumvent some of the risks associated with compensation – for example, the risk of mitigation deterrence if CDR units are inaccurately quantified. Such claims can be highly impactful for the development and scaling of CDR methods and do not exacerbate the current scarcity of high-quality CDR credits. This approach can also allow firms to invest in diverse projects at varying stages of readiness, and use diverse financial instruments, rather than only purchasing certified credits from projects that are carbon market-ready. An example of contribution is outlined in Box 1.

Organisations are generally less familiar with contribution claims compared with compensation. There is thus a need for guidance to be developed and best practices to emerge. In particular, the business case for contribution must be defined. Some key questions to resolve include how much organisations should pay and what they can say to the public about their actions.

Contribution must appear attractive enough for organisations to adopt at scale. To date, compensation has allowed organisations to make specific climate claims such as “carbon neutral”, which are relatively straightforward to interpret. These claims can generate value for the firm through improved public standing or the ability to charge higher prices to climate-conscious customers. It is arguably harder to communicate about contribution. Organisations can communicate their overall “climate spending” or express this contribution as a percentage of total profits – but familiarising organisations with these claims is likely to take time and may not make an impact at scale without a compliance requirement. Contribution could be pitched as a corporate social responsibility exercise, a marketing approach, or even a financial investment in the growing CDR sector.

Box 1: Enabling CDR contributions – Milkywire’s Climate Transformation Fund

Milkywire is a Swedish platform allowing emitters to engage in climate contributions. Its Climate Transformation Fund aggregates impactful climate projects, including abatement, CDR, nature restoration, and policy advocacy projects – identifying those where “financial contributions will make the biggest impact”, particularly those that are currently unprofitable. For CDR projects, inclusion criteria include high overall potential, durability, co-benefits, and crucially, donations’ ability to catalyse additional growth. Donors to the fund include Klarna, Pangaia and ING.

In terms of best practice for spending levels, it is appropriate that organisations “contribute” to climate action at a level that is proportional to their resources. To support either compensation or contribution actions, organisations can set an internal carbon fee to generate revenue, and then use the funds to invest in carbon removals. One approach is to set this fee at a level aligned with the social cost of carbon. As set out by Carbon Gap, most of the largest companies across the globe could afford to permanently remove their final 10% of emissions at 100 USD/t.⁹ Climate action at the organisational level could thus move towards a spend-based system linked to an appropriate carbon fee, bringing together compensation and contribution to drive near-term action on CDR whilst maintaining a strong financial incentive to reduce emissions.

2.2 MAINSTREAMING CONTRIBUTION CLAIMS REQUIRES CLEARER CORPORATE GUIDANCE

While initiatives like the Science-Based Targets Initiative (SBTi) have developed guidance on science-based climate action for corporations, there is a need for such guidance to consolidate contribution as a use case for CDR.

⁹ Carbon Gap (2023). [Bridging the corporate ambition gap](#).

SBTi proposes a category of activities that organisations may undertake along the journey to net zero, to maximise their impact – referred to as “beyond value chain mitigation” (BVCM).¹⁰ Unlike compensation, which follows a “tonne for tonne” approach (retiring an appropriate amount of credits against specific emissions), BVCM may or may not be linked to organisational emissions – for example, “dollar for tonne” (linking spend to emissions levels through an internal carbon fee), or “dollar for dollar” (where spend is determined by another metric, such as a percentage of profits). In 2024, SBTi expanded its guidelines on BVCM activities and the climate claims they may generate, referring specifically to guidance provided by the Voluntary Carbon Markets Integrity Initiative (VCMI) for claims based on the use of high-quality carbon credits.¹¹

Despite this effort, guidance gaps remain. The expected scale and timing of contribution relative to compensation needs defining, or companies may perceive an unfair double burden. Corporations need better information about which CDR methods or projects to contribute to. Finally, to make contributions most effective, coordination of corporate funding streams is likely needed to support a portfolio of projects. A reduction in current policy uncertainty regarding corporate claims may also be needed before funds are committed to more experimental initiatives. SBTi and VCMI have chosen to focus their guidance around the “integrity” of corporate claims to postpone resolving these complex questions.

2.3 MEASURING THE IMPACT OF VOLUNTARY CONTRIBUTIONS

While the aim of contribution is not to make quantitative claims (as it is with compensation), it is still desirable to measure and validate how much carbon was removed and stored as a result of a contribution. We argue that, for contribution claims, the required precision and associated cost of quantification could be lowered relative to compensation. Where the use of CDR is contribution, and not compensation, relaxing the standards for quantification would allow contribution to emerge as a funding stream for projects that are costly to quantify and may struggle to access the voluntary carbon market. Indeed, quantifying the impact of investments may also be an important internal or reporting metric for corporates or funds engaging in contribution, as is the case for Milkywire, and may guide decision-making about what to fund in the future.

Box 2: Offtakes and advanced market commitments

Frontier is a group of corporate buyers, including Stripe, Alphabet, Shopify and Meta, aiming to signal market demand for CDR and thus accelerate the development of solutions. Individual buyers determine an annual spend on CDR units, which are to be supplied in the future. The Frontier platform identifies, evaluates, and aggregates high-quality, mostly permanent CDR suppliers. For larger suppliers, this method mainly works via offtake agreements, where the price is agreed in advance, while for smaller suppliers, lower volumes are pre-purchased at higher prices, creating access to finance.

Certification frameworks with strong co-benefits requirements could drive contribution claims. Indeed, some CDR projects generate measurable co-benefits (biodiversity enhancement, economic benefits for local communities), forming an impactful package of activity that goes beyond solely removing carbon. Those CDR units may prove harder to sell on carbon markets focused on compensation but could be valuable assets for organisations looking to maximise their overall impact. Certification could therefore act as a quality label to reduce reputational risk for “contributing” organisations.

KEY TAKEAWAYS

- A.** Contribution claims constitute a sustainable alternative to compensation, allowing private funding to flow towards CDR development, while limiting the risk of mitigation deterrence.
- B.** Despite their potential impact, contribution claims are not yet attractive to corporates. Clear voluntary guidance is needed to incentivise companies to adopt contribution over, or in addition to, compensation claims.
- C.** Certification could help to mainstream the contribution approach by offering alternative pathways involving less stringent quantification requirements and stricter rules on co-benefits. This approach departs from the “carbon only” approach of compensation.

¹⁰ SBTi (n.d.). *Beyond Value Chain Mitigation*.

¹¹ SBTi (2024). *Above and Beyond: An SBTi Report on the Design and Implementation of Beyond Value Chain Mitigation (BVCM)*.

3. USE CASE 3: COMPLIANCE FRAMEWORKS

The previous sections explored the voluntary use of CDR by organisations through a compensation and contribution approach. **Yet in the absence of economic incentives to invest in CDR, voluntary mechanisms are unlikely to drive private investments in CDR development at the rate and scale needed.** It is therefore critical to ultimately establish compliance frameworks for organisations to engage with, and finance, CDR more consistently and comprehensively, which would deliver both clear rules and a more predictable market size.

3.1 COMPLIANCE FRAMEWORKS CAN CLARIFY THE ROLE OF ORGANISATIONS IN CDR SCALE-UP

Compliance frameworks are an important longer-term policy milestone for supporting the development of the CDR sector. Compliance systems represent mandatory use cases, which set out specific rules on how companies and organisations engage with CDR. Such a framework would establish enduring demand for CDR to enable the continued growth of the sector.¹² Compliance use cases would have several crucial advantages:

- Sustaining the demand signal from different uses and establishing a predictable market for CDR;
- Creating a level playing field, whereby CDR “users” adhere to the same rules (e.g. compensation rules or contribution rules) by following the guiding principles outlined in Section 1.3;
- Potentially allowing a more coordinated use of revenues, for example through a central fund which can distribute finance amongst CDR suppliers and bring forward a portfolio of CDR options;
- Alleviating the reputational risks that may deter organisations from investing in CDR voluntarily.

Compliance systems for CDR are slowly emerging across different jurisdictions, with the UK and EU exploring options to integrate CDR into their respective emissions trading systems (ETS). The EU should also assess the opportunity of introducing a Removals Trading System (RTS) for organisations within the EU,¹² which would be distinct from the existing ETS, and oblige covered entities to buy or

Box 3: California’s Carbon Dioxide Removal Market Development Act (SB308)

California bill SB308, known in a former version as the Carbon Dioxide Removal Market Development Act,¹⁴ was a proposal which would have established a negative emissions obligation on private entities with emissions above 25 ktCO₂eq/yr. Qualifying emitters would have been obliged to purchase certified negative emissions credits equal to a specified percentage of their greenhouse gas (GHG) emissions (in CO₂eq) for each year, starting at 1% of emissions in 2030 to reach 100% in 2045. These credits would have been reflected in state-level GHG calculations. While this bill would have been the first of its kind in enforcing a dedicated compliance scheme for CDR, it builds on a precedent for using the “polluter-pays principle” to guide climate action at the state level.

deliver an increasing amount of CDR over time. The chosen approach (ETS or RTS) should seek to scale the supply of high-quality, permanent CDR while not disrupting the existing decarbonisation signal from the ETS. Notably, California has considered introducing a CDR purchase obligation via its Carbon Dioxide Removal Market Development Act, unsuccessfully so far (see box 4). CDR compliance markets could also target specific sectors or groups of organisations, imposing different obligations on each, rather than representing a blanket standard for how companies engage with CDR.

An important question to address when establishing compliance frameworks for CDR is how they interact with pre-existing compliance instruments for climate action. Any “double burden” associated with adding CDR obligations to existing, increasingly stringent reduction obligations (such as ETS obligations) could undermine the political acceptability of both systems. The Californian proposal in Box 3 specified that the negative emissions obligation it sought to create would have been additional and separate to obligations companies face under California’s ETS, which has generated some concern over the additional financial burden.¹³ Jurisdictions wishing to implement this dual trading system should manage this risk by modulating the relative financial burdens of each system, for instance by gradually increasing the removal obligations as ETS obligations are progressively phased out.

¹² Carbon Gap (2024). [Envisioning a Carbon Removal Strategy for Europe](#).

¹³ World Resources Institute (2023). [Lessons From California’s Carbon Dioxide Removal Policies](#)

3.2 INCLUDING COMPLIANCE USES IN NATIONAL ACCOUNTING

The development of compliance frameworks should lead to a significant increase in organisational investments and would, in turn, increase the importance of properly accounting for organisational use of CDR. **As systems develop and strengthen, states will need to clarify accounting rules to ensure that all CDR uses can be counted towards climate mitigation objectives.**

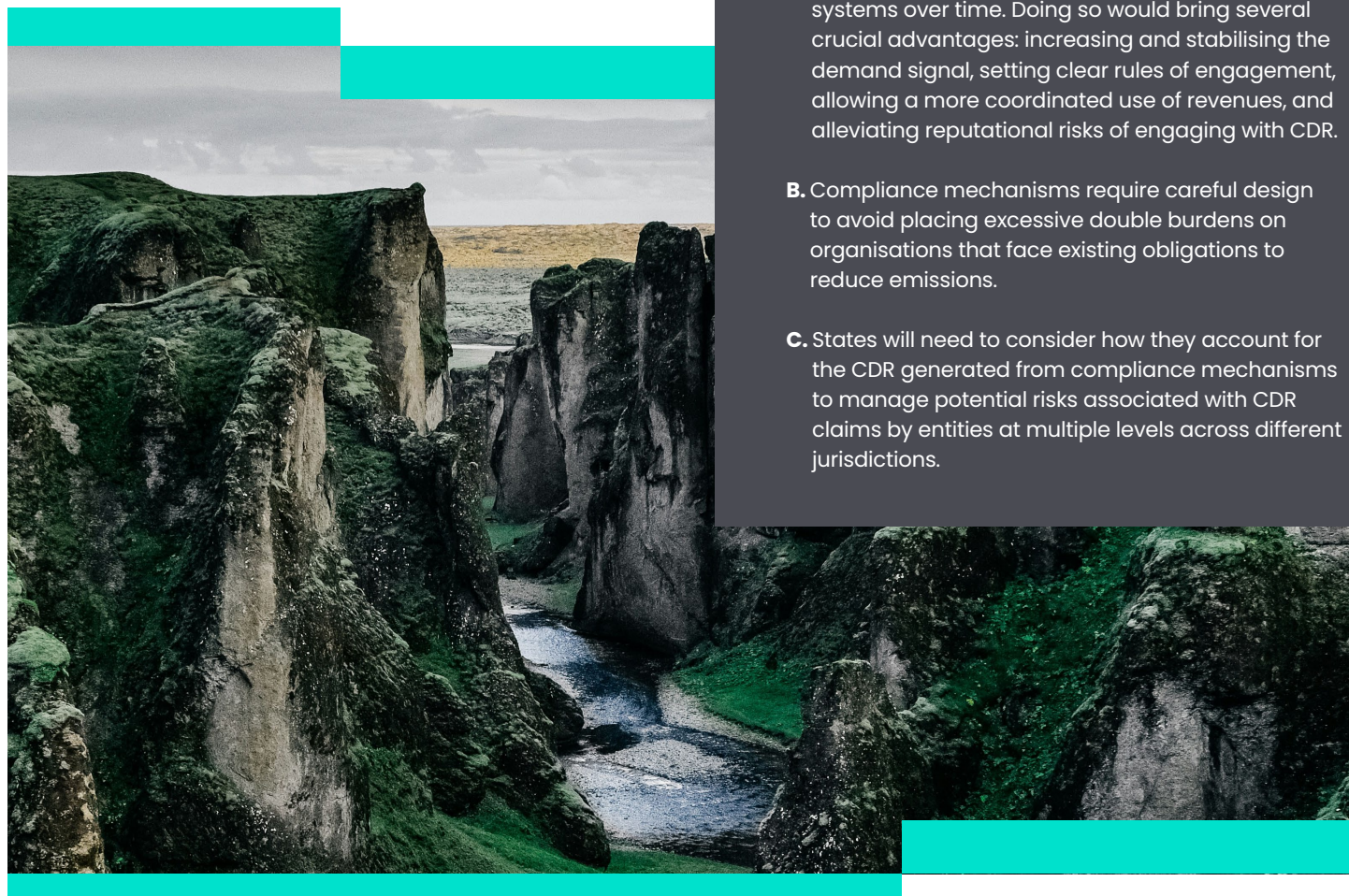
However, reconciling organisational and national CDR accounting is not straightforward. Stakeholders have highlighted concerns about both “double-counting” of CDR projects where units are traded internationally (e.g. units accounted in two different country accounts) and “double-claiming” of the CDR volumes between one country and a private supplier within its borders. **Clear international rules are needed to address the risks of double claiming leading to overestimated climate benefits.**

In addition, jurisdictions need to amend accounting rules to ensure diverse CDR types can be accounted for. For example, in the UK, the LULUCF sector is the only sector within the national greenhouse gas inventory which reports both sources and sinks.¹⁴ Addressing the governance gaps and establishing clear accounting rules for all CDRs would incentivise states to adopt appropriate policies.

To harmonise rules, states could leverage public certification frameworks, such as the CRCF, to underpin both national accounting and removal compliance frameworks. Because the certification’s public registry would disclose the name and nature of each user, as well as the location where the CDR is used, it would considerably ease the burden of integrating organisational-level CDR investments in country-level targets.

KEY TAKEAWAYS

- A.** Voluntary practices like compensation and contribution should move towards compliance systems over time. Doing so would bring several crucial advantages: increasing and stabilising the demand signal, setting clear rules of engagement, allowing a more coordinated use of revenues, and alleviating reputational risks of engaging with CDR.
- B.** Compliance mechanisms require careful design to avoid placing excessive double burdens on organisations that face existing obligations to reduce emissions.
- C.** States will need to consider how they account for the CDR generated from compliance mechanisms to manage potential risks associated with CDR claims by entities at multiple levels across different jurisdictions.



¹⁴ Brown, P. et al. (2023). [UK Greenhouse Gas Inventory, 1990 to 2021. Annual Report for Submission under the Framework Convention on Climate Change.](#)

4. USE CASE 4: PUBLIC PROCUREMENT AND INTEGRATION INTO POLICY FRAMEWORKS

So far, this paper has examined both voluntary practices and compliance frameworks as key use cases for CDR. These use cases are designed to attract private sector funding, by encouraging corporates to “use” CDR towards their climate and sustainability goals, or to comply with mandatory schemes, such as the EU ETS. In addition, **public funding from governments at multiple levels must be better harnessed.** This section identifies options for mainstreaming CDR use through public policies and investments.

4.1 COUNTRIES MUST SCALE UP CDR TO MEET CLIMATE TARGETS

Governments have a legal and moral obligation to the international community to deliver on the targets of the Paris Agreement, embodied through Nationally Determined Contributions (NDCs) – state-level targets for climate action.¹⁵ This responsibility is even stronger for EU member states, who are legally bound by the EU Climate Law of 2021 to a shared 55% emissions reduction target by 2030 compared to 1990 levels, and an obligation to reach net zero by 2050. **States thus face a dual responsibility to rapidly develop CDR to scale and correctly account for it in national climate targets.**

The EU Climate Law will be revised in 2025, with a view of enshrining further intermediate climate goals for 2040. Carbon Gap advocates for a net emission reduction target of 90%, broken down into separate targets for emission reduction and carbon removals.¹⁶ This distinction will ensure that efforts to reduce GHG emissions and scale up CDR are carried out in parallel, while avoiding under or overreliance on carbon removal. The carbon removal target must be furthermore divided into two sub-targets, one for higher-durability carbon removal and another for lower-durability carbon removal in the land sector and wider biosphere. This distinction is essential for the EU to realistically quantify CDR's contribution to the 2040 and 2050 climate targets and reach a state of “durable net zero”.^{17, 18}

Box 4: Government purchasing of CDR in Switzerland through a levy and dedicated fund

Between 2005 and 2012, the Swiss government imposed a 1.5 cent/L charge on petrol and diesel imports to fund a bespoke independent structure, the Climate Cent Foundation, in charge of purchasing emissions reductions and removal units to contribute to the Swiss climate change mitigation effort.²⁰ Although the levy was lifted in 2012, the Foundation has funded the reduction of nearly 40 Mt CO₂eq through the purchase of emissions reduction credits from activities in Switzerland and abroad. The Foundation is now expected to invest its remaining assets, approx. 60 million CHF, in CDR activities in Switzerland and abroad.

Any removals already delivered to comply with EU-wide instruments such as the ETS or an RTS (see section 3 above) would count towards these targets. The EU CRCF, with its single Union-wide registry, would harmonise the quantification of climate benefits from removals delivering toward the overall target. To cover the remaining shortfall after the abovementioned volumes have been accounted for and to attract large-scale government support, CDR targets should be further integrated into the Effort Sharing Regulation (ESR).¹⁹ Under the current ESR, member states have national emissions reductions targets for 2030, and are permitted to allocate a maximum of 262 MtCO₂eq of removals from the land-use, land-use change, and forestry (LULUCF) sector towards these. The ESR should be further revised to include 2040 and 2050 targets for both LULUCF but also higher-durability CDR, with individual shares of the overall binding targets allocated to each member state. The ESR could also be used to set removal targets beyond 2050, setting targets higher than countries' residual emissions to deliver net negative emissions for the EU. Under the ESR, member states could also have the option of buying CRUs from other member states that have a surplus, just as the ESR currently envisions trading to balance emissions reduction efforts.

¹⁵ UNEP (2023). [Emissions Gap Report 2023](#).

¹⁶ Carbon Gap (2023). [Carbon removal in the 2040 targets: the key to getting them right](#).

¹⁷ European Commission (n.d.). [EU climate target for 2040](#).

¹⁸ Carbon Gap (2022). [A guide to certifying carbon removal](#).

¹⁹ European Commission (n.d.). [Effort sharing 2021–2030: targets and flexibilities](#).

²⁰ Stiftung Klimarappen (2024). <https://www.klimarappen.ch/index.html?lang=en>

Turning to the state level, California's proposal for a CDR obligation (outlined in Box 3) and Switzerland's public procurement programme (see Box 4) demonstrate the early consideration of specific policies to drive CDR development. However, Switzerland has faced criticism over the indiscriminate use of "emissions reductions" and "removals" credits to meet its targets – it is therefore essential for jurisdictions to build CDR policies that deliver robust and reliable outcomes. The EU CRCF, which clearly distinguishes between emissions reduction and removal activities, can be mobilised by EU member states willing to purchase CDR units, to ensure quality public investments. Carbon Gap has also proposed an EU Carbon Clearinghouse to act as an aggregator of funds that states could leverage to purchase CDR units from CRCF-certified activities and operationalise delivery on their CDR targets.

4.2 CDR-SPECIFIC PUBLIC PROCUREMENT PROGRAMMES

In the following subsections we examine some specific policy mechanisms for the delivery of CDR by governments. Various approaches are currently being considered in the EU and beyond to integrate CDR into jurisdictional climate plans. Some countries plan to set incremental volume targets for CDR, which could be reached through public procurement schemes such as those described in Boxes 4 and 5. **Public procurement programmes for CDR leverage the ability of governments to allocate funding in large amounts, accelerating the scale-up of a high-quality CDR industry by increasing trust in certified providers and catalysing private funding as well.**

Carbon Gap recommends an initial phase of public procurement, which can act as a "vetting" period, involving smaller-scale funding (i.e. EUR 50 million for an EU programme) to evaluate the technology readiness level (TRL), projected costs, and learning curves, of each CDR method. Larger procurement schemes, whereby much more substantial government funding is mobilised to procure removals at the multi-megatonne scale, can then be enacted for the most mature and scalable CDR methods.

Box 5: Carbon Dioxide Removal Leadership Act 2024

The Carbon Dioxide Removal Leadership Act, a US Federal Act first introduced in 2022 by Democratic Representatives and Senators, was reintroduced in an updated version in January 2024.²¹ If passed, the Act would direct the US Department of Energy (DOE) to procure an increasing amount of technology-based CDR, amounting to 10 MtCO₂ of yearly removals from 2035 onwards. The Act specifically suggests the DOE engage in long-term contracts with CDR providers that can issue high-quality removal credits, as a way of using public funding to assist the scale-up of the US CDR industry, thus aiming to act as a catalyst for private investment.

4.3 INCLUDING CDR REQUIREMENTS IN GREEN PUBLIC PROCUREMENT

Given the economic weight of public procurement contracts (approximately 14% of EU GDP),²² the EU has been progressively strengthening Green Public Procurement requirements. The 2014 Public Procurement Directive integrated strong social and environmental dimensions into the decision criteria in public contracts, departing from cost-only as the sole award criterion.²³

Governments could incentivise private actors to invest in CDR by procuring goods and services whilst mandating low embodied carbon – targeting sectors that can adapt their processes to deliver negative emissions. There is limited precedent for such incentives in the EU, but examples may be drawn from other jurisdictions (Box 6). This approach would need to ensure coherence with key principles of public procurement, such as proportionality and non-discrimination, and ensure compatibility with other policies like the recent EU Directive on Empowering Consumers for the Green Transition, on the question of carbon neutrality for products and services.²⁴

²¹ Brown, P. et al. (2023). [UK Greenhouse Gas Inventory 1990 to 2021. Annual Report for Submission under the Framework Convention on Climate Change.](#)

²² European Commission (2019). [Public Procurement Indicators 2017.](#)

²³ Pouikli, K. (2021). [Towards mandatory Green Public Procurement \(GPP\) requirements under the EU Green Deal: reconsidering the role of public procurement as an environmental policy tool.](#) ERA Forum, 21, 699–721.

²⁴ European Commission (2024). [New EU rules to empower consumers for the green transition enter into force.](#)

4.4 INTEGRATING CARBON REMOVALS INTO EXISTING EU LEGISLATION

Public procurement of CDR and the inclusion of CDR in green public procurement requirements constitute direct approaches to mobilising public funding for CDR. However other avenues exist to drive CDR through public funding. The interconnected and transnational nature of EU legislation offers the opportunity to create a large CDR demand pool through an array of sector-specific regulations.

As called for previously by Carbon Gap, the **EU should conduct a survey of its legislation to uncover opportunities to deliver removals at a large scale, low cost, and with minimal burden on existing economic activities.** Wherever policies contain an existing mandate to reduce net emissions – in sectors as diverse as the built environment, infrastructure permitting, and agriculture – there is an opportunity to motivate carbon removal through revisions to existing policy frameworks.

In each case, specific methodologies could be developed within the CRCF, to quantify the CDR occurring within these sectoral initiatives, while the volumes of CDR generated would be accounted for by the Union-wide registry (set out in the CRCF) and feed into the CDR target of the relevant EU member state. For example:

- **Built environment** – The EU could drive the uptake of building materials using removed carbon, for example via the revised Energy Performance of Buildings Directive²⁵ and its associated standards. As one example, building demolition should require recarbonation of concrete before landfilling.
- **Permitting of strategic infrastructure** – The EU may be able to influence the requirements imposed by member states with regard to permitting large-scale infrastructure projects – for example on materials procurement in infrastructure to favour carbon-negative materials, or by requiring mine tailing recarbonation by default in mining concessions.
- **Sustainable food systems** – The EU could model behaviour or provide guidance on food purchasing patterns, for example inspiring public institutions to source a rising percentage of products from ‘carbon farming’- certified supply chains.

Box 6: Tax incentives for low-carbon concrete procured in New Jersey

The Low Embodied Carbon Concrete Leadership Act (LECCLA), introduced in the US state of New Jersey in 2022, harnesses public procurement to deliver climate action. From 2024, concrete suppliers that deliver above a threshold volume of concrete to public projects will have access to tax incentives based on the carbon performance of their concrete, relative to a benchmark set by the state. Eligible mechanisms to reduce embodied carbon can include, inter alia, energy efficiency in manufacturing, point source capture at manufacturing sites, and utilisation/storage of carbon within the concrete. Producers will demonstrate their carbon performance via an Environmental Product Declaration, using an ISO-approved methodology to calculate lifecycle emissions.

A thorough examination of how carbon removal can play a role in policy frameworks across different sectors of the EU’s economy will help disperse the costs of CDR across society and ensure a diversity of removal methods are incentivised. For example, this examination could identify yet unexplored ways of driving the scale-up of emerging CDR methods to more precisely quantify their climate benefits. Such methods may otherwise struggle to credibly demonstrate one-for-one, high-durability and high-certainty “compensation” for a tonne of fossil emissions, making them unfit to issue units on carbon markets, or in potential compliance instruments.

Above all, mainstreaming CDR requirements across pre-existing legislation would complement other compliance mechanisms, potentially contributing to delivering a large share of both nature-based and higher-durability removals.

²⁵ Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings.

4.5 USING CERTIFICATION TO ENSURE HIGH-IMPACT PUBLIC INVESTMENTS IN CDR

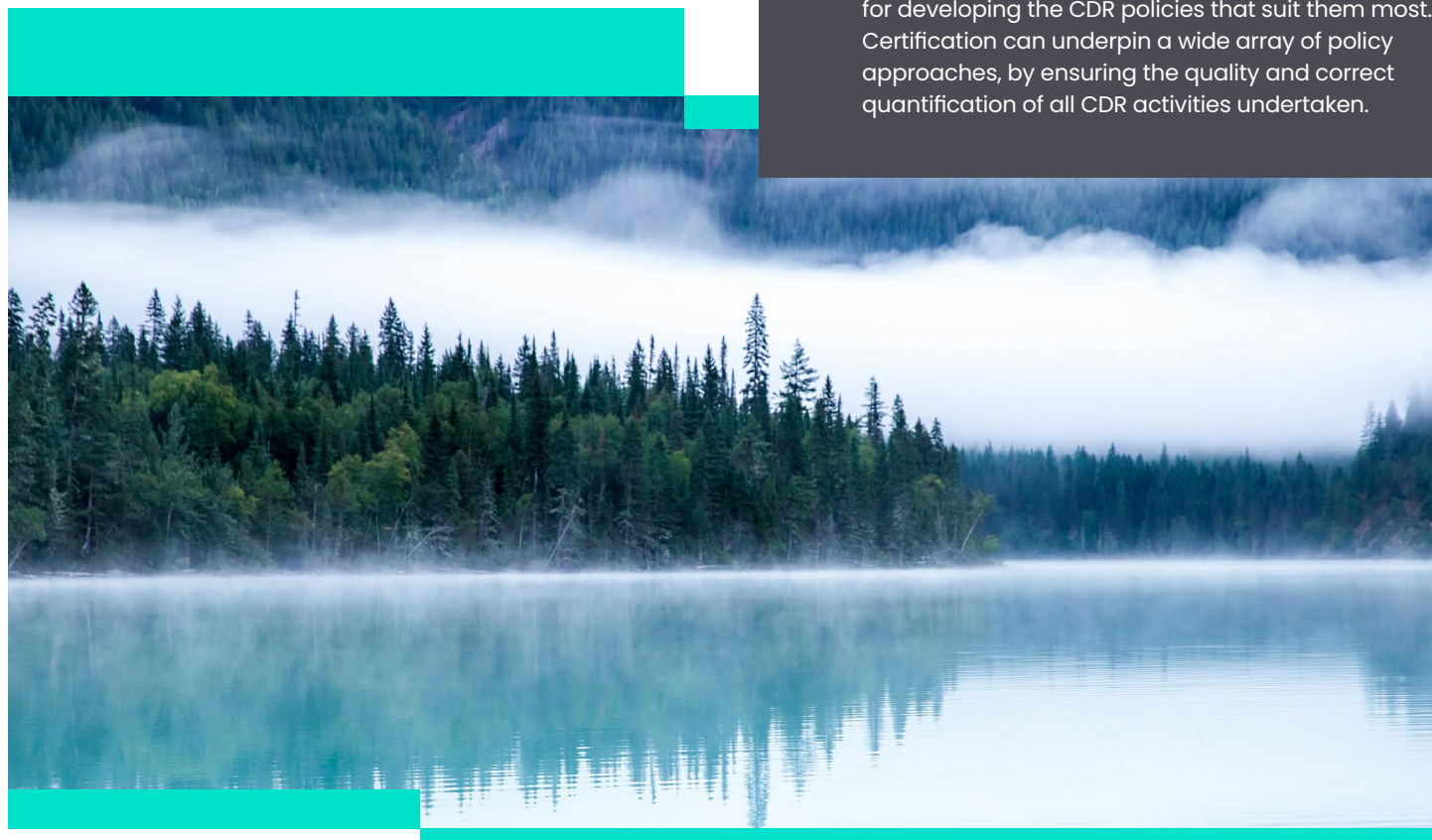
As the various policy interventions detailed in this section show, public support for CDR can take various forms. Indeed, different policies are better suited to certain jurisdictions – due to varying regulations, market structures, and cultures of public intervention in the economy. While some jurisdictions may prefer incentivising private entities to engage in CDR investments through subsidies or tax credits, others may find it more efficient to implement more stringent compliance mechanisms to ensure CDR uptake. The value of a robust public framework certifying CDR activities is to underpin these different approaches. **A common recourse to a public certification framework would allow the introduction of locally tailored policies that facilitate CDR adoption across a range of policy areas and mechanisms.**

Where public support is directed to CDR, there is a high burden to ensure value for money and the absence of collateral environmental and social harms. Thus, certification can also identify suitable activities for government support, drive robust quantification for the comparison of supplier bids, and enable public bodies to quantify the impact of their procurement on the scaling of CDR methods.

In “green public procurement”, CDR certification could be a label to demonstrate supplier eligibility and support quantification of the CDR performance of the procured good. This approach could also be used in public research and innovation funding. In this case, a high level of precision may not be required, as the aim is not to contribute to accounting or public claims. Nonetheless, data will likely be important for tracking the emissions associated with procured products and services.

KEY TAKEAWAYS

- A.** Relying only on VCMs will not deliver CDR scale-up at the required level. CDR must become part of national climate strategies and be embodied in climate targets; which in turn should prompt the development of supportive policies for CDR delivery.
- B.** CDR should be integrated across diverse policy areas using an array of policy mechanisms and funding sources. Mechanisms could include direct approaches such as public procurement of CDR, and through revisions to sector-specific policies such as in the built environment, infrastructure planning and agriculture.
- C.** Governments should use certification as an enabler for developing the CDR policies that suit them most. Certification can underpin a wide array of policy approaches, by ensuring the quality and correct quantification of all CDR activities undertaken.



5. RECONSIDERING USE CASES FOR CONVENTIONAL CDR

Any discussion of use cases for CDR must not neglect the critical issue of the inherent differences between CDR methods. This section examines use cases for conventional CDR, explaining why these differ from the uses discussed so far and how they could be approached by stakeholders.

CDR activities span a suite of methods, which vary greatly in terms of cost, duration of storage they offer, and risk of reversal, but also in terms of their level of interaction with or impact on ecosystems and societies. Conventional CDR, referring to land management and nature restoration activities (now referred to in the EU as “carbon farming”), constitutes the vast majority of CDR delivered today (99.9%) and occupies a much larger share of the VCM than novel CDRs.²⁶ Yet **conventional CDR has too often been misused, undermining its benefit for the climate and harming ecosystems and local communities in the process.** The use cases for “conventional” CDR must be reconsidered to ensure we fund nature appropriately while delivering high-integrity climate action.

5.1 CONVENTIONAL CDR CANNOT COMPENSATE FOR FOSSIL EMISSIONS

As explored in Section 1.3, compensation should adhere to the like-for-like principle – in other words, hard-to-abate fossil emissions must only be compensated with highly durable, permanent CDR. Many CDR methods – such as forestation, soil carbon in farmlands, peatland and wetland restoration, and agroforestry – lack the appropriate characteristics to compensate for fossil emissions. These include:

- **Physical constraints** – i.e., durability of the carbon storage pool, risk of reversal due to change in land ownership or land use, mitigation potential and capacity to scale.
- **MRV method used** – i.e., are units verified using an activity-based, results-based, or hybrid approach, and what are associated levels of uncertainty? How is the risk of non-additionality estimated?²⁶

- **Social and environmental impacts** – i.e., what are the effects of introducing these units across environments and societies, and how are complex trade-offs among different land uses accounted for?

When these characteristics are considered, it is evident that using low-durability CDRs for compensation carries two key risks:

1. **Mitigation deterrence** – In instances where leakage or reversal occurs, any fossil emissions thought to have been “compensated” become suddenly uncompensated.
2. **Overexploitation of natural sinks** – Dependence on conventional CDR to compensate for global emissions could lead to unsustainable reliance on natural sinks to generate removals.

To limit mitigation deterrence and promote more sustainable outcomes for the biosphere, Carbon Gap supports the principle of durable net zero,¹⁸ described in Figure 2. This principle should underpin voluntary and compliance compensation practices and lead to a move towards permanent CDR to balance fossil-based emissions. But the principle should also precipitate new ways of thinking about how to fund nature beyond the carbon market.

5.2 FUNDING NATURE IN ITS OWN RIGHT

Nature faces a catastrophic funding gap. Funding needs for biodiversity conservation worldwide are in the range of USD 700–1,000 billion, while spending in 2019 was estimated at USD 120–140 billion.²⁷ On the other hand, funding nature protection and restoration will cut carbon emissions and bolster sinks. Public and private finance must be leveraged much more effectively, and at a much larger scale, to deliver simultaneous nature and climate outcomes – identifying new finance channels and improving governance of existing ones.

Past attempts to generate tradeable carbon units from nature have led to concerns about “carbon tunnel vision”,^{28,29} as well as competition with other uses of the biosphere. Although increasing carbon stocks on land often brings benefits, optimising for carbon may create perverse incentives or oversights that undermine the complex balance that leads to healthy natural systems.

What is more, the importance of carbon markets for financing nature is likely overestimated. A mere 1% of funding for biodiversity in 2019 was estimated to have come from nature-based solutions and carbon markets.²⁸

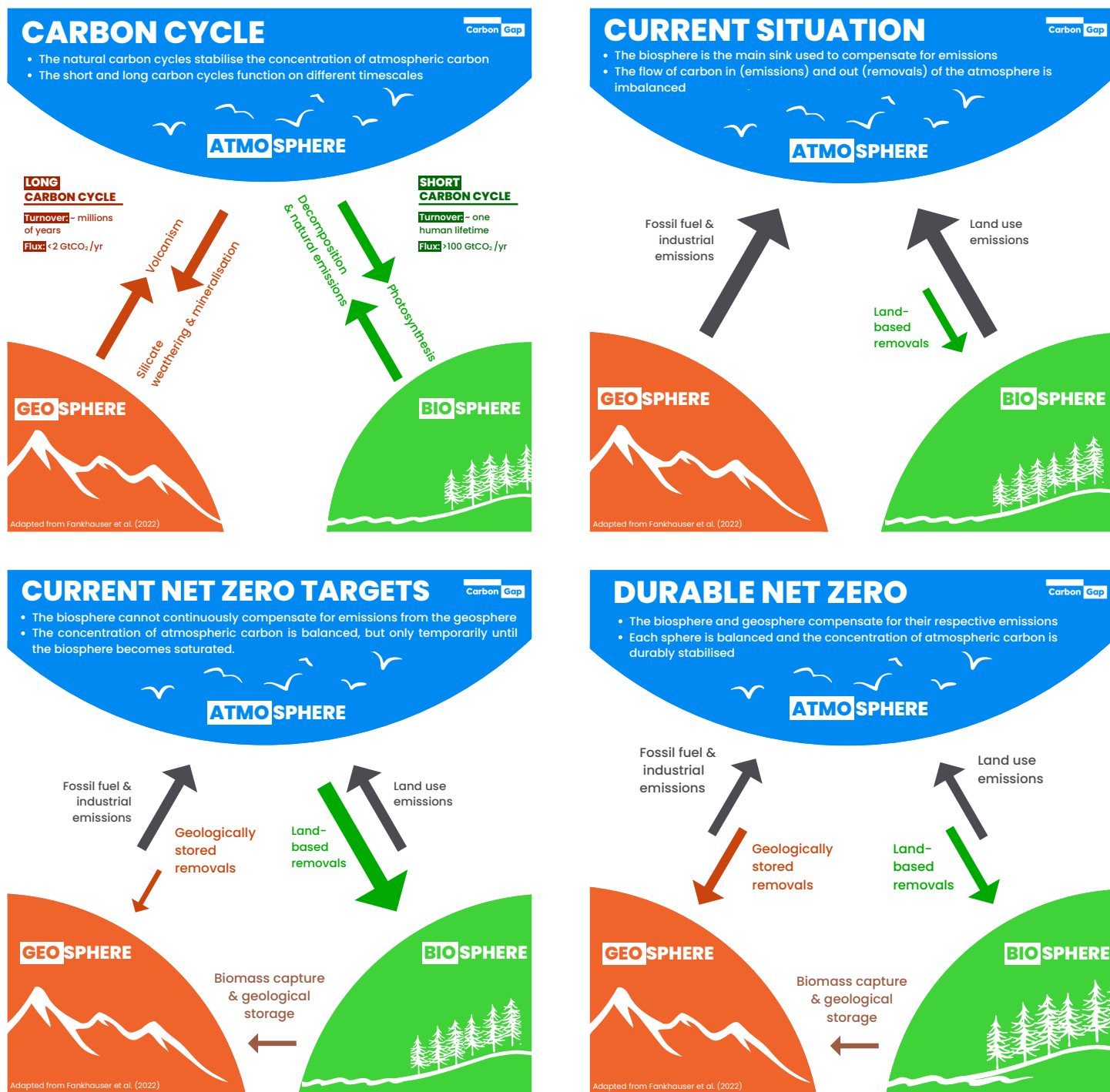
²⁶ Carbon Gap (2023). [SOIL HORIZONS: UNEARTHING PERSPECTIVES ON THE FUTURE OF SOIL CARBON GOVERNANCE Part 1: A Surface Outlook](#).

²⁷ Deutz, A. et al. (2020). [Financing Nature: Closing the global biodiversity financing gap](#). The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability.

²⁸ Achakulwisut, P., Almeida, P. & Around, E. (2022). [It's time to move beyond "carbon tunnel vision"](#). Stockholm Environment Institute.

²⁹ Konietzko, J. (2022). [Moving Beyond Carbon Tunnel Vision With A Sustainability Data Strategy](#). Forbes.

Figure 2: CDR must be used to deliver durable net zero in which emissions and stores of carbon are balanced like-for-like



Adapted from Fankhauser, et al. (2021).

For these reasons, some stakeholders advocate against financing nature based on the tonnes of CDR it delivers and moving towards an “activity-based” approach where specific practices are promoted.³⁰ For companies, a solution may lie in mainstreaming a “contribution” approach to nature protection and restoration, without the expectation of a tonne-for-tonne claim in return.

In tandem, governments should support a suite of practices that protect and restore nature and promote sustainable land management – and, where possible, promote and measure CDR as one of the co-benefits. Funding for nature is often entangled within large-scale policies such as the EU Common Agricultural Policy or the United States Farm Bill, which can simultaneously support conflicting land management goals.³¹ Through changes to these policies, and the establishment of new ones, governments can promote CDR – by changing the way nature and land management activities are incentivised and the way outcomes are measured. Mechanisms could involve grants to land stewards, investments in training and capacity building, changes to subsidy regimes, new taxes, green financial instruments, and regulatory measures such as new procurement guidelines and easements, explored in Boxes 8 and 9.²⁸

5.3 SHOULD WE BE USING CONVENTIONAL CDR FOR COMPENSATION?

Despite its strong limitations, compensation should not be ignored as a financing mechanism for nature. Though the VCM plays a very small financial role in the overall nature conservation picture (e.g. less than 1% for afforestation/reforestation activities),⁸ this funding stream should not be neglected as long as benefits can be generated.

Stronger rules are therefore needed to govern the use of low-durability CDR from nature and land as a compensation tool. In line with the like-for-like principle (see Section 1), CDR units generated from conventional CDR should in any case only be used to compensate for biogenic emissions – meaning emissions from the short-lived carbon cycle. Agriculture and the LULUCF sectors will be key sources of such emissions³³. However, the concept of agricultural carbon trading needs further work to understand where the deployment of conventional CDR units would be appropriate, as well as to understand the impacts on direct and indirect land use change, ecosystems, and rural livelihoods.

Box 7: Public food procurement using activity-based certification

Public procurement plays a significant role in the food sector, representing 5.5% of food sales in the UK, for example.³² It therefore constitutes a key lever for the scale-up of sustainable agricultural practices, including those that deliver CDR. Governments could require an increasing share of total food procurement to be delivered by suppliers engaging in sustainable land management or conservation practices. This approach has been used to support the scale-up of organic food production – for example in Denmark, as part of a plan to double organic agricultural area by 2030. An activity-based certification with an appropriate level of stringency (so as not to disproportionately deter or exclude smaller suppliers) could provide evidence of compliance with this requirement. This approach could institutionalise and incentivise sustainable agricultural practices that also generate CDR, without creating an overreliance on removal units as a success metric.

Box 8: Land conservation easements

Easements represent a tool to shape or constrain how land is managed. They involve an agreement between a landowner and a public body or private land trust, for the latter to use the land in a certain way. By codifying the desired practices into land title documents via “conservation easements” and other similar legal tools, governments, private conservation funders, and land stewards can work together to permanently shift specific land tracts into sustainable management. Through this tool, CDR activities could be incentivised without necessitating continued public support, or the high-precision carbon accounting necessary to mobilise compensation-based funding. Easements have enjoyed wide adoption in the USA but much less in the EU, despite evidence that 90% of EU countries may be legally ready to deploy this tool.³⁴

³⁰ Račinska, I. & Vahtrus, S. (2018). [The Use of Conservation Easements in the European Union](#). NABU Federal Association.

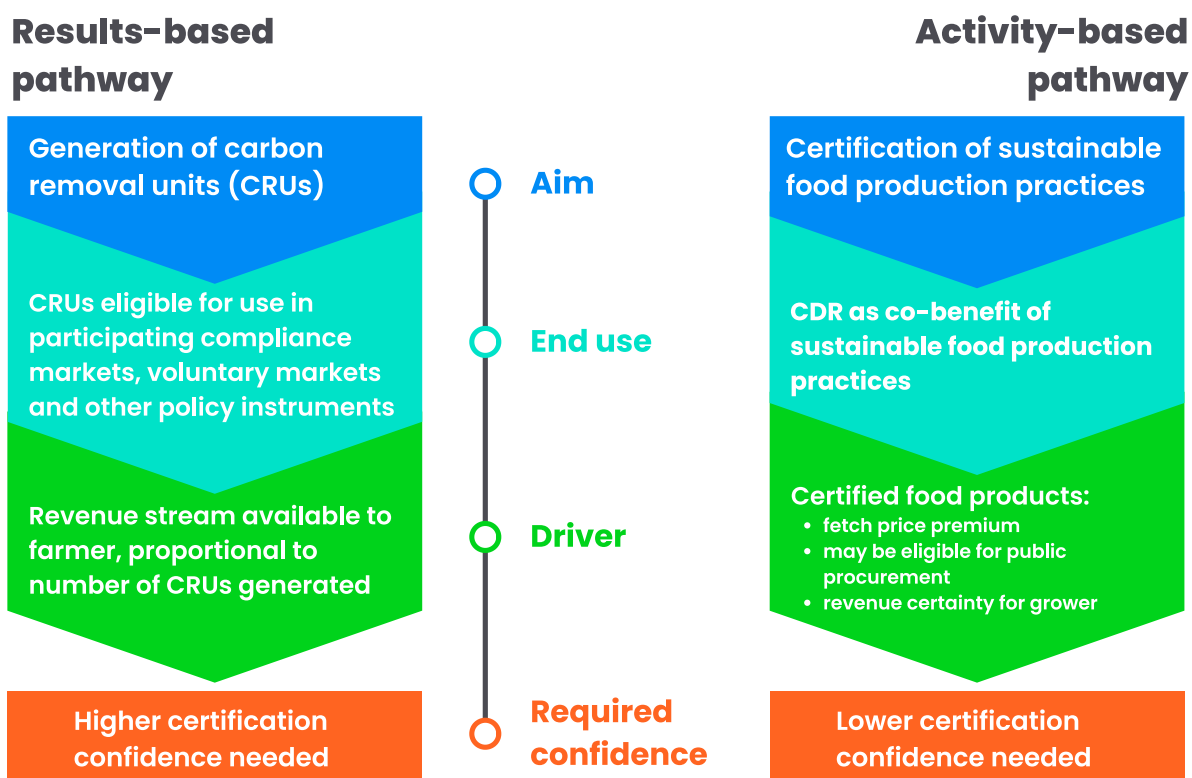
³¹ European Commission (2022). [Common Agricultural Policy for 2023–2027](#).

³² Parsons K. & Barling D. (2021). [What Would a Transformational Approach to Food Public Procurement Look Like?](#) University of Hertfordshire.

³³ Notably, these sectors will also generate significant fossil CO₂ emissions, as well as emissions of other long-lived (N₂O) and short-lived (CH₄) climate pollutants, mostly from synthetic fertilisers and machinery. These hard-to-abate fossil emissions will need to be compensated for with permanent CDR, as with other sectors.

Figure 3: Illustration of different certification pathways for a CDR-generating activity

INTRODUCTION OF NO-TILL AGRICULTURAL PRACTICE FOR 1-YEAR PERIOD



5.4 LEVERAGING CERTIFICATION TO ENABLE DIVERSE SUPPORT FOR NATURE

As argued above, creating a carbon-centric funding structure for nature risks undermining other environmental objectives. Thankfully, a carbon certification framework like the CRCF can also be deployed outside the carbon market, to support better land stewardship and financing of nature. Certification frameworks must enshrine strong rules on the need for co-benefits to mitigate carbon tunnel vision. For example, certification could be used:

- To support public funding programmes, via distinct routes:
 - Results-based approach:** Certification could be used in CDR-focused funding schemes to measure results and apportion incentives;
 - Activity-based approach:** Certification could be used in non-CDR schemes to demonstrate carbon co-benefits of sustainable land management practices. For example, certification could be an eligibility requirement for environmental payments or for public procurement of agricultural products;

- In private transactions:
 - As a quality label for agricultural products and services, much like the “organic” label;
 - By land stewards who wish to voluntarily assess CDR potential on their land, e.g. as an indicator of land value;
- As part of NDC accounting to identify eligible CDR activities from nature and robustly quantify their contribution.

For CDR activities in the land sector – where projects take place at varying scales, run by land stewards with varying levels of capital and technical capacity – policymakers should consider modulating the level of precision required to obtain certification. Certification processes can be a significant administrative and financial burden, and modulation would enable much wider access for land stewards to deliver recognised CDR. Certification frameworks could consider integrating a series of methodology “levels” that reflect the various use cases and the stringency required. These methodology levels would be accompanied by clear rules on where different levels are appropriate (ensuring high-precision methodologies are used in compensation, for example). Figure 3 outlines an example of how a single activity could follow divergent certification pathways, depending on the use targeted by the project operator.



The extent to which conventional CDR activities need to be measured and certified will vary depending on local conditions and prevailing targets. It is likely useful for countries to quantify, to some degree, the carbon flows arising from nature and land, even where not explicitly used for compensation. The quantification of carbon flows will provide better data and experience of measurement and allow countries to identify gaps to address with incentives and policies. In the EU, the Soil Monitoring Law – which has introduced binding “soil health thresholds” for member states, including a threshold for soil organic carbon content – is an example of carbon measurement being used to assess both climate and nature impacts.³⁴

KEY TAKEAWAYS

- Viewing nature purely as a carbon sink promotes potentially harmful practices for ecosystems and local communities, while failing to address the massive funding gap for nature protection.
- Jurisdictions should encourage investments in nature protection and restoration activities through an ecological rather than carbon lens, while seeking to measure CDR outcomes as a co-benefit. CDR certification methodologies must enshrine strong co-benefit requirements to avoid carbon tunnel vision.
- Due to the low durability and high reversal risk associated with conventional CDR, compensation practices must be restricted to hard-to-abate biogenic emissions only, to avoid mitigation deterrence and overexploiting natural sinks.
- Because certification risks becoming a financial burden on operators, different methodology levels with varying stringencies should be made available for each activity type. This optionality would underpin policies that can support CDR activities in a range of contexts.

³⁴ Carbon Gap (2023). [Soil Monitoring Law](#).

6. CONCLUSION

Compensation is currently the dominant use case for CDR, and presents an important market for driving CDR deployment. However, inconsistent and unclear rules are limiting the size of that market. **Voluntary guidance must establish a clear role for CDR, particularly for near-term use**, rather than kicking the CDR can down the road by presenting it as a tool for the net zero date only. Stronger guardrails are also needed to promote trust in markets to encourage wider adoption of compensation. Carbon Gap proposes **four key principles that would enable robust compensation** – these must be incorporated into corporate practices as well as voluntary and regulated standards.

Meanwhile, alternative use cases for CDR abound and yet are under-appreciated. Establishing **more diverse use cases for CDR beyond compensation could create new revenue streams** needed to scale up permanent CDR and **ensure the protection and restoration of natural carbon sinks**.

Companies voluntarily engaging with CDR can move towards “contribution” claims, where emitters direct catalytic funding towards projects that scale CDR while avoiding “tonne-for-tonne” claims. In this way, contributing organisations can take action to address their net emissions while limiting the risk of mitigation deterrence, and can invest in diverse projects rather than limiting to those that are carbon market-ready.

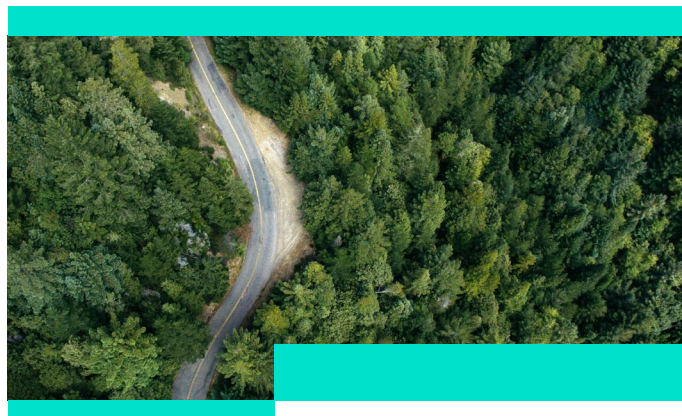
Compliance mechanisms will ultimately be required to allow CDR to scale. **Voluntary use cases like compensation and contribution should move towards compliance systems over time, creating a clearer market size for CDR while setting clear rules of engagement**. States will need to address the question from such schemes features in national inventories consider how they account for the CDR generated from compliance mechanisms, ensuring a diversity of CDRs can be reflected while addressing the governance gaps surrounding double counting and co-claiming.

In addition, government policy and funding must be better harnessed for CDR scale-up. **The role of CDR must be clearly articulated in national climate strategies and through dedicated targets, which in turn will prompt the development of supportive policies to deliver on targets**. These could include direct government procurement of CDR, or integrating CDR requirements in sectoral policies such as in the built environment. Such policies can catalyse private project financing for scale-up as seen for solar and wind energy.

Conventional CDR units from the biosphere (from nature restoration and land management activities) are diverse and have characteristics that set them apart from the highly durable units needed for compensation of fossil emissions. Carbon market-based approaches to financing nature preservation and restoration have, in many cases, yielded adverse outcomes for ecosystems. **Activity-based, rather than results-based, approaches should be adopted by public and private actors to support nature-based CDR**. However, using conventional CDR units in certain instances to compensate hard-to-abate emissions from the land sector could provide a small but nonetheless important revenue stream.

The clear need for a robust public certification framework is illustrated through the multiple use case examples scattered throughout this document. Certification has been viewed as a mechanism to demonstrate robust quantification of removed carbon, but in fact has a much wider array of uses. It can support the compiling of national GHG inventories, allow the comparison of CDR performance of different projects to guide investments, support value for money in public CDR decision-making, be an eligibility requirement for receipt of funding or participation in public procurement, provide assurance of co-benefits, and generally act as a quality label for climatically and environmentally sound CDR activities. **Leveraging certification frameworks like the CRCF in novel ways could substantially accelerate CDR development to make climate neutrality a much more credible prospect**.

Policymakers, corporates, and standard-setting bodies must take action to address the demand gap surrounding the uses of carbon removal, by embodying a diverse array of new uses. New policy and guidance can guide companies across various sectors, public bodies, and land stewards to adopt CDR for different reasons, diversifying revenue streams towards CDR scale-up whilst ensuring ecological sustainability and climate integrity.



GLOSSARY

Certification – A system that sets standards for how CDR activities should be conducted, as well as requirements for how that performance is assessed and validated. Certification is important to underpin CDR activities as it guides how CDR is quantified.

Compensation – While the Science Based Targets Initiative has phased out this term in favour of “neutralisation”, Carbon Gap uses compensation as a catch-all term to refer to the use of CDR units to address and counterbalance specific emissions elsewhere.

Contribution – Refers to a corporate climate practice whereby payments are made to support a climate mitigation activity, but in contrast with compensation, these do not lead to quantitative claims by the buyer. Firms therefore explicitly claim to “contribute” to climate outcomes, but do not link in any way these outcomes to their own emissions.

Hard-to-abate – Refers to emissions that cannot yet be abated, due to current technology, prohibitively high costs, or high social demand for emitting activities. The fact that such emissions are likely to remain even when deep abatement has been undertaken necessitates the use of CDR to achieve net zero. A widely agreed definition for such emissions has not yet been established.

Like-for-like principle – Also known as fungibility, like-for-like refers to a state of durable net zero where carbon fluxes are properly balanced. According to this principle, any CO₂ emissions should be matched by removals of equivalent character. Namely, emissions deriving from geological sources (such as emissions from combustion of fossil fuels or process emissions from cement production) should only be addressed with permanent carbon removals, ensuring carbon is returned to the geosphere. In turn, emissions from the biosphere can be addressed with biogenic removals.

Mitigation deterrence – Refers to the risk of delaying or stopping emissions reductions due to the availability of alternative mitigation options, among them carbon removal. Mitigation deterrence can arise through several pathways: “substitution and failure”, “rebounds”, and “mitigation foregone”. For more information about how mitigation deterrence may arise and how it can be addressed, see Carbon Gap’s paper, *How to avoid carbon removal delaying emissions reductions*.⁷

Social cost of carbon – A quantification of the “quantifiable costs and benefits of emitting one additional tonne of CO₂ in monetary terms”.³⁵

Residual emissions – Refers to emissions that remain after deep abatement has been undertaken. Such emissions are “hard to abate” due to current technology, prohibitively high costs, or high social demand for emitting activities. A widely agreed definition for such emissions has not yet been established. The terms “hard to abate” and “residual” are often used interchangeably – however, residual emissions are increasingly conceptualised as those expected to remain in the long-term, while hard-to-abate emissions may be those that cannot be abated today.

Use cases – A “use case” refers to the motivation for a stakeholder to engage with carbon removal activities, recognising the circumstances and end goals of these engagements are diverse. Use cases vary in terms of the identity of any user (e.g. a company, a government), the purpose of the use (e.g. demonstrating compliance with a regulation, making a public claim), how it is paid for (e.g. by purchasing a certified unit, investing in project development, donating to non-profit organisations working on CDR) and how the climate benefit is accounted for (e.g. retired to substantiate a claim, counted towards a given country’s NDC, or both where allowed).

³⁵ Carbon Brief (2017). THE SOCIAL COST OF CARBON. www.carbonbrief.org/qa-social-cost-carbon [Accessed 30/07/2024]

About Us

Carbon Gap is an independent, Brussels and UK-based non-profit **organisation** supporting Europe's unique opportunity to lead the responsible deployment of carbon dioxide removal (CDR) to fight climate change through independent and science-led advice.

The logo consists of a dark grey rectangle above the word "Carbon" in a bold, dark grey sans-serif font. To the right of "Carbon" is a blue square containing the word "Gap" in a bold, white sans-serif font.

Carbon Gap

Get in touch

 <https://www.linkedin.com/company/carbongap/>

 <https://twitter.com/carbongap>

 contact@carbongap.org

 www.carbongap.org

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