

Carbon dioxide removals action guide

DRAFT 14 April 2025 - for consultation

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# 1. About this guide

This guide outlines key actions for integrating carbon dioxide removals (CDR)[[1]](#footnote-1) into corporate climate action. It builds on the principles introduced in the [Exponential Business Playbook 4.1](https://exponentialroadmap.org/the-exponential-business-playbook/) in 2025 which recommends that companies should:

* include in their net zero target statements the volume of CDR they are likely to require
* start investing in removals now, with interim milestones for increasing volumes towards net zero
* invest in diverse CDR portfolios, with different drawdown times, storage durations and reversal risks
* increase the average durability levels of their CDR portfolios over time
* report publicly on CDR volumes, drawdown times, expected durability, potential reversal risks, any co-benefits, and retirement dates of CDR credits

This guide is for companies that want to know the practical steps they should take to integrate CDR into their broader net zero plans.

# 2. The role of CDR in reaching net zero

Corporate net zero goals are derived from the global aim of achieving net zero, which is: “when anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period” (IPCC definition).

Companies with net zero targets commit to counterbalancing their own residual emissions at organizational net zero with removals with long durability storage. But most companies with net zero targets have yet to start planning for how they will do the counterbalancing and assume they can start thinking about it many years from now, as they approach their net zero target date.

The CDR industry, however, is nascent and needs investment to reach the scale required. If companies don’t invest in removals now, the technologies and projects won’t exist when they need them at net zero. That’s why evolving net zero standards and regulations are starting to steer companies to start addressing today their future residual emissions.

# 3. Seven key actions to build your CDR capacity

*[Illustration of the seven key actions, as icons in a flowchart, to be added here]*

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## Action 1: Integrate CDR into business strategy

As part of a credible transition plan, your company should consider how CDR can best be incorporated into the business.

Start by considering these questions:

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| --- |
| **Q1: Is it possible to embed removals into our business operations?**  This depends on the nature of your operations. Examples of business operations into which removals can be embedded include:   * industrial processes that incorporate biomass eg pulp and paper, waste incineration, water utilities, * production of building materials into which carbon can be incorporated * operations producing waste stone that could be crushed for enhanced rock weathering eg mining, quarries, cement * operations producing waste biomass that could be turned into biochar.   In several of these examples, removals can be part of a circular strategy, transforming waste to value and even becoming a revenue generator rather than a cost. |

|  |
| --- |
| **Q2: Would it make sense to invest in removals within our value chain?**  For other industries, removals can take place within value chains (sometimes called insetting). For instance, companies within the agrífood or furniture sectors can work with farmers or forest owners, or with retailers, to incorporate removals into their operations, which can be part of a broader Scope 3 engagement strategy. However, remember that you will not be able to count this as both counterbalancing and net reductions to your inventory. |

If neither of the above are relevant, or if they would cover only a small proportion of your company’s anticipated residual emissions, you should start now to develop a diversified portfolio of CDR credits. Buying CDR credits will be the dominant approach for most companies today and is a valid option, as long as it is part of a robust net zero strategy.

How you integrate CDR into your business strategy will vary depending on sector, net zero target date, size, strategy and location – and could evolve over time - but will involve one or more of these three approaches.

[*Note: graphic to be inserted to illustrate the approaches for CDR: (1) within operations, (2) within value chain, (3) purchasing credits*]

When developing a removals plan, you should keep these five aspects in mind:

1. Start now to build a robust CDR portfolio, learning what is out there, how it is managed, locking in supply and prices.
2. Support the scale-up of nascent high-durability CDR to ensure their availability at scale at net zero – otherwise the ‘net’ part of the net zero target is theoretical rather than real.
3. Include removals that have fast drawdown to slow the pace of warming.
4. Shift your CDR portfolio over time towards removals with high durability.
5. Embed CDR into decarbonization strategies where relevant.
6. Identify co-benefits that align with SDGs, such as biodiversity protection, crop yield, improved air and water quality, and clean development.

## Action 2: Calculate anticipated residual emissions

Residual emissions are those emissions that remain once a company has taken all available measures to decarbonize[[2]](#footnote-2). Exact definitions vary and the actual volume of residual emissions once net zero is reached will depend on:

* the evolution of a company’s business activities during its transition to net zero
* the development of technological options for decarbonisation
* whether ‘available’ is defined as referring only to technological feasibility or also to economic feasibility, and
* whether all three scopes of emissions are assumed to be included when organizational net zero is reached.

By setting long-term emissions reduction targets, you have already committed to an ‘anticipated’ level of residual emissions. Despite the lack of certainty about the exact definition and the exact quantity, the residual emissions level implied by your net zero target provides a good starting point. You need to start today to ensure that sufficient removals are available at the scale, durability and price you will need to achieve net zero.

Over time, you will need to shift to reality-based, bottom-up estimates of residual emissions. But for now, if your emissions reduction target is 90% from a given base year, the anticipated residual emissions are 10%. That translates into a known amount of tonnes based on your base year GHG inventory.

The anticipated volume of residual emissions should be clearly stated in transition plans and other net zero documents. You should review your anticipated residual emissions at least once every five years until the anticipated volume matches reality at net zero.

## Action 3: Select the trajectory approach

There are two approaches to planning the trajectory for scaling removals over time and transitioning to long-term durability; one based on volume and one based on budget. Each approach has different advantages and disadvantages which makes them suitable for different organisational contexts.

In the volume-only approach the volumes or amounts of CDR determine the intermediate and final targets of your trajectory as well as the possible portfolio composition and determine the required budget. This approach is most suitable for setting long-term objectives and milestones as in the short-term it can lead to a race to the bottom – buying or investing in the cheapest projects or credits to cover the most tonnage without reaching strategic goals.

A budget-only approach helps avoid the race-to-the-bottom risk, incentivises the diversification of CDR portfolio and allows for a certain degree of flexibility in investment strategies. The budget formation options described in Action 4 are applicable for this approach as well.



The optimal strategy would be to incorporate both approaches into trajectory and milestones. The overall strategy for the CDR portfolio evolution should be driven by the required volume of removals at net zero, but the interim decisions made according to a budget-based approach.

## Action 4: Determine funding model for CDR

A well-defined financial plan is needed to build, support and expand a portfolio of removals, whichever approach you take. The plan should allow your organisation to absorb the cost of building up durable CDR capacity, which has a considerably higher cost per tonne than most carbon removals credits.

There are a range of options to allocate the necessary funds. Any of these options can be used to secure funds for either budget-based or volume-based models for your removals trajectory:

1. **Pre-determined annual amounts** – fixed amounts allocated each year for CDR, with gradual annual increases to allow for planned increases in volume and durability.
2. **Internal carbon fee** – an internal tax levied on part or all of a company’s GHG emissions and increasing over time, to encourage decarbonisation while building up a budget for CDR.
3. **Small premium** charged to multiple customers in relevant areas (e.g. marathon entrance fee, airline tickets) to create a ring-fenced budget for CDR.
4. **On balance sheet investment vehicle** to buy and trade carbon removals.

You should select a model that fits with your company’s broader climate strategy.

## Action 5: Define your trajectory and milestones

Having identified the amount of CDR required to counterbalance anticipated residual emissions and planned how to pay for them, you should create a trajectory to reach the target, with milestones along the way (alongside interim GHG reduction target milestones). This trajectory should ensure that the company can reach the volume and durability of CDR needed to counterbalance its residual emissions at its net zero target date, and continue to do so each year thereafter.

There are different options for defining a trajectory and the choice will depend on how you decide to incorporate carbon removals into your broader strategy:

[*Illustrations to be added for the two approaches below*]

1. **Linear trajectory**

Draw a linear trajectory from zero at the emissions base year to the anticipated residual emissions level at the net zero target date, with incremental increases each year and milestones and reviews at 5-yearly intervals. The durability of the removals should increase as the company progresses towards net zero.

*Initial volume: automatically determined*

1. **Stepped ramp-up**

Calculate the cumulative removals implied by a linear trajectory (the area under the curve) and plan for a ramp-up, increasing the volume and durability of removal purchases or investments using a step-wise approach.

*Initial volume: set a minimum based on volume or budget*

The implied amount of removals needed at net zero will most likely change as the actual level of residual emissions becomes clearer so the milestones will need to be adjusted. A company with an earlier net zero target date will have a steeper upwards CDR trajectory.

## Action 6: Define a robust CDR portfolio

A CDR portfolio supports a company’s transition to net zero by building up its capacity to counterbalance its residual emissions. The ideal portfolio today will be made up of a diverse range of CDR investments and credits, balancing different methods, durability levels, times to drawdown and co-benefits. For some companies, it will include projects that are owned and/or run by the company or implemented in the value chain.

When defining the portfolio composition to meet interim CDR milestones, you should consider the following principles:

* **Include removals of varying levels of durability[[3]](#footnote-3) and reversal ris**k:
* Different CDR methods can be categorised into high, medium and low durability bands, according to their reversal risk over time[[4]](#footnote-4). Most technological removals would fall into high and medium bands, and most nature-based removals would fall into low and medium bands.
* Include from the start
  + removals with high durability and low reversal risk
  + removals from projects that support wider values and co-benefits like biodiversity protection, improved air and water quality, jobs and clean industrial development.
* **Increase the durability level of the portfolio over time**
  + Set a plan to increase durability over time to 100% high-durability at net zero. For example, starting at the first milestone with 5% high durability, 15% medium durability and 80% low durability, and shifting towards greater durability at each milestone.
  + Aim to shift towards a “like-for-like” model which matches the durability of the removals with the length of time the gases emitted remain in the atmosphere (ie using high durability CDR to counterbalance CO2 emissions and lower durability for methane emissions or contrails).
* **If buying removals credits, include a combination of ex-post and ex-ante purchases**:
* Set a share of the portfolio to be made up of CDR tonnes which can be retired immediately (e.g. spot market purchases) to ensure rapid drawdown and to prevent stockpiling of credits for later sale.
* Also include advance offtake agreements[[5]](#footnote-5) that commit to receiving delivery of a certain volume and price over a number of years in future, supporting the expansion of new supplier facilities and securing prices upfront.

[*Potential graphic: transition over time of the shift in share of the portfolio that’s from retired credits vs offtakes.*]

## Action 7: Set up accounting, reporting and communications on CDR

GHG Protocol and ISO GHG accounting rules are currently being revised, with expected implementation between 2027 and 2030. The revised standards are expected to address current gaps in how to account for CDR, both within organisations’ inventories and as interventions. Some countries and regions are also introducing disclosure requirements for removals.

Given this evolving landscape, companies should disclose targets and progress comprehensively and transparently, including records of their CDR activity, so they can easily adapt to new standards and rules. Here are some general principles you can follow:

1. Account for and report on CDR separately from the GHG inventory and non-removal credits
2. Disclose methodologies and frameworks used for accounting and reporting
3. Differentiate between CDR credits and other types of CDR in accounting and reporting
4. Ensure ongoing monitoring and verification
5. Report on anticipated residual emissions, trajectories for CDR, reversal risk and retirement of reversed CDR.

**Accounting**

Until there is a clear consensus around accounting for CDR, you are recommended to maintain a full ledger for all CDR activity, including the changes in the carbon flows and stocks over time. You should separate CDR credits from in-value-chain efforts, to allow for traceability, with further sub-classification on the basis of durability bands (see Action 5).

**Reporting and communicating**

You should publicly disclose in your net zero ambition statements the anticipated volume of residual emissions at net zero and the proposed trajectory and milestones to counterbalance that volume. The assumptions, milestones and trajectory should be clearly set out in the transition plan (internal or public), along with resource allocation plans to meet the first milestone.

**Ensuring integrity and credibility**

To ensure credibility and integrity when making claims about CDR, relevant methodologies and quality assurance mechanisms should be used. The best practice recommendation varies between in-value-chain CDR projects and CDR credits:

* If in-value-chain projects – refer to the proposed *Land Sector and Removals Guidance* offered by GHG protocol[[6]](#footnote-6) or forthcoming ISO standards.
* If CDR credits – refer to standards and guidelines offered by ICVCM[[7]](#footnote-7) or industry-specific guidelines (e.g. International Biochar Initiative[[8]](#footnote-8))

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# References and further reading

* [CDR.fyi platform](https://www.cdr.fyi) – a public data platform that tracks purchases, suppliers, and market trends in the CDR industry.

* ICVCM (n.d.) Core Carbon Principles. Available at: <https://icvcm.org/core-carbon-principles/>
* GHG Protocol (2022) Draft: Land Sector and Removal Guidance. Available at: <https://ghgprotocol.org/land-sector-and-removals-guidance>
* ERI (2025) The Exponential Business Playbook V4.1. Link: <https://exponentialroadmap.org/the-exponential-business-playbook/>
* Gogerty, Nick and Johnson, Paul, Carbon at Risk: A Value-at-Risk Approach to Carbon Removal Risk Management (February 22, 2024). Available at SSRN: <https://ssrn.com/abstract=4745542>
* International Biochar Initiative (n.d.) Biochar Standards. Available at: <https://biochar-international.org/biochar-standards/>
* IPCC, 2022: Annex I: Glossary. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.020
* SBTi (2024): Glossary. Available at: <https://sciencebasedtargets.org/glossary>.
* Smith, S. M. et al: T[he State of Carbon Dioxide Removal 2024 - 2nd Edition](https://www.stateofcdr.org/edition-2-resources). DOI 10.17605/OSF.IO/F85QJ (2024)

1. Carbon dioxide removal (CDR) – Anthropogenic activities removing carbon dioxide (CO2) from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. (IPCC, 2022). [↑](#footnote-ref-1)
2. Residual emissions – emissions that cannot be completely eliminated despite implementing all available mitigation measures contemplated in pathways that limit warming to 1.5°C with no or limited overshoot (SBTi, 2024). [↑](#footnote-ref-2)
3. Durability is a measure of the permanence of storage of the removed carbon dioxide emissions (SBTi, 2024), but exact thresholds, definitions and transition models are currently under development. [↑](#footnote-ref-3)
4. This idea is based on the [Carbon @ Risk framework](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4745542) originally developed by Gogerty & Johnson (2024) and which is currently being refined by a wider group of researchers. IPCC categorises carbon removals by the removal process and the time scale of storage. The GHG Protocol categorises carbon removals by their nature, i.e. biogenic removals and technological removals [↑](#footnote-ref-4)
5. There are different options for procuring the carbon removal credits with spot market and long-term offtakes being the most prevalent. The main difference between the two is that spot market functions akin to the regular financial market where the price fluctuates depending on the external factors, while the long-term offtakes, or rather offtake agreements, are contracts where the company pledges to purchase a certain volume of credits for an agreed-upon price during some period of time. [↑](#footnote-ref-5)
6. See [GHG Protocol Land Sector and Removals Guidance](https://ghgprotocol.org/land-sector-and-removals-guidance) for more. [↑](#footnote-ref-6)
7. See [The Integrity Council for the Voluntary Carbon Market](https://icvcm.org/core-carbon-principles/) for more. [↑](#footnote-ref-7)
8. See [International Biochar Initiative, Biochar Standards](https://biochar-international.org/biochar-standards/) for more. [↑](#footnote-ref-8)