

WHITE PAPER

RIISING TO THE CHALLENGE

**Funding CDR research,
development & innovation
for a net zero competitive EU**

February 2025

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EXECUTIVE SUMMARY

In 2024, global temperatures exceeded 1.5°C above pre-industrial levels for the first time, making it the hottest year on record¹. This alarming milestone underscores the urgency of taking bold and immediate action to mitigate climate change.

Carbon dioxide removal (CDR), alongside drastic emission reductions, will play a crucial role in fighting climate change² and supporting Europe's path to net zero and beyond. **Between 400Mt and 800Mt of CO₂ will need to be removed annually to reach EU climate neutrality by 2050³.**

To achieve this goal, the EU must prioritise the rapid scale-up of a **portfolio of CDR methods**. Scaling up the CDR sector also represents a significant economic opportunity for the EU. By 2050, it could become a EUR 220 billion annual market, creating 670,000 high-quality jobs, driving innovation, and positioning Europe as a global leader in the green economy⁴. And yet, this nascent sector is facing a number of challenges that hinder its growth and could even jeopardise its deployment at scale. Many promising CDR methods remain under-researched, and a deeper understanding is needed to optimise them, address risks, explore co-benefits and inform society in order to boost their scale-up and reach EU climate goals. A recently launched [database](#) compiled by Carbon Gap reveals over 300 remaining CDR-related questions that lack sufficient research or are underexplored. This ever-evolving tool aims to help target funding where it is most needed to accelerate CDR RD&I.

Public funding is key to unlocking technological development and innovation, especially in early-stage projects. Whilst the EU is widely regarded as a global research powerhouse, its support for CDR so far has been fragmented and insufficiently targeted. Between 2020 and 2023, excluding member state funding, the **EU has allocated approximately EUR 657 million to directly support**

CDR methods through existing programmes such as Horizon Europe (including the European Innovation Council or EIC), the LIFE Programme or the Innovation Fund. This number represents a mere 0.1% of the total projected EU climate action budget between 2021–2027. Moreover, there are no clear CDR-specific funding streams among the EU's many funding programmes, since existing calls tend to bundle CDR with carbon capture and storage (CCS), a related but distinct technology. As a result, opportunities to advance dedicated CDR research and development in Europe are limited, thereby slowing progress and discouraging innovation.

The development of the CDR sector will depend on the materialisation of a robust and diverse set of CDR methods, hence the urgency of catalysing support by harnessing the potential of a new EU funding cycle. A significant funding gap remains, for which **the EU will need to direct around EUR 2.88 to 5.85 billion⁵ in the next 15–20 years** in order to support the technical development of CDR methods and address cross-cutting research questions to get them ready for deployment.

Building on [DG RTD's analysis of research needs for climate neutrality by 2050⁶](#), which recognises **CDR as a priority EU research area in need of support**, the EU must develop a detailed roadmap with concrete actions to address remaining CDR research and funding gaps. Ahead of the negotiations for the EU budget for 2028–2034 as well as the EU's main funding programme for RD&I (that will follow 'Horizon Europe'), we propose 4 main recommendations for efficiently allocating the funding resources necessary for bringing the portfolio of CDR methods to scale.

To meet our climate goals, additional RD&I funding must go beyond the EU level. While the Commission must lead by example, success depends on a **united effort from member states and the private sector**. Now is the time for bold political commitment at all levels to drive this transformation.

¹ Copernicus, [2024 is the first year to exceed 1.5°C above pre-industrial level](#) (2025)

² IPCC, [AR6 Synthesis Report](#) (2023)

³ ESABCC, [2040 climate target and 2030–2050 GHG budget report](#) (2023)

⁴ BCG & DVNE, [Carbon dioxide removal: Europe and Germany's role in Catalyzing a Trillion-Euro Industry](#) (2024)

⁵ Carbon Gap, [Envisioning a carbon removal strategy for Europe](#) (2024)

⁶ European Commission, [Research and innovation for climate neutrality by 2050 Challenges, opportunities and the path forward](#) (2023)

Recommendations

- 1. Increase EU & member state RD&I funding for CDR. At least EUR 2.6 billion** should be committed to CDR (not including deployment needs) during the upcoming EU 7-year financial cycle 2028–2034 through the next RD&I Framework Programme and other EU funding mechanisms, as well as member states' funding schemes.
- 2. Make RD&I funding for CDR more visible, accessible and secure** by designing comprehensive funding calls that clearly and directly target a **portfolio of CDR methods**.
- 3. Leverage the full spectrum of RD&I funding schemes to address all the research priorities,** channelling resources in a coordinated way across different funding mechanisms, ensuring continuity in support across a project's lifecycle and strengthening EU CDR research communities.
- 4. Go beyond the technical aspects of CDR.** The scale-up of CDR also hinges on innovation in areas like governance and societal readiness which should either be embedded in funding calls addressing technical questions, or addressed in specific calls.

INTRODUCTION

The EU's journey to climate neutrality by 2050 is dependent on removing carbon dioxide from the atmosphere. Alongside drastic emissions reductions, the expeditious deployment of carbon dioxide removal⁷ (CDR) is essential to address both residual and historical emissions. The Intergovernmental Panel on Climate Change (IPCC)⁸ and the European Scientific Advisory Board on Climate Change⁹ both highlight the crucial role CDR must play in keeping global temperature rise within safe limits. The latter estimates that the EU will need between 400Mt and 800Mt of CDR from both the land sector and novel technologies to reach climate neutrality by 2050¹⁰.

The EU stands at a critical juncture to expand its support for the rich variety of CDR methods, which range from conventional solutions, like afforestation and reforestation, to novel methods such as direct air carbon capture and storage (DACCS) and bioenergy with carbon capture and storage (BECCS). Many novel CDR methods are still nascent and unfamiliar to the public, such as enhanced rock weathering and ocean CDR; the full spectrum of CDR methods can be found in Figure 1. Each of these approaches offers unique benefits, challenges and stages of readiness, making the **portfolio approach** not only advantageous but necessary.

There is a promising number¹¹ of **CDR start-ups** in Europe that we can rely upon to build momentum, but the right regulatory environment and sufficient support are key to keeping them in Europe and avoiding the potential loss of intellectual property to other regions that foster more favourable RD&I funding landscapes. By fostering a robust and diverse CDR ecosystem, Europe can leverage the combined strengths of multiple methods, accelerating the path to large-scale deployment while distributing risk adaptability and resilience. Leveraging this potential will also stimulate innovation across sectors.

Indeed, scaling up the CDR sector presents a **major economic opportunity** for the EU. By 2050, Europe's CDR sector could develop into a EUR 220 billion annual market, driving innovation and sustainable growth, and positioning the EU as a global leader in the green economy¹². Expanding this sector has the potential to create 670,000 high-quality jobs across Europe¹³, supporting local communities while advancing the EU's climate objectives.

The coming years will witness negotiations for a **new 7-year EU budget** (i.e., the [Multiannual Financial Framework](#) or MFF), expected to start in 2028 that will outline high-level funding priorities until 2034. The current MFF (along with NextGenerationEU) amounts to 2 trillion EUR over the 2021–2027 period, roughly a third of which is dedicated to climate action and channelled through funding mechanisms in place to advance the European Green Deal. Examining each of these funding programmes reveals a demonstrable gap in funding support for the portfolio of CDR technologies necessary to reach our climate goals.

A variety of RD&I funding mechanisms in the EU are targeting CDR methods depending on their technology readiness level¹⁴ (TRL): either to develop new technologies (TRLs 1–7) or to support the scale-up of more advanced technologies (TRL 8–11) and create a market for them. This paper analyses RD&I funding mechanisms mainly focused on technologies between **TRL 1–7**, not extending to the deployment stage. It also covers cross-cutting research questions where the TRL metric is less relevant. Based on this analysis and the insights gathered through the compilation of a CDR research gaps [database](#), this paper aims to provide informed policy recommendations that can support increased and better-targeted RD&I funding for CDR in the new EU funding cycle.

⁷ IPCC defines CDR as “anthropogenic activities that remove CO₂ from the atmosphere and store it durably in geological, terrestrial, or ocean reservoirs, or in products”.

⁸ IPCC, [AR6 Synthesis Report](#) (2023)

⁹ ESABCC, [2040 climate target and 2030–2050 GHG budget report](#) (2023)

¹⁰ Ibid.

¹¹ cdr.fyi, [Carbon Removal Map](#) (2024)

¹² BCG & DVNE, [Carbon dioxide removal: Europe and Germany's role in Catalyzing a Trillion-Euro Industry](#) (2024)

¹³ Ibid.

¹⁴ Technology readiness level, which according to the [International Energy Agency \(2020\)](#) follows a 1–11 scale defined as:

- 1 Initial idea (basic principles have been defined)
- 2 Application formulated (concept and application of solution have been formulated)
- 3 Concept needs validation (solution needs to be prototyped and applied)
- 4 Early prototype (prototype proven in test conditions)
- 5 Large prototype (components proven in conditions to be deployed)
- 6 Full prototype at scale (prototype proven at scale in conditions to be deployed)
- 7 Pre-commercial demonstration (prototype working in expected conditions)
- 8 First of a kind commercial (commercial demonstration, full-scale deployment in final conditions)
- 9 Commercial operation in relevant environment (solution is commercially available, needs evolutionary improvement to stay competitive)
- 10 Integration needed at scale (solution is commercial and competitive but needs further integration efforts)
- 11 Proof of stability reached (predictable growth)

Figure 1: An overview of the existing CDR methods

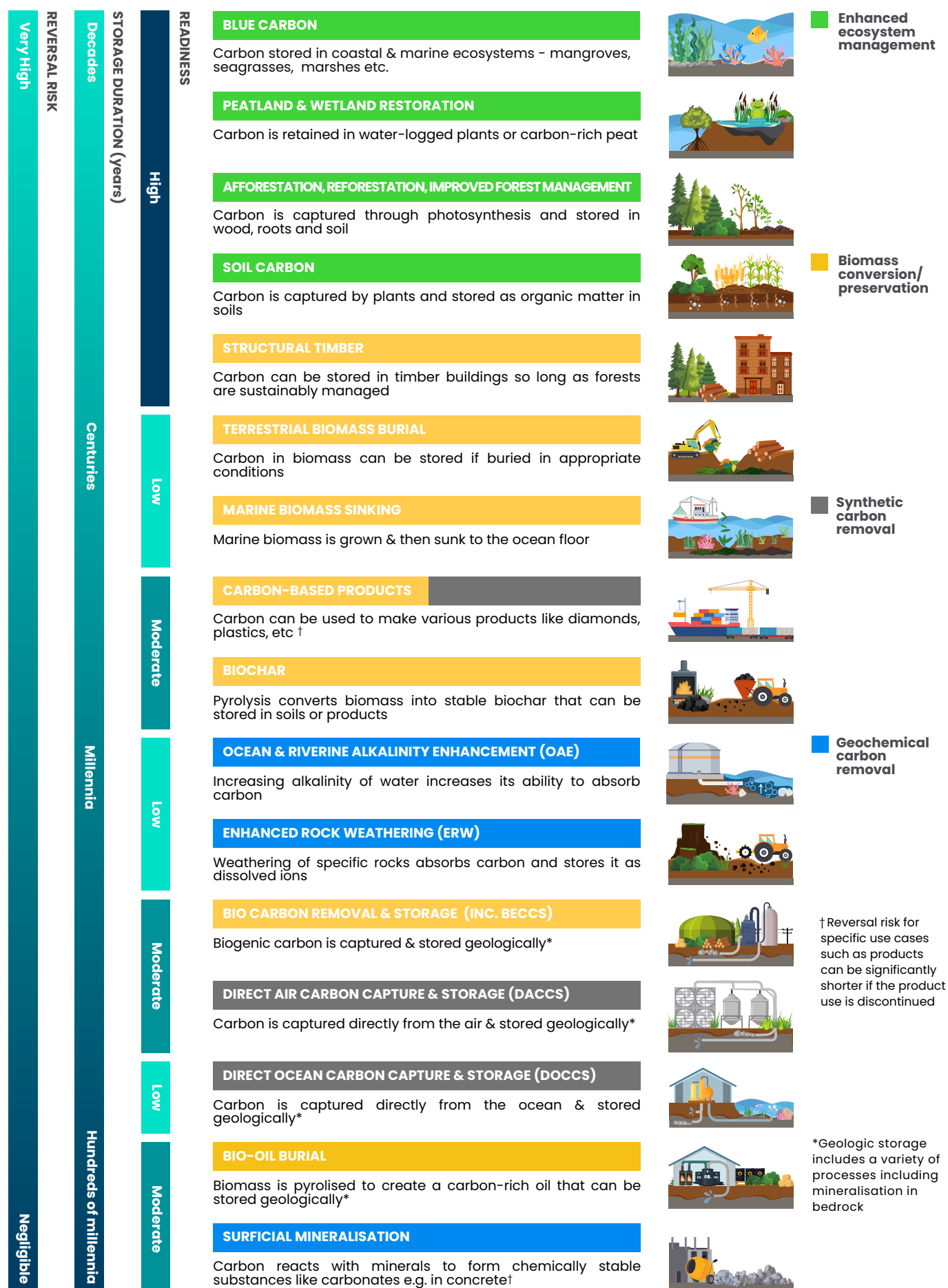


Figure 1: The portfolio of carbon removal methods are sorted based on their durability and reversal risk. Source: Carbon Gap adapted from the State of CDR and the IPCC

1. WHY DO WE NEED TO INVEST IN RESEARCH, DEVELOPMENT & INNOVATION FOR CDR?

The world needs to deploy a significant amount of CDR in order to reach climate neutrality and net-negative emissions thereafter: 5 to 10 GtCO₂ will need to be removed annually by 2050¹⁵. Achieving such goals requires high volumes of carbon removal within a short timeframe, making effective coordination across the entire CDR ecosystem critical. **Success depends on making as many CDR methods as safe, viable and resource efficient as possible.**

To succeed, RD&I must help address the diversity of challenges CDR methods currently face. As depicted in Figure 1, there are at least 16 known carbon removal methods. Yet some of them are not yet economically viable or scientifically robust, given the lack of understanding of their potential impacts. These limitations apply particularly to methods based on open systems like the ocean. These methods cannot scale up until research adequately evaluates the ‘do no significant harm’ principle. Other methods do not face such impediments but have low maturity levels, meaning they are still resource-intensive and have high uncertainty about their real potential for scale-up and adoption. Other methods might not even exist yet. Therefore, it is equally important to go beyond the functioning and impacts of CDR methods and develop the **key enabling pillars** of the CDR ecosystem. Research, development and innovation (RD&I) play a vital role in **unlocking reliable CO₂ storage and transport** options as well as ensuring that transparent, **trustworthy measurement, reporting, and verification (MRV) systems** are ready to track to validate the quality of the removals.

The need for RD&I is **not limited to unproven early-stage methods**. Beyond understanding costs, failure points and practical applications, there is also a role for RD&I to address the **cross-cutting issues** that remain to precisely quantify CDR’s climate benefits, second-order effects and societal readiness, as well as research governance options and their implications.

The EU has significantly contributed to the development of cleantech like wind and solar energy thanks to a consistent vision and a comprehensive policy approach, combining explicit targets like those in the Renewable Energy Directive¹⁶, with market creation measures such as Feed-in tariffs¹⁷. These policies, together with enduring support to RD&I since the early 2000’s through Intelligent Energy Europe (IEE), the Horizon Framework programme¹⁸, and the SET Plan^{19,20}, significantly scaled up these renewable energy technologies. A similar approach is needed for CDR, with the additional challenge of speed; CDR must grow faster with only 15 – 25 years to reach multi-gigatonnes scale.

Carbon Gap has combined existing resources (Frontier, RMI and DG RTD)²¹ and harmonised them into a [comprehensive database](#) of over 350 existent research gaps across 60 carbon removal methods that will need to be addressed to scale up CDR. This database lists the remaining unanswered questions required for policymakers, funders and ecosystem actors to better target their support. The research gaps can be grouped in five main categories corresponding to the strategic objectives that the EU’s RD&I funding should pursue (see Figure 2).

¹⁵ Smith, S. M., Geden, O., Gidden, M. J., Lamb, W. F., Nemeth, G. F., Minx, J. C., Buck, H., Burke, J., Cox, E., Edwards, M. R., Fuss, S., Johnstone, I., Müller-Hansen, F., Pongratz, J., Probst, B. S., Roe, S., Schenit, F., Schulte, I., Vaughan, N. E. (eds.) *The State of Carbon Dioxide Removal 2024 – 2nd Edition*. [DOI 10.17605/OSF.IO/F85QJ](https://doi.org/10.17605/OSF.IO/F85QJ) (2024)

¹⁶ European Commission, [Renewable Energy Directive](#) (2021)

¹⁷ Gregory Nemeth, [How Solar Got Cheap](#) (2019)

¹⁸ European Commission, [Previous Funding](#) (no date)

¹⁹ Soriano F. H., Mulaturo, F. EU Research and Innovation (R&I) in renewable energies: The role of the Strategic Energy Technology Plan (SET-Plan) doi: doi.org/10.1016/j.enpol.2011.03.059 (2011)

²⁰ European Commission, [Strategic Energy Technology Plan](#) (2023)

²¹ The carbon removal ecosystem has so far provided three main resources that look at the open research questions in carbon removal:

(1) Frontier, [Carbon removal research gaps](#) (no date): an editable resource that highlights critical knowledge and innovation gaps in carbon removal technologies categorised by attributes. It is designed to evolve with collaborative input.

(2) RMI, [Applied Innovation Roadmap for CDR](#) (2023): a comprehensive guide to advancing the technical readiness of 32 carbon dioxide removal (CDR) approaches, offering guidance and examples on research, development and demonstration needs and opportunities with the goal of helping policymakers, funders, and developers overcome challenges in scaling CDR technologies and increasing funding for carbon removal.

(3) European Commission- DG RTD, [R&I for climate neutrality by 2050](#) (2023): a report that looks at R&I needs to reach climate neutrality by 2050 in the context of a forthcoming new Framework Programme for R&I. The results identify CDR as a key solution in need of R&I support and highlights the critical gaps that require attention.

Figure 2: Strategic objectives for RD&I funding for CDR

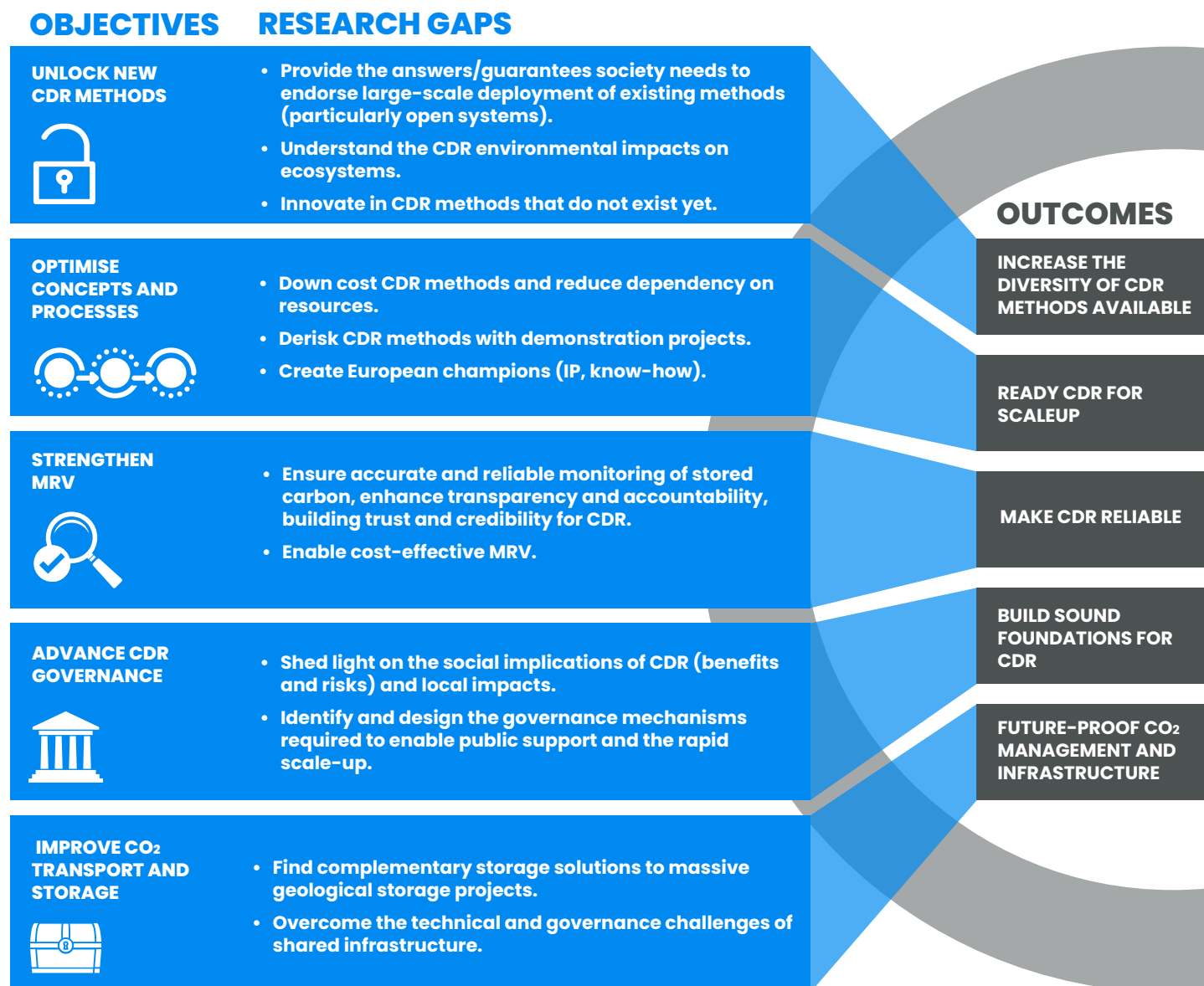


Figure 2: The 351 research gaps Carbon Gap compiled have been categorised according to five strategic objectives for scaling carbon removal.
Source: Carbon Gap, [CDR Research Gaps Database](#) (2024).

Of the five categories identified in the database, the first refers to research questions aimed at **expanding the range of viable and accessible CDR methods**. These gaps address current uncertainties in unlocking the progress of some CDR methods due to major roadblocks. Examples include understanding the impacts in open systems (gaps 146, 147, 150 in the [database](#)) and identifying sites for biomass storage, alkalinity creation and coastal dispersion (142, 151, 160). This category also includes funding research for alternative or undiscovered CDR approaches to maximise our current portfolio of methods. Addressing these research gaps can not only reduce scale-up efforts and resource pressure but also better distribute co-benefits across territories. A greater diversity also mitigates the risk that some CDR methods may not scale as expected. It is therefore a strategic investment to address these gaps and secure our capacity to meet our climate goals.

The second category covers those research gaps that aim at **making the existing CDR methods more efficient** and, therefore cost-effective and viable. Such gaps include developing innovative materials that can help reduce the energy consumption of direct air capture (DAC) (database no. 221), testing enhanced rock weathering in a diversity of field conditions (42), or optimising the energy needed to grind and move the rocks required for alkalinity or weathering enhancement (205).

Answering these unknowns and optimising the physical performances of CDR methods will reduce their costs and facilitate their adoption in a broader set of contexts. There is also a strategic component to this second category of research gaps; the EU can generate intellectual property and industrial champions when creating highly competitive technologies.

The third category of research gaps deals with the **MRV protocols** needed to increase the credibility of the CDR methods. It includes innovating methods to gather reliable data more efficiently and inform lifecycle accounting and technoeconomic assessments (database no. 114), develop sensors and field tools for ocean and geochemical CDR (234), or methods to monitor the stability of stored biomass (212). Trust is a key ingredient for CDR's success, not only to create durable demand but also to increase societal support and guarantee a genuine climate benefit. Robust, transparent and cost-effective MRV protocols are a key asset for scaling CDR successfully and can also create economic opportunities for those companies with the most reliable and cost-effective methods.

The research gaps in the fourth category address the **cross-cutting issues of governance and justice** in deploying CDR, including researching legal frameworks to enable the safe development of bio-based removals (preserving food production, natural sinks and other priority land uses; database no. 308), incentivising the emergence of CDR projects while strengthening societal readiness or participation so as to address the recurring issue of local opposition (347), modelling to avoid perpetuating environmental injustices (346, 348, 349), or characterising public perceptions of carbon removal (345, 351).

CDR is new and involves the construction of new infrastructure; it can therefore potentially compete for resources with other uses and pose the risk of [mitigation deterrence](#)²². These concerns point towards a genuine governance gap that needs to be filled if the EU is to implement the regulations and safeguards that society needs to support CDR in the long run. European society is particularly sensitive to the conditions in which new technologies are being developed, making this category of research gaps as strategic an investment as the more technical ones.

Finally, the last category of research gaps deals with the challenges in creating **CO₂ transport and storage infrastructure**. The creation of shared infrastructure poses technical challenges (gas specifications) that then raise questions about optimisation at the value chain level – e.g. individual versus grouped facilities to reach the agreed gas specifications. Whilst a lot of attention has been put on massive, centralised CO₂ storage reservoirs, exploring new locations and methods for geological storage (database no. 314, 179, 140) would be highly beneficial and reduce the need for transport. Moreover, synergies need to be revealed, for example by identifying potential routes and locations that can foster CO₂ transport and storage hubs (327). The infrastructure soon to be built for CO₂ management is made of long-lasting, CAPEX-intensive assets. As such, the planning done now will define how the EU can manage CO₂ in the future, hence the importance of this category of research gaps.

CDR is still in its early stages, and many questions remain open, but it requires rapid, large-scale deployment now if Europe is to be on track for 2050. It is both a daunting and crucial challenge. For this reason, both technical and social research are highly relevant and pressing, the former to prove or disprove the merits of CDR approaches and the latter **to create adequate governance frameworks** to best support carbon removal's role in reaching climate neutrality.

²² Carbon Gap, [How to avoid carbon removal delaying emissions reductions](#) (2023)

2. WHAT IS THE EU'S CURRENT FUNDING CONTRIBUTION TO CDR?

Between 2020 and 2023, the EU **directly**²³ **disbursed approximately EUR 657 million** toward carbon removal methods through existing EU-level funding mechanisms including Horizon Europe, the European Innovation Council (EIC), the LIFE Programme and the Innovation Fund (**without accounting for funding contributions from member states**), representing **0.1%** of total the EU climate-dedicated budget in the current funding cycle (2021-2027)²⁴. Likewise, the **indirect disbursed funding amounts to EUR 4.03 billion**. To put this effort into perspective, the USA disbursed **EUR 2.59 billion**²⁵ between 2018 and 2024, marking a significant difference in comparison to the European Union. Most of the USA funding has been directed to the construction of DAC hubs. A full methodology of how these EU funding amounts were synthesised based on definitions of direct and indirect funding can be found in the Annex.

Addressing global RD&I needs: An EU-US perspective

Global funding estimates for carbon removal RD&I needs are between **EUR 16 billion** and **EUR 32.3 billion** required over the next 15 to 20 years. Based on the "Applied Innovation Roadmap" by RMI, which estimates the investment needed for research, development and demonstration (RD&D), adjusted per inflation using the Consumer Price Index 2022 (World Bank). This investment is essential to support the development of CDR methods and scale them to the levels suggested by IPCC models. By approximating the contribution of each country based on their share of global GDP, the USA and EU contributions would amount to **EUR 3.79–7.68 billion** and **EUR 2.88–5.85 billion**, respectively for RD&I (not including deployment funding). Figure 3 shows how both jurisdictions are falling short, despite the USA spending twice as much as the EU.

Since 2020, the level of research, development and demonstration (RD&D) funding for carbon removal has significantly increased in the US. A key difference in the US approach to (RD&D) funding for CDR is that the US has specifically funded CDR-specific RD&I programmes and large-scale demonstration of higher-durability removals, specifically DACCS²⁶. The 2021 [Bipartisan Infrastructure Law](#)

Figure 3: An EU-US comparison of current spending and estimated funding needs (EUR) for RD&I on CDR

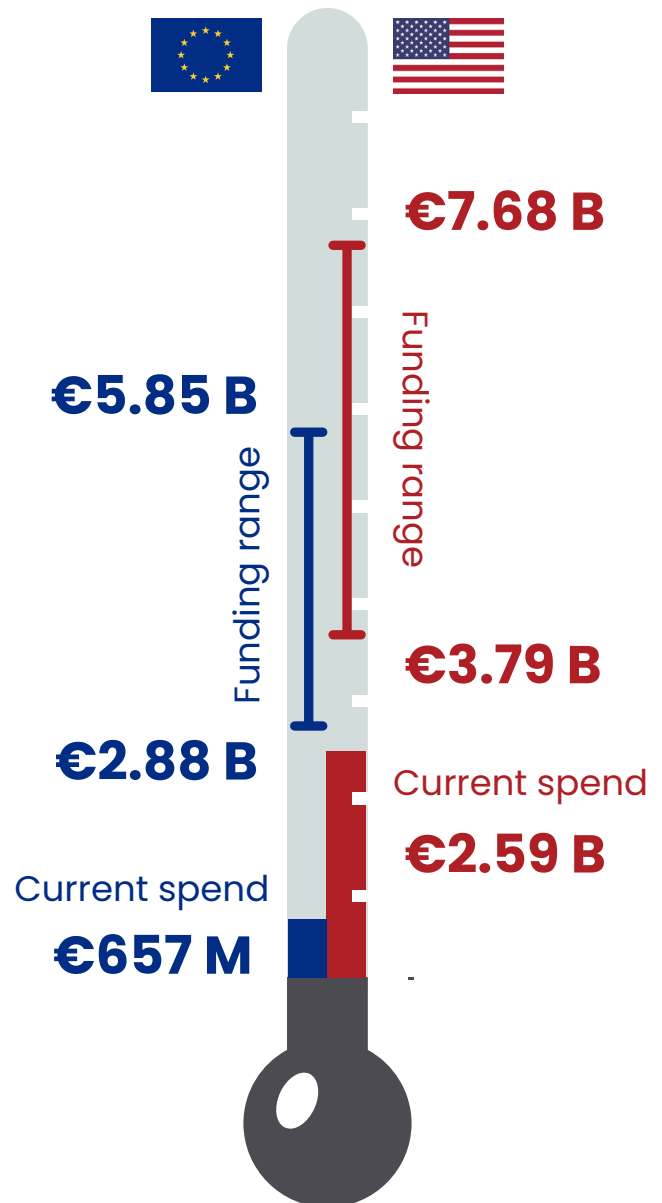


Figure 3: The figure shows current volumes of RD&I funding disbursed to CDR in the EU and the US (filled bars) compared to estimated requirements to address pending research gaps over 20 years (indicative ranges). This figure is based on updated numbers from Q4 2024. Source: Carbon Gap, [Envisioning a Carbon Removal Strategy for Europe](#) (2024).

²³ See Annex

²⁴ The EU has projected to invest around EUR 657.7 billion between 2021-2027 in climate. This amount is not limited to RD&I, but rather meant to be mainstreamed across all policy initiatives that relate to climate.

²⁵ US estimates are based on Carbon 180, [CDR Funding Tracker](#) (2024) and include only direct and targeted funding for CDR and the share of committed funding that has been effectively disbursed to date but excludes adjacent funding that can indirectly contribute to CDR development and the rest of the committed bills to be disbursed in the future.

²⁶ Dedicated analysis of funding for CDR in the EU versus US comes from Carbon Gap, [Carbon Removal Policy Tracker](#) (2024)

(BIL) provided several billion dollars to support demonstration projects for direct air capture and to support the buildout of enabling infrastructure like geologic sequestration and CO₂ pipelines. The US has put a strong focus on DAC, notably with the DAC prize (USD 115 millions), and DAC hubs programme (USD 3.5 billions). Most recently, the US Department of Energy (DOE) announced up to \$1.8 billion in new funding for transformational direct air capture technologies²⁷. The [CHIPS and Science Act](#), which was signed into law in late 2022, includes USD 1 billion in authorised funding for carbon removal research, development and demonstration activities for fiscal years 2023–2026.

Annual budget appropriations in the USA were also increasingly used for CDR, with the DOE being the main recipient so far. The budgets targeted to CDR increased from less than USD 10 million before Financial Year (FY)

2019 to USD 140 million in FY23. Beyond DAC, the National Oceanographic Partnership Program, used appropriations and other funding to provide [USD 24.3 million](#) to 17 projects in 2023 to advance ocean CDR research. Funding for nature-based solutions is also provided to the [US Forest Service](#) (USFS) and [US Department of Agriculture](#) (USDA), which received [USD 300 million](#) under the inflation reduction act, to improve measurement, reporting and verification for carbon sequestration in climate smart agriculture and forestry.

In the EU, direct support provided so far has been channelled mainly through Horizon Europe, the European Innovation Council (EIC), the LIFE programme and the Innovation Fund. CDR only forms a minute portion of total climate funding in the EU (see Figure 4), despite varying amounts disbursed in all these EU programmes. Notably, only Horizon Europe and the EIC have sent out dedicated calls for carbon removal.

Figure 4: Direct RD&I funding for carbon removal at the EU level

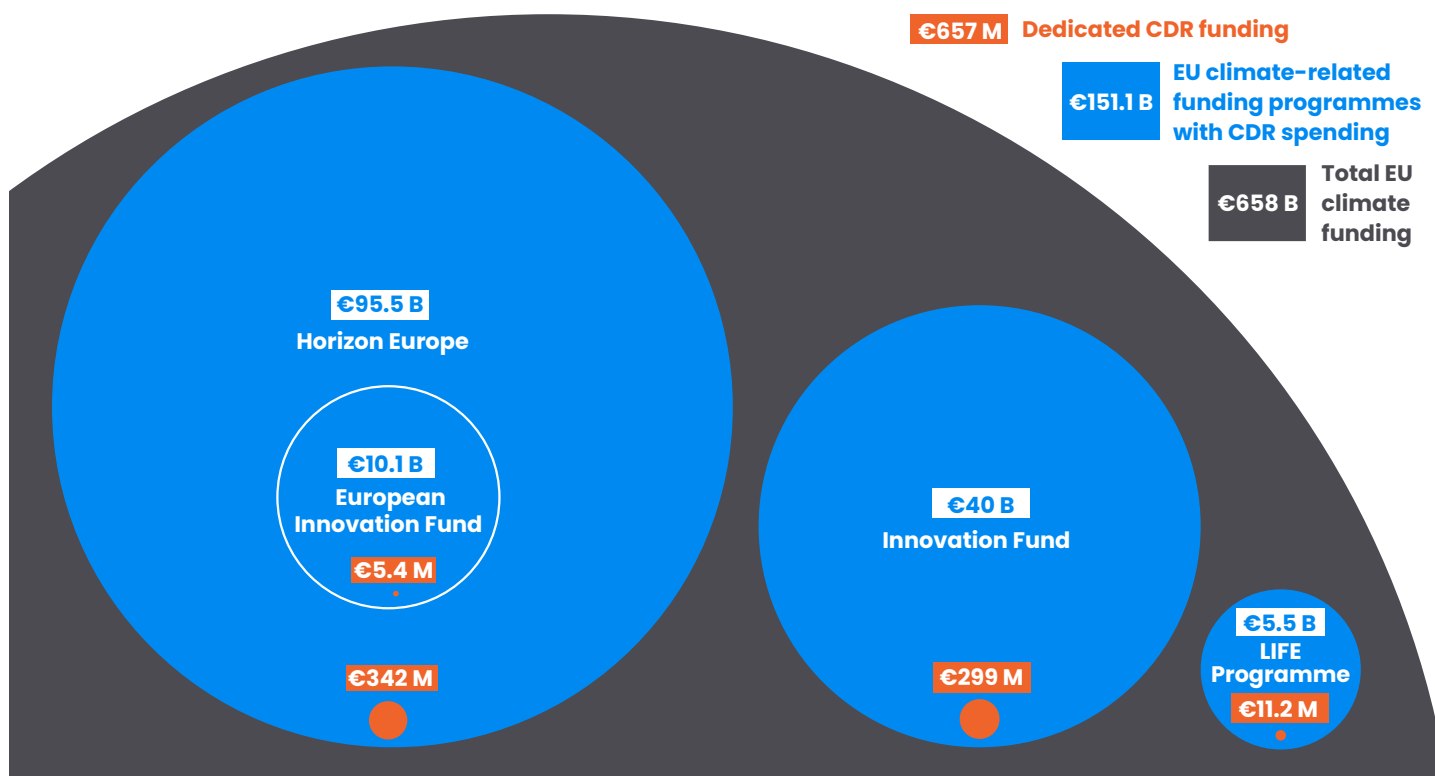


Figure 4: The total EU climate funding (excluding member state funding). The total climate budget corresponds to the projected budget to be allocated to climate action by the EU between 2021–2027, whereas calculations for dedicated CDR funding correspond to the years 2020–2023.

Source: Carbon Gap's mapping of EU funding opportunities Carbon Gap, [Carbon Removal Policy Tracker](#) (2024); European Commission, [Climate mainstreaming](#) (2024).

²⁷ United States Department of Energy, [OCED Announces up to \\$1.8 Billion in New Funding for Transformational Direct Air Capture Technologies](#) (2024)

Funding opportunities for carbon removal at the EU-level are often clustered with CCS. Although such calls don't exclude CCS-related CDR methods, such as DACCS and BECCS, focusing on CCS rather than CDR can limit the visibility of CDR and does not include the large family of removal methods that don't involve CCS, like ocean CDR, enhanced rock weathering or land-based removals.

In other instances, funding calls are vaguely worded and lack clarity on eligibility for carbon removal. EU funds such as the Just Transition Fund and the Recovery and Resilience Facility (RRF) are generally available for the green transition; the Common Agricultural Policy (CAP) should technically be open to land-based carbon removal, though the nature of these funds makes mapping funding difficult.

Despite recent developments such as the funding pledged under the Industrial Carbon Management Strategy (ICM) and the latest call for pilot projects in the Innovation Fund that include carbon removal, the EU's approach to funding CDR has been **dispersed and unfocused**. So far, RD&I funding for CDR has been guided by neither an investment plan nor a coordinated research plan to outline priorities, and no dedicated bucket of funding or CDR RD&I-specific programmes yet exists. The recent publication of the [DG RTD report](#)²⁸ (included in the [research gaps database](#) accompanying this report) is a welcome development, suggesting that CDR could soon become a proper RD&I topic with its own priorities, providing the very first signals for an innovation plan.



EU funding mechanisms: a comprehensive breakdown of CDR support

1. Horizon Europe

[Horizon Europe](#) is the European framework programme for research and innovation covering the 2021-2027 period. It is the EU's main funding programme in this area, and operates a **EUR 95.5 billion budget**, covering a vast range of topics supporting the Union's policies and the road to the UN's Sustainable Development Goals by generating knowledge, incentivising the competitiveness and growth of the EU and strengthening the impact of RD&I. The programme is divided into three pillars. Pillar I ("Excellent Science") is meant to strengthen the excellence and competitiveness of the EU's scientific base, putting an emphasis on supporting early-stage researchers, enhancing mobility and training, and improving the research infrastructure, through programmes such as the [Marie Skłodowska-Curie Actions](#) and the [Research Infrastructures](#) respectively, which should contribute to creating European scientific communities. Pillar II and III are discussed below, since most relevant project funding calls for CDR are found within them.

1.1 – Horizon Europe – Pillar II

Within Horizon Europe, Pillar II has committed funding to CDR-related topics (directly and indirectly), including calls with a high potential for spillovers in both the 2021-2022 and 2023-2024 work programmes. The number of calls indirectly related to carbon removals found in both periods, – ranging from CCS and CO₂ infrastructure projects to digital solutions and MRV – is higher than those with a direct link to CDR, such as blue carbon, carbon sequestration and BECCS projects. For context²⁹, the funding allocated directly to CDR projects amounted to about 1.1% of the total budget for 2021-2022 and 1.2% of the 2023-2024 total budget. Direct and indirect funding for CDR reached 3.8% of the total 2023-2024 budget, instead of the 1.8% allocated for 2021-2022³⁰. The breakdown of funding for projects directly and indirectly related to carbon removal can be found in Figure 5, based on funding across the three main types of support in the programme: Innovation Actions, Research and Innovation Actions, and Coordination and Support Actions.

²⁸ European Commission, [Research and Innovation for Climate Neutrality by 2050](#) (2023)

²⁹ Methodology note: 2021-2022 and 2023-2024 are not compatible due to improvements in the methodology followed to map carbon dioxide removal (CDR) projects.

³⁰ Carbon Gap, [Carbon Removal Policy Tracker – Horizon Europe](#) (2024)

Figure 5a: Horizon Europe Pillar II Indirect and direct funding for CDR (2021–2024)

	Funding related to CDR	2021–2022			2023–2024		
		Funding Calls	Funding (€)	Projects	Funding Calls	Funding (€)	Projects
INNOVATION ACTIONS	Directly	1	6 M	1	3	43.8 M	6
	Directly & Indirectly	2	64 M	3	13	241.8 M	32
RESEARCH & INNOVATION ACTIONS	Directly	10	169 M	25	11	117 M	17
	Directly & Indirectly	12	190 M	27	27	264 M	44
COORDINATION & SUPPORT ACTIONS	Directly	2	6 M	2	–	–	–
	Directly & Indirectly	4	31 M	4	2	9 M	5
TOTAL	Directly	13	181 M	28	14	160.8 M	23
	Directly & Indirectly	18	285 M	34	42	514.8 M	81

Figure 5b: CDR Funding Share in Horizon Europe (2021–2024)

	Funding related to CDR	2021–2022		2023–2024	
		Funding (€)	% of Budget	Funding (€)	% of Budget
Horizon Europe	Total Budget	16 B	100%	13.5 B	100%
	Directly	181 M	1.13%	160.8 M	1.19%
	Directly & Indirectly	285 M	1.78%	514.8 M	3.81%

Figure 5a & 5b: The years 2021–2022 and 2023–2024 are not compatible due to improvements in the methodology followed to map CDR projects
Source: Horizon Europe's 2021–2022/2023–2024 Work Programmes, Carbon Gap's mapping of EU funding opportunities – Carbon Gap, [Carbon Removal Policy Tracker](#) (2024).

Projects applying for Horizon Europe funding have, on average, a [16%](#)³¹ success rate. This value varies according to the different pillars, but even a [21% success rate for the Climate, Energy and Mobility cluster](#)³² is still significantly low enough to show, beyond a limited budget, the complexity of the application procedures and the high opportunity cost and significant resources that are invested into an application with a high possibility of failure. For a nascent

sector such as carbon removal, this barrier poses a big challenge, since a large proportion of applications are early-stage start-ups or small companies that struggle with being able to devote financial and physical resources to understanding complex requirements and preparing applications, or simply cannot comply in time with the full lists of to-dos, potentially resulting in unsuccessful applications or companies deciding not to apply at all.

³¹ [Horizon Dashboard](#) (2024)

³² Ibid.

1.2 – Horizon Europe Pillar III – European Innovation Council Funds (EIC Funds)

The [European Innovation Council](#) is part of pillar III (Innovative Europe) of Horizon Europe, with a total budget of **EUR 10.1 billion** between 2021–2027. It focuses mainly on promoting breakthrough, deep tech and disruptive innovation with scale-up potential at the global level and supports all stages of innovation from research and development to the scale-up phase.

Support for CDR is available within the EIC, broken down among the various subprogrammes (Pathfinder, Transition, Accelerator – see breakdown in Figure 6), although it is not always made explicit through ‘challenge’ thematic calls. In total, **EUR 5.4 million** were attributed to direct CDR projects over the period 2022 – 2023, a mere 0.17% of the total EIC budget. Similarly, direct and indirect CDR projects were granted together EUR 16 million over the same period, representing only 0.40% of the total³³.

Figure 6: Funding in the European Innovation Council directed to carbon removal (2022–2023)

		2022		2023	
		Total Funding (€)	CDR Funding (€)	Total Funding (€)	CDR Funding (€)
EIC Pathfinder	Open Calls	183 M	–	180 M	3 M ^a
	Challenges	167 M	7.7 M ^b	164 M	–
EIC Transition	Open Calls	71 M	–	68 M	2.3 M ^c
	Challenges	61 M	–	61 M	–
EIC Accelerator	Open Calls	631 M	–	612 M	–
	Challenges	537 M	3.1 M ^d	523 M	–
EIC Total Budget		1.650 B	10.8 M (0.65%)	1.608 B	5.3 M (0.33%)

^a: Indirect funding for carbon dioxide and nitrogen management and valorisation

^b: Indirect funding for Highly Efficient Reactor for Conversion of CO₂ and H₂O to Carbon Neutral Fuels and Chemicals

^c: Direct for Accelerating Energy-Efficient Atmospheric Carbon Capture Technologies

^d: Direct for Technologies for Fit for 55 – technologies and natural solutions

Figure 6: The total funding refers to the overall budget of each EIC sub-programme. The percentages of funding directed towards CDR are calculated over the total of the disbursed EIC budget, meaning the amount of money that has been allocated to present date (Dec 2024), rather than the total programme budget for the period 2021–2027. In 2021, no challenges were directly related to CDR, while in 2022, the EIC pathfinder listed ‘Carbon dioxide and nitrogen management and valorisation’ as the first of the challenges. In 2022, the EIC Accelerator under the ‘Fit for 55’ challenge explicitly touched on carbon removal techniques, including technologies and natural solutions. In 2023, novel technologies for resilient agricultures were being tackled within the EIC Accelerator, with possible spillovers to soil sequestration.

Source: EIC Work Programme 2022 and 2023, Carbon Gap’s mapping of EU funding opportunities – Carbon Gap, [Carbon Removal Policy Tracker](#) (2024).



³³ Estimations take into account the total funding dedicated to the EIC and not the total budget for Horizon Europe.

Figure 7: LIFE Spending directly and indirectly-related to CDR (2021–2023)

	Funding related to CDR	2021		2022		2023	
		Number of Projects	Funding (€) and % of Total Budget	Number of Projects	Funding (€) and % of Total Budget	Number of Projects	Funding (€) and % of Total Budget
LIFE Programme	Directly	3	7.2 M (1.16%)	0	0 M (0%)	2	4 M (0.96%)
	Directly & Indirectly	4	9 M (1.45%)	3	5.6 M (0.8%)	3	9.9 M (2.38%)

Figure 7: The total funding refers to the overall budget per call year of the LIFE programme. The percentages of funding directed towards CDR are calculated over the total of disbursed budget per call year based on the amount of money that has been allocated to date, rather than the total programme budget for the period 2021–2027.

Source: LIFE programme calls 2021, 2022 and 2023, Carbon Gap’s mapping of EU funding opportunities – CarbonGap, [Carbon Removal Policy Tracker](#) (2024).

The [2024 work programme](#)³⁴ identified an open challenge titled ‘Towards cement and concrete as a carbon sink’ – that could potentially fund projects relevant to CDR, but results are not yet available. The [2025 work programme](#)³⁵ was released in October 2024 and included a [Strategic Technologies for Europe Platform \(STEP\)](#)³⁶ scale-up pilot call within the EIC Accelerator to support the scaling up of strategic technologies. As part of the implementation of the STEP, the call is open to CCS, carbon capture and utilisation (CCU) and CO₂ transport projects, with no direct mention of CDR, although open funding remains potentially available upon application.

The success rate of applications to the EIC is still significantly low, around **11%**³⁷, even lower than the average for Horizon Europe. So far, only **21%**³⁸ of the projects supported are cleantech projects. It is likely that, similarly to Pillar II of Horizon Europe, the low success rate of applications does not justify the complexity of the application process, which requires time and eventually implies high administrative costs, posing a disincentive for early-stage start-ups to apply.



2. LIFE programme

The LIFE programme is one of the EU’s main funding programmes for environmental and climate action. It puts more emphasis on **nature-based carbon dioxide removal**, dedicating **EUR 11.2 million** of its **EUR 5.45 billion** budget between 2021–2027 to such projects, which usually fall under the ‘nature and biodiversity’ and ‘climate change mitigation and adaptation’ sub-programmes. Indirect funding for CDR has totalled **EUR 13.2 million** so far. Figure 7 details the number of calls, the amount of funding available to CDR and the share it represents.

New calls open every year, but for the first time in 2024, the [call for projects](#) under the ‘climate change mitigation and adaptation’ sub-programme specifically mentioned engineered carbon removal technologies. The results of this call are not yet available.

The programme has historically supported a wide range of projects with levels of readiness. It is open to all EU member states and [third countries](#) participating in the programme, but calls for projects are restricted to a list of possible technologies and approaches.

A [call](#) to enhance both the participation and quality of proposals submitted by member states and associated countries has been announced for 2025. This initiative aims not only to encourage applications but also to provide tailored support, thereby increasing the likelihood of successful submissions and overcoming the complexities of the application processes. These efforts are crucial to fully harness the available funding and maximise the potential of the projects.

³⁴ European Commission, [European Innovation Council \(EIC\) Work Programme 2024](#) (2023)

³⁵ European Commission, [European Innovation Council Work Programme 2025](#) (2024)

³⁶ The [STEP](#) was set up by the EU to support the development of critical technologies in sectors relevant to the green and digital transition.

³⁷ [Horizon Dashboard](#) (2024)

³⁸ European Innovation Council [Impact report 2023: accelerating Deep Tech in Europe](#) (2023)

Figure 8: Funding directed to carbon removal in the Innovation Fund between 2021–2023

	Funding related to CDR	2021		2022		2023	
		Number of Projects	Funding (€) and % of Total Budget	Number of Projects	Funding (€) and % of Total Budget	Number of Projects	Funding (€) and % of Total Budget
Innovation Fund	Directly	2	183.9 M (15%)	1	115 M (6.8%)	0	0 M (0%)
	Directly & Indirectly	7	790.1 M (63%)	9	1 B (60%)	10	1.5 B (30.5%)

Figure 8: The total funding refers to the overall budget per call year of the Innovation Fund. The percentages of funding directed towards CDR are calculated over the total disbursed budget per call year, meaning the amount of money that has been allocated to date, rather than the total programme budget for the entire period. In 2021, [Stockholm Exergi's BECCS project](#) received EUR 180 million and [Carbfix's Silverstone](#), EUR 3.8 million. In 2022, only one project out of 16 was related to CDR, the [Coda Terminal](#), which received EUR 115 million. In 2023, [41 projects](#) were awarded a total of EUR 3.6 billion, none of which were directly CDR-related.

Source: [Innovation Fund portfolio dashboard](#), Carbon Gap's mapping of EU funding opportunities – Carbon Gap, [Carbon Removal Policy Tracker](#) (2024).

3. The Innovation Fund

The Innovation Fund (IF) is set up to provide around **EUR 40 billion** between 2020–2030 for marketable, decarbonised industrial solutions that aim to facilitate Europe's transition to climate neutrality. The fund is based on the auctions of approximately 530 million allowances from the [EU Emissions Trading System](#) (ETS) since the latest revision in 2023³⁹.



There are no readiness requirements for IF applications, but support is generally more catered to first commercial examples and large-scale demonstrations (more in line with TRLs 6–8); yet the IF still plays a key role in bridging very early-stage innovation and commercial viability. This middle ground between demonstration and commercial scale also fosters an environment to support optimisation processes.

Although CDR projects can benefit from the IF, CDR is not listed as a targeted area, whereas CCU and CCS are. Moreover, when projects related to CDR do receive support, it is lower in comparison to technologies such as CCU and CCS. Since CDR projects are labelled as CCS, it is difficult to track exact CDR funding. A full overview of past IF funding for CDR from 2021–2023 is found in Figure 8. The EUR 4.8 billion call for projects that closed on April 2024 mentioned that pilot project funding would be open to CDR and also awarded additional points to those projects that resulted in CDR as a co-benefit. However, results show no selected project contributed directly to carbon removal.

The IF is open to a wide range of technologies and can cover up to 60% of a project's relevant costs. Since the latest revision of the ETS Directive, the maritime, road transport and building sectors also fall in the scope of the IF. CDR technologies eligible for Innovation Fund support currently only include those with a CCS component, namely DACCS and BECCS. CO₂ transport and storage infrastructure projects are also eligible and benefit CDR indirectly. Furthermore, as per the revised [ETS](#), the IF will also look at the feasibility of creating carbon contracts for difference (CCfDs). Depending on how this scheme is designed, it could benefit CDR by providing predictable financial support to CDR projects.

³⁹ European Commission, [What is the Innovation Fund?](#) (no date)

4. Important Projects of Common European Interest (IPCEI)

[Important Projects of Common European Interests](#) (IPCEIs) are initiatives led by the private sector and member states with a cross-border nature, endorsed by the European Commission. [The eligible projects must represent a clear contribution to the EU's objectives or strategies](#), including climate neutrality by 2050⁴⁰.

The funds, provided through state aid and private funding, are generally open to projects between **TRL 4 and 9/10**, since they can focus on RD&I, industrial deployment and infrastructure projects. These projects must ordinarily involve at least four member states, and their benefits must not be confined to the member state who finances the project. While there is no stated funding rate, IPCEIs can only cover eligible costs (those stipulated by the funding programme) of the forecasted projects and their funding gaps.

So far, nothing has been directed towards direct or indirect CDR projects, as there is **no IPCEI related to CDR**. The Commission announced it will consider the possibility of creating an Important Project of Common European Interest around **CO₂ transport and storage infrastructure** in the Industrial Carbon Management Strategy and will explore the topic with member states in the near future. Given that several permanent CDR methods rely on such infrastructure, **IPCEIs could become an important vector for the scaling up of CDR**.

5. Connecting Europe Facility and Trans-European Network for Energy Regulation

The Trans-European Network for Energy (TEN-E) Regulation is an EU policy aimed at connecting EU energy infrastructure, including creating a cross-border carbon dioxide network by funding transport infrastructure and infrastructure related to CO₂ storage, such as that used for permanent geological storage. Only those projects recognised by the TEN-E framework as Projects of Common Interest (among member states) or Projects of Mutual Interest (including third countries), referred to as PCIs and PMIs respectively, are eligible for funding through the [Connecting Europe Facility](#) (CEF).

Within the CEF, funding for energy (CEF-E) for the 2021–2027 period was **EUR 572 billion**, which included **EUR 641.3 million** (9.79%) to indirectly support CDR through CO₂ infrastructure projects such as CO₂ exports hubs.

A [new call for proposals](#) under CEF-E was launched in 2024 with EUR 850 million available to co-finance studies and works for PCIs and PMIs. Because PCIs and PMIs are generally large-scale infrastructure projects, TRLs do not apply to these projects, which are generally in the advanced stages of readiness (TRL 8+).

6. Recovery and Resilience Facility

The [Recovery and Resilience Facility](#) (RRF) entered into force in February 2021 and makes **EUR 723.8 billion** available to member state governments who have produced [national recovery and resilience plans](#) to be implemented by end-2026, including 37% investment for green reforms. It was conceived to mitigate the economic and social impacts of the pandemic and to support Europe through the challenges and opportunities of the green and digital transitions.

The RRF can support investment around six pillars, including the green transition, for which it could potentially support technologies such as CCS, CCU and CDR. However, **no explicit mention of CDR is made** in the guidance documents produced by the EU Commission. [Several funding opportunities](#) stemming from national recovery and resilience plans were relevant for CCS⁴¹. In its [April 2024 guidance document](#), the Commission stressed that national plans should focus on supporting the development of critical technologies recognised by the STEP, which includes CCS.

7. Just Transition Fund

The [Just Transition Fund](#) (JTF) makes a budget of **EUR 17.5 billion** available between 2021–2027 to enable the European Green Deal by supporting regions encountering socio-economic challenges related to the transition to climate neutrality. National authorities are responsible for publishing the calls for proposals under the Fund. Therefore, award criteria and requirements vary between countries. Different funding rates apply to projects selected under the Fund: up to 85% for less developed regions, 70% for transition regions, and 50% for more developed regions.

The Fund supports different kinds of projects across a gamut of categories including investments in pillars such as digital connectivity, clean energy technologies, the reduction of emissions (including the ETS under certain conditions), the regeneration of industrial sites (including the building CO₂ transport and storage facilities), the reskilling of workers (imperative for developing the CDR sector) and technical assistance⁴². This wide range of topics means CCS, CCU and CDR can potentially benefit from the support.

⁴⁰ European Commission, [Important Projects of Common European Interest \(IPCEI\)](#) (no date)

⁴¹ In Belgium, EUR 95 million to build a 'CO₂ and hydrogen backbone'. In Croatia, EUR 658 million to modernise energy infrastructure, invest in advanced biofuels and renewable hydrogen production and implement innovative CCS projects. In Denmark, EUR 27 million for a subsidy scheme to support CO₂ storage sites in the North Sea. In Finland, EUR 136 million for low-carbon hydrogen and CCS. In Greece, EUR 150 million for a CO₂ storage project called Prinos.

⁴² European Parliament, [Just Transition Fund](#) (2024)

8. Common Agricultural Policy

In its latest iteration, the Common Agricultural Policy (CAP) 2023–2027 amounts to **EUR 386.6 billion** to pursue [10 overarching objectives](#) for ensuring agricultural productivity and farmers' income while encouraging environmentally-friendly practices. Direct payments to support farmers are granted on the condition that they implement 'good agricultural and environmental conditions' (GAEC). Furthermore, 25% of direct payments are optional and require farmers to implement [eco-schemes](#) (specific to each country) rewarding environmentally friendly farming. Some GAEC and eco-schemes relate to practices improving soil carbon sequestration and thus, carbon removal.

A new obligation to protect wetlands and peatlands will be included in the CAP by 2025 at the latest, two ecosystems conventionally considered as carbon removal methods when preserved anthropogenically. The Commission will propose an improved [methodology](#) to ensure that the contribution of the CAP to climate action is correctly measured and accounted for by 2026 at the latest.

9. InvestEU

The [InvestEU Fund](#) covers a wide range of funding, from research innovation to commercialisation and scale-up. It spreads across four dimensions: sustainable infrastructure, research, innovation and digitalisation, SMEs, and social investment and skills.

InvestEU falls into a different category than the previous mechanisms since it is implemented through financial partners that invest in projects themselves; they then benefit from the protection of a **EUR 26.2 billion EU budget guarantee** which backs the investment. By increasing their risk-bearing capacity, around **EUR 372 billion can be mobilised by financial partners in additional investment**.

The InvestEU Portal (an EU database covering investment opportunities that bridge the gap between investors and project promoters) shows one carbon capture project and three projects relevant to CDR – one related to agriculture, another to wastewater treatment and one for a carbon removal investment pay tech solution – out of a total of 1182 projects. These three projects amount to EUR 1.5 million. However, none of them have reached their full financing percentage.

10. European Investment Bank and Project Development Assistance

The [European Investment Bank](#) (EIB) has invested more than **a trillion euros** both in Europe and around the world, making it one of the biggest financial institutions in the world. The bank offers loans (both for the public and private sector, including SMEs), investment in equity and funds, provisions of guarantees that can cover project risks, as well as loan portfolios. The EIB also makes available advisory services in both technical and financial fields to better guide projects, while also providing a range of mandates and partnerships to support clients.

A focus on climate and environment is just one of the bank's six priorities, yet in November 2019, the EIB decided to strengthen its environmental commitment, identifying itself as a 'the EU Climate Bank' and establishing 'the Climate Bank roadmap'. As part of this commitment, the EIB stated its ambition to increase the support directed towards climate and environmental action by committing it would exceed **50%** of its overall lending portfolio by 2025, provided the supported projects align with the Paris Agreement. This shift led to the creation of a new work framework, which contemplates accelerating the transition through green finance, ensuring a just transition, supporting Paris-aligned operations, and the build-up of accountability and strategic coherence.

The EIB offers financing support rather than public funding, falling into a separate category from most of the aforementioned mechanisms. Still, it offers **project development assistance** to small and large-scale projects that have **not received grants under the Innovation Fund**. Furthermore, it provides technical and financial advice to projects so as to increase their maturity and entry into operation in preparation for future IF calls.

Currently, three small-scale CCS and CCU projects, one biochar-based, two large-scale CCS projects, and one DAC project have been receiving project assistance by the Climate Bank. However, as mentioned, **no financial aid has been made available**.

3. HOW CAN THE EU BUILD ON ITS RESEARCH POWERHOUSE STRENGTH TO SUPPORT CDR?

The multitude of funding mechanisms explored above demonstrate the EU's position as a research powerhouse for the green transition. It has successfully spearheaded cleantech development in the past, supporting the development of climate technologies such as wind and solar power, and later becoming a key world actor in the scaling of these technologies by harnessing their environmental and economic benefits.

The EU's long-term budget, the [Multiannual Financial Framework \(MFF\)](#), amounts to over EUR 1.2 trillion (in current prices) over the 2021–2027 period. An additional EUR 800 billion funding package, NextGenerationEU, was added as a response to the COVID-19 pandemic. Out of these EUR 2 trillion, the EU committed to spend about 30% on climate action via the funding programmes that fall under the MFF, as discussed at length above.

Carbon Gap's estimations show that, so far, the EU's support towards carbon removal has represented **only 0.1% of the projected EU's budget for the green transition between 2021–2027⁴³**, which is insufficient and has not covered the full spectrum of removal methods and unaddressed questions. The remaining open questions within the portfolio of carbon removal methods indisputably prove that CDR requires dedicated funding directed towards research, innovation and development to advance these methods toward maturity and prepare them for commercial scale-up.

Ensuring priorities and unlocking potential: a new EU funding cycle

In 2025, the EU will kick start the process negotiating and adopting a few crucial EU funding mechanisms with direct relevance for CDR. Firstly, the new 7-year EU budget (i.e., MFF) will be negotiated, establishing high-level funding priorities until 2034. Alongside it, the EU will negotiate its renewed research and innovation programme (i.e., Framework Programme 10) which will succeed the currently ongoing Horizon Europe (2021–2027) programme. This new cycle will bring new budgets, allocations and priorities. But with a limited budget, addressing the growing pool of needs generated by the green transition will prove tricky. Following recent cuts to [Horizon Europe's budget of around EUR 2.1 billion](#), **the first step** in the coming years remains to ensure that the EU maintains a **high ambition** to

prioritise funding the green transition, and a **higher budget** to be pledged for **climate research and CDR** within the next funding cycle.

The second step lies in setting **a clear vision and priorities**. The Commission has recently published a flagship report that looks at what RD&I is needed to reach climate neutrality by 2050 in the context of the forthcoming Framework Programme for RD&I. The report uses a composite indicator to rank eighteen solution landscapes, including **greenhouse gas removals** – covering DACCS, point source capture, durable storage, terrestrial ecosystem-based removals and ocean-based ecosystem removals – and twenty-five highest priority R&I areas to be addressed, including solutions such as biochar, ocean CDR, improved testing of DAC, and durability. The report offers a breakdown of the RD&I gaps and the challenges facing CDR methods. It is, until now, the closest we have come to forming an RD&I plan for CDR in Europe, and a promising first step, but further work is needed. The research priorities identified in the report need to be more **comprehensive and as specific as possible**, allowing for better targeting of resources. To that end, Carbon Gap has combined available resources to build the database of CDR research gaps presented in section II.

A CDR research roadmap is needed to set out paths, timelines, funding requirements, and coordination to canalise resources across EU funding mechanisms in a way that reaches existing needs but also guarantees the continuity of support, as technologies move up the TRL scale and become safer, more efficient and ready for commercial scale-up.

The third step lies in **political commitment**. Significant levels of RD&I funding will be needed within **the next 15–20 years** to ensure the timely maturation of methods. To be effective, RD&I funding for CDR must be frontloaded over the next decade. Significant investment today can ensure that CDR methods reach the maturity needed for large-scale deployment and help Europe solidify a lead role in the CDR sector. Any delay in action now cannot be compensated for later. Specifically, the EU should dedicate around [EUR 2.6 billion⁴⁴](#) to CDR in the next MFF. The new funding cycle offers a clear window of opportunity and political momentum for the EU to make carbon removal a **research priority** and translate research agendas into actionable funding opportunities that cover the entirety of the portfolio of CDR methods.

⁴³ European Commission, [Climate mainstreaming](#) (2024)

⁴⁴ Carbon Gap, [Envisioning a carbon removal strategy for Europe](#) (2024)

Further bridging the gap: the need for national and private funding mobilisation

Additional RD&I funding, however, will not be sufficient if only deployed by the EU. Although the Commission must lead by example, developing carbon removal at the scale necessary to reach climate goals will have to be a **global** and **joint effort** between the EU, member states and the private sector in Europe, and political commitment at all levels will be necessary to make this happen.

Some projects currently funded at the national level are good examples of **how member states can support the development of CDR**. For example, the [CDRmare](#) (EUR 26 million) and [CDRterra](#) (EUR 21 million) projects funded by the German Federal Ministry of Education and Research

(BMBF) focus on developing and refining ocean and land-based CDR respectively. Sweden's focus on bioenergy-based CDR is also worth mentioning. Indeed, the country's Bio+ research and innovation programme dedicates [an innovation cluster for biochar and bioenergy from pyrolysis](#) with a budget of SEK 4.5 million (around EUR 400,000) between 2023 and 2025. The University of Luleå is conducting a research project on the '[Use of mining waste to form carbonate minerals via a symbiotic CC and DAC biostrategy](#)' with funding from the Swedish Energy Agency. This project will run from 2023 to 2029 with a budget of SEK 14.5 million (around EUR 1.3 million).

Achieving the EU's ambitious climate and competitiveness goals requires increased financial support and RD&I funding that extends beyond EU-level legislation. Success will rely on a coordinated effort from member states and the private sector to contribute resources. Now is the time for bold political commitment and investment at all levels to drive this transformation forward.



4. TAKEAWAYS AND RECOMMENDATIONS

The numerous existing funding initiatives at the EU level, such as Horizon Europe, the EIC, the LIFE programme and the Innovation Fund can play a major role in helping the EU advance the Green Deal and reach its climate goals, including scaling up CDR. However, for these initiatives to be effective in supporting the development of the European carbon removal sector at the necessary scale, the EU must ensure CDR is given sufficient and better-targeted focus within its research and development funding programmes, and for these to become more accessible. The current stream of direct funding related to CDR (approximately **EUR 657 million**) is a good starting point but only represents around **0.1% of the EU's budget for climate**.

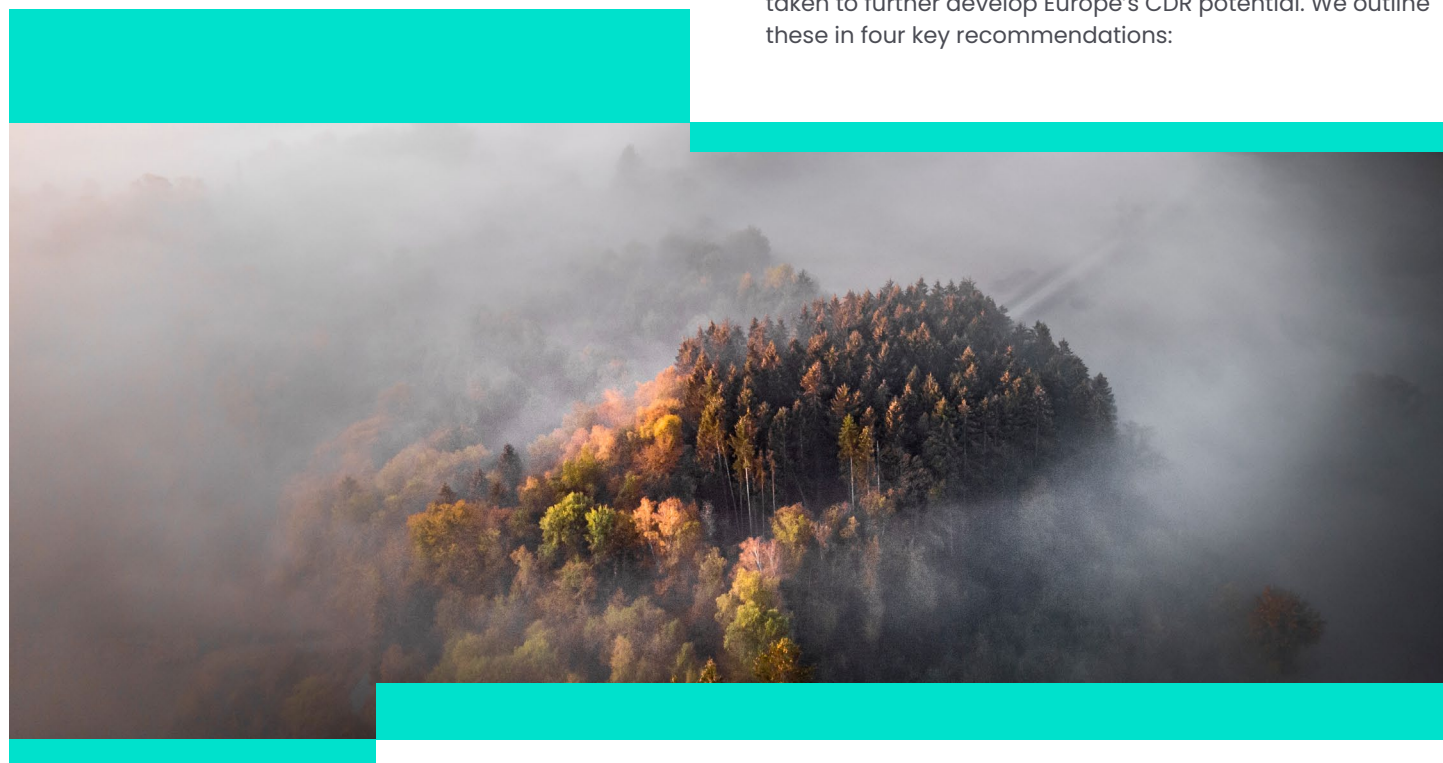
The latest political cycle saw the adoption of key pieces of climate legislation, making Europe a leader in climate commitments to reduce emissions and reach climate neutrality. The EU has set out the goal to spend 30% of its long-term budget to fund this transition. Even though the upcoming funding cycle will bring about changes in priorities, **the path to meeting our climate goals requires the European ambition to be maintained or upheld**.

The new Commission has unveiled priorities for its new political cycle, with enhancing European competitiveness

as a clear focus. **Competitiveness and the green transition can go hand in hand, including in the case of carbon removal**. By increasing the support for the development of clean technologies (such as CDR) and **spearheading innovation**, Europe can drive the competitiveness of its cleantech sector while capturing economic benefits.

A strong RD&I funding framework is a key pillar of a comprehensive strategy to scale CDR on time. As described in our April 2024 [envisioned CDR strategy for the EU](#)⁴⁵, RD&I support should come first and will depend on the development of a robust and diverse set of CDR methods to supply carbon removal services. The DG RTD analysis of research and innovation needs for climate neutrality by 2050 is an important step in recognising CDR as a priority in need of support in the years to come. This work should be followed up with a roadmap that, in addition to laying out the remaining CDR research gaps, devises a detailed action plan on how to answer these open questions, including timelines, funding needs estimations and funding opportunities/mechanisms. Only then can the EU seize the opportunity to become a leader and referent in carbon removal.

With a forthcoming renewal of the EU's long-term budget offering a window of opportunity, significant steps must be taken to further develop Europe's CDR potential. We outline these in four key recommendations:



⁴⁵ Carbon Gap, [Envisioning a carbon removal strategy for Europe](#) (2024)

Recommendations

Increase the committed budget to RD&I for CDR:

1. Make a clear and significant financial commitment to EU research, development and innovation (RD&I) on carbon removal, equalling at least EUR 2.6 billion (not including deployment needs) to be disbursed by the EU during the upcoming EU financial cycle (2028–2034) via the next R&I Framework Programme and other EU funding mechanisms, as well as **member states' funding schemes**. Such a commitment would be an important first step toward securing Europe's capacity to scale CDR in time, cement EU's global leadership in the green transition and retain human capital and intellectual property. Mobilising private investment to support CDR is also a key part of the puzzle, securing public-private partnerships that can expand the budget available for CDR. Significant additional funding will also be needed to support the deployment of CDR methods in a later stage once they've reached maturity.

Make RD&I funding for CDR more visible, accessible and secured

2. Target CDR explicitly and strategically within the next RD&I funding scheme to significantly increase the impact of such funding and the progress of CDR.

3. Design a comprehensive set of EU funding calls that address the open questions across the **portfolio of CDR methods**. They must also **address CDR clearly and directly**, making it easy for potential applicants to understand the availability of the funds for carbon removal, improving the visibility of the calls and lowering uncertainty for potential applicants.

Significant progress can be made by embedding these recommendations into the research objectives laid out in funding calls tackling technical questions or devising dedicated calls to address them.

Time lost at this stage will not be recovered, and carbon removal methods will simply not be ready to fulfil their indisputable role on the road to climate neutrality and net-negative emissions thereafter. Beyond the risk of being off-track to meet climate goals, failing to support the development

Leverage the full spectrum of RD&I funding schemes to address all CDR strategic research priorities

4. Channel resources in a coordinated way across the different funding mechanisms to ensure the best use of the available budget. At the same time, the resources allocated, along with the open questions being addressed, need to be **tracked** and kept up to date.

5. Ensure continuity in the support for early-stage projects all the way to the deployment stage. The ultimate goal is to bring CDR methods from the lab to the market. The development process should not be staggered by a lack of continuous support across a project's lifecycle.

6. Strengthen EU CDR research communities through research and innovation schemes such as the *Marie Curie Actions* or the *Research Infrastructure programme* and make them more visible/accessible to civil society, stakeholders and decision-makers.

Go beyond the technical aspects of CDR: the scale-up of CDR hinges on innovation in social areas

7. Provide sufficient funding to address non-technical questions, particularly related to **governance and societal readiness**; these subjects are equally important for enabling the scale-up of CDR methods.

8. Focus efforts on missing policies and on assembling the different parts of the puzzle that will make the **carbon removal policy framework** a key area for research since it will bring direction to the entire ecosystem.

9. Ensure funding calls also advance awareness of the social aspects of CDR and the governance frameworks best suited to guide a **CDR-community relationship** in a way that ensures environmental injustices are neither enabled nor replicated.

of early-stage CDR jeopardises building global leadership in an emerging market that remains critical to combat climate change. If support is not ramped up, the EU would be missing out on attracting and fostering a leading innovation sector that delivers cutting-edge technologies. Along the way, CDR can drive technological innovation across the value chain, foster the creation of specialised complex services and industries, increase skilled workforce development and job creation, and ultimately contribute to European competitiveness.

LIST OF ABBREVIATIONS

BECCS	– Bio-energy with carbon capture and storage
CAP	– Common Agricultural Policy
CAPEX	– Capital Expenditure
CCfDs	– Carbon Contracts for Difference
CCS	– Carbon Capture and Storage
CCU	– Carbon Capture and Utilisation
CDR	– Carbon Dioxide Removal
CEF	– Connecting Europe Facility
DAC	– Direct Air Capture
DACCS	– Direct Air Carbon Capture and Storage
DG RTD	– Directorate-General for Research and Innovation
EIB	– European Investment Bank
EIC	– European Innovation Council
ETS	– Emissions Trading System
GAEC	– Good Agricultural and Environmental Conditions
GDP	– Gross Domestic Product
ICM	– Industrial Carbon Management Strategy
IF	– Innovation Fund
IPCC	– Intergovernmental Panel on Climate Change
IPCEI	– Important Projects of Common European Interest
JTF	– Just Transition Fund
MFF	– Multiannual Financial Framework
MRV	– Monitoring, Reporting and Verification
PCI	– Projects of Common Interest
PMI	– Projects of Mutual Interest
RD&I	– Research, Development and Innovation
RMI	– Rocky Mountain Institute
RRF	– Recovery and Resilience Facility
STEP	– Strategic Technologies for Europe Platform
TEN-E	– Trans-European Network for Energy
TRL	– Technology Readiness Level

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ANNEX. THE TAXONOMY OF CDR PROJECTS

In order to assess the relevance and contribution to CDR within different EU funding and support mechanisms, this report relies on the use of the following criteria to guide the classification of projects as relevant to carbon removal.. Not all criteria are necessarily used at the same time, as the information and nature of the projects differ according to the initiative. The ultimate goal is to provide a picture of the available funding relevant to CDR in the European ecosystem.

Analysis of EU programme funding for CDR was based on the following definitions:

Directly related: the resources targeted directly towards developing a removal method in itself.

Indirectly related: produces spillovers to removals methods and the ecosystem itself, such as developing CO₂ transport and storage or strengthening MRV systems.

Two main questions are asked when looking at different projects:

- (1) *Are the resources targeted directly towards developing a removal method in itself?*; or
- (2) *Is the effect an indirect one, by producing spillovers to removals methods and the ecosystem itself?*, such as developing CO₂ transport and storage or strengthening MRV systems

Further details are also used to analyse the funding support based on the following questions and data points.

1. How much funding is available? And what is the size of the project? Answers to these questions relied on the following information:

- a. Expected EU contribution per project;
- b. Indicative budget and size brackets for eligible projects;
- c. Type of funding (ex. Grant, equity, subsidy, blending, etc...);
- d. Number of calls (dedicated to CDR/mentioning CDR);
- e. Number of projects (dedicated to CDR/mentioning CDR);
- f. Percent allocated to CDR (indirectly/directly).

2. What type of project does it support? Projects were assessed based on:

- a. Innovation, research and innovation, coordination and support;
- b. Scale-up and deployment;
- c. TRL targeted.

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 for Carbon Gap, featuring the word "Carbon" in white on a dark grey background and "Gap" in white on a blue background.

Carbon Gap

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