

DIVIDE TO DELIVER: WHY 2040 SEPARATE TARGETS FOR CARBON REMOVAL ARE FEASIBLE & NECESSARY TO REACH EU NET ZERO

Policy brief
JULY 2025

KEY TAKEAWAYS

- **Separate targets are feasible and necessary.** Scenario modelling confirms that clearly defined 2040 targets for gross emissions reductions, temporary removals, and permanent CDR are achievable and essential to deliver climate integrity, policy clarity, and investment certainty.
- **Temporary removals will be maxed out.** According to our scenarios, temporary removals can deliver up to around 350 MtCO₂/year by 2040 with successful LULUCF measures. The EU must plan for the remaining gap with a credible permanent CDR strategy.
- **Permanent CDR needs are large and vary according to the emissions reduction strategy.** Depending on how emissions evolve, the EU will need between around 100–280 MtCO₂/year of permanent removals by 2040 — far more than the 75 Mt presented in the Commission's Impact Assessment.
- **No single method can deliver at scale.** A diverse portfolio of CDR methods is required to manage cost, timing, and risk across scenarios.
- **The EU must act now.** The revision of the Climate Law is a once-in-a-decade opportunity to provide legal certainty by setting separate targets and back them up with the dedicated policy tools needed to scale CDR.

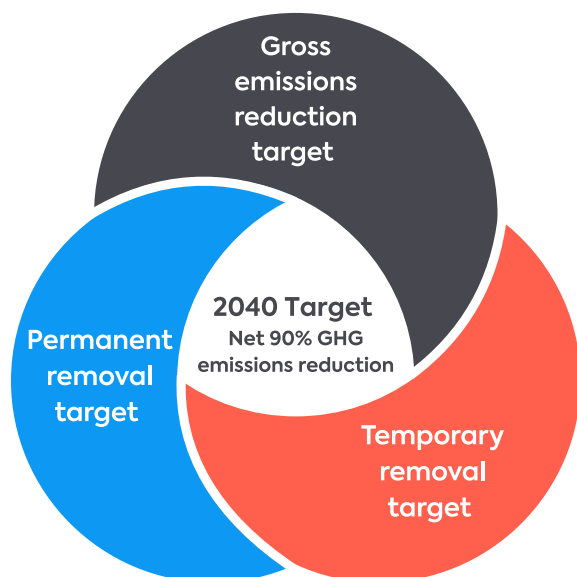


***The EU must
act now.***



WHY DOES THE EU NEED SEPARATE TARGETS FOR CARBON REMOVALS?

Fig 1: Proposed 2040 target architecture



At current emission rates, the global carbon budget for a [66% chance of limiting warming to 1.5°C](#) will be exhausted in two years. Staying within the limit will require not only steep emissions cuts but also a **rapid and sustained scale-up of carbon dioxide removal (CDR)**. The EU's proposed 2040 target of 90% net emissions reductions aims to place the Union on track for climate neutrality by 2050 and net negative emissions thereafter. But how we meet that target — and how we combine deep emissions cuts with carbon removals — will shape the credibility, costs, and chances of success of Europe's climate transition.

As CDR becomes a pillar of the EU's climate strategy, it must be recognised as essential for removing legacy emissions and balancing residuals from hard-to-abate sectors such as aviation, cement, and agriculture. Scientific and expert consensus, including from the [European Scientific Advisory Board on Climate Change \(ESABCC\)](#), supports EU policies that clearly distinguish between reducing emissions and removing carbon. Figure 1 outlines what such a target architecture would look like.

Enshrining separate targets in EU law would allow for:

- 1 Climate integrity.** Separate targets ensure that carbon removals develop alongside emissions reductions, serving as a complement rather than a substitute for decarbonisation. This approach prevents mitigation deterrence, where removals could be misused as a license to emit under the ambiguity of a net target.
- 2 Transparency and policy uniformity.** Separate targets enable policymakers and civil society stakeholders to better track progress and account for distinct contributions of both emissions reductions and CDR towards the net objective. Moreover, given the significant difference in member states' CDR ambition today, EU-wide sub-targets would guide national long-term policy planning, ensuring better uniformity.
- 3 Tailored policy instruments.** Permanent CDR methods¹ deliver long-term climate benefits by storing carbon away for centuries to millennia. In contrast, temporary removals² from forests, soils, and other biogenic sinks are inherently vulnerable to reversal from climate impacts (e.g., wildfires, pests, droughts) or land-use changes. These two categories serve different roles in climate mitigation timelines, follow different cost and readiness trajectories, and require tailored policy incentives and accounting approaches. Separate targets enable the development of differentiated instruments that are fit-for-purpose and avoid over-reliance on any one method or sector.
- 4 Investor certainty.** Defining separate targets for permanent and temporary removals helps reduce policy ambiguity and signals clear, long-term demand pathways. In turn, demand certainty allows investors and innovators to make strategic, method-specific decisions — whether in land-based practices or industrial-scale CDR technologies. Clear regulatory direction is particularly critical for unlocking the capital-intensive scale-up of permanent removals, which require more upfront investment and dedicated public funding support to bring down costs.

To support Carbon Gap's call for separate targets and the progressive implementation of the like-for-like principle³, and to explore how such goals could be achieved, Carbon Gap and VTT have modelled⁴ alternative scenarios to the [European Commission's 2040 targets Impact Assessment](#). This project focuses exclusively on domestic carbon removal within the EU and does not account for or assume the use of international carbon credits. A more detailed paper outlining the methodology, scenarios, and assumptions will follow in the coming weeks.

HOW TO REACH THE 2040 TARGET BASED ON OUR MODELLING

OUR APPROACH

To better understand how separate targets could be rolled out, we used an integrated energy system model which follows the least expensive way to reach set climate targets, considering the different costs and capacities of the possible mitigation solutions. Our three main scenarios are aligned with a 90% net emissions reductions target by 2040 and incorporate a portfolio of permanent and temporary CDR methods, meanwhile assuming a moderately stable LULUCF capacity.

Classic least-cost (Classic LC): Selects the cheapest combination of mitigation and removal options without requiring permanent removals to balance fossil emissions, therefore mirroring the approach of the Commission's [Impact Assessment](#) (i.e. no like-for-like principle).

Like-for-like low (LFL-low): Requires remaining fossil emissions to gradually be fully balanced by permanent CDR. Simulates the case where emissions reduction efforts are unsuccessful/delayed, and fossil emissions remain relatively high, hence requiring a higher need for permanent CDR.

Like-for-like high (LFL-high): Requires fossil emissions to gradually be fully balanced by permanent CDR. In this optimistic case, emissions are aggressively reduced, enabling the model to meet the 2040 target with a lower volume of permanent removals.

For the full set of modelling results, [see the presentation by VTT Technical Research Centre of Finland here](#). A more detailed paper outlining the methodology, scenarios, and assumptions to follow.

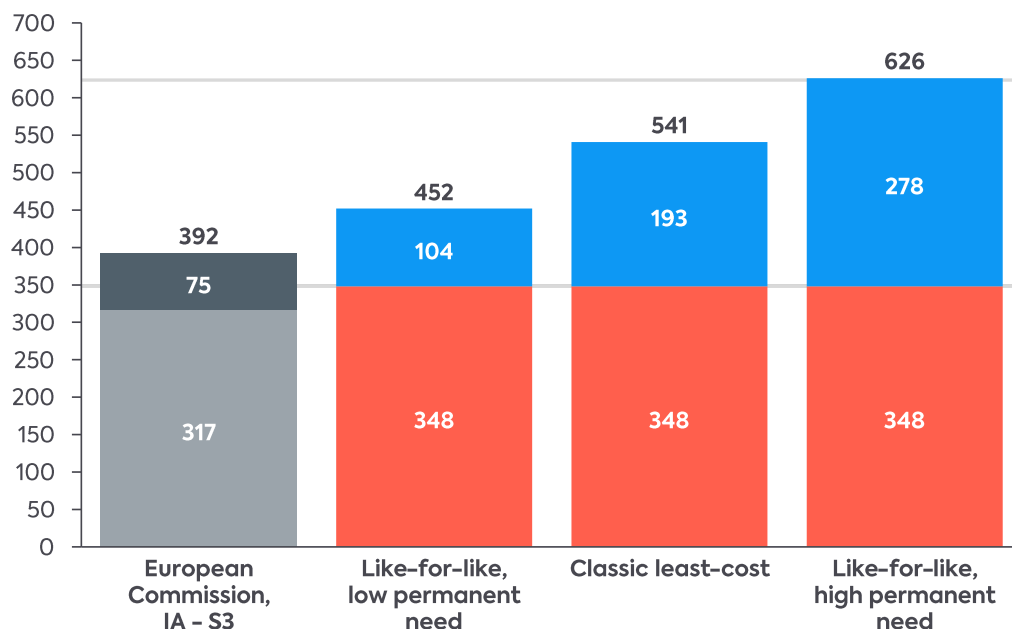
How much CDR will the EU need by 2040? Our modelling shows that total carbon removal needs in 2040 range from 452 to 625 MtCO₂/year, depending on the decarbonisation strategy the EU applies (Fig. 2). Within that total, permanent CDR makes up between 104-278 MtCO₂/year and temporary removals are consistently around 348 MtCO₂/year across all scenarios.

For comparison, the European Commission's Impact Assessment includes just 75 MtCO₂/year of permanent CDR – well below even our most optimistic gross emissions reductions scenario (104 MtCO₂/year). The discrepancy may lie in the scope of permanent removals covered; our modelling includes a broader permanent CDR portfolio aligned with the CRCF definition, whereas the IA excludes several methods. The message is clear – if mitigation action is delayed, permanent CDR must scale accordingly – up to around 280 Mt CO₂/year by 2040, resulting in nearly four times the Commission's estimate. Planning for that possibility today is critical.

In contrast, temporary removals remain consistent across scenarios, since land-based removals (i.e., afforestation, reforestation, soil carbon) are being deployed at full capacity. There is little room for further growth, making it all the more important to protect and sustain natural sinks. Without separate targets, there is a risk of underachieving on net targets, potentially jeopardising the EU's long-term climate strategy and impeding planning.

Fig 2: Scenario modelling reveals a gap in projected 2040 EU CDR needs

Annual removals in 2040
(Mt CO₂e / year)



452-625 MT CO₂/YR

Total removals needed in 2040 between our modelled lower and upper estimated levels of emissions reductions

104-278 MT CO₂/YR

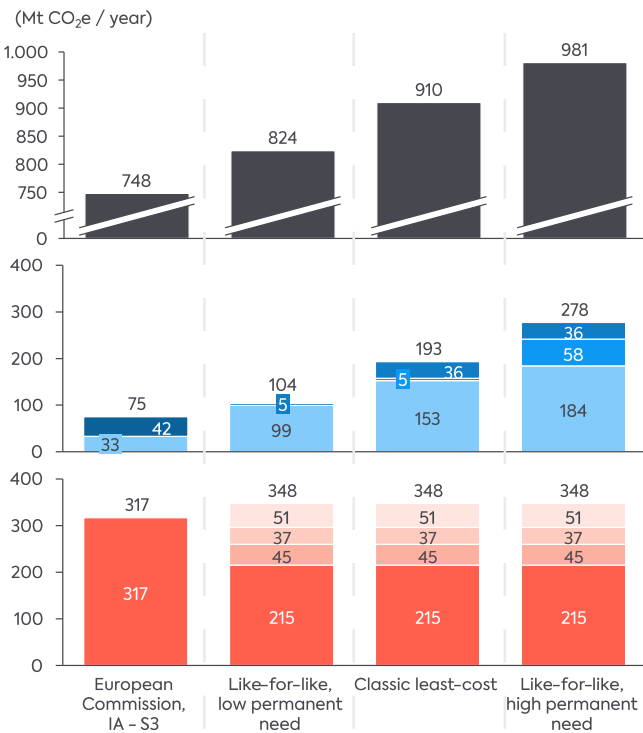
Permanent removals needed in 2040 based on our modelled lower and upper estimated emissions reductions levels

348 MT CO₂/YR

Temporary removals needed in 2040 across all of our modelled scenarios

Fig 3: A portfolio of CDR methods is required to reach the 90% net target

Is there a silver bullet? Our modelled scenarios show that Europe will need a full portfolio of CDR methods to reach climate targets cost-effectively (Fig. 3). BECCS accounts for the largest portion of permanent removals, yet, when more permanent CDR is needed, so are further solutions like ERW and biochar. DACCS is not deployed by 2040 in our scenarios, which should not be seen as an invitation to postpone action. Achieving the volumes needed for DACCS in later decades will be difficult without significant progress and upfront investment already in 2040.



- The European Commission's Impact Assessment has limited volumes and diversity of permanent CDR by comparison, with methods like biochar and ERW excluded (which under the CRCF are permanent). It includes only 75 Mt/year, while our scenarios show between 104-278 Mt.
- BECCS leads but can't do it alone. Even in the high-removal scenario, BECCS reaches 184 Mt - other methods (e.g., biochar, ERW) must scale as well.
- DACCS is expected to scale only post-2040 due to its higher costs and energy needs, as electricity demand triples by 2050. But deployment must begin this decade to ensure capacity is in place when needed.
- Temporary CDR methods (e.g., afforestation, reforestation, soil carbon) offer cost-effective ways to grow the net LULUCF sink but are consistently deployed at full capacity. Permanent CDR is needed to reach the net target.
- Planning must be tailored by CDR category. Each removal method has different costs, infrastructure needs, and MRV challenges. Separate targets help ensure the right mix and support for both temporary and permanent approaches.

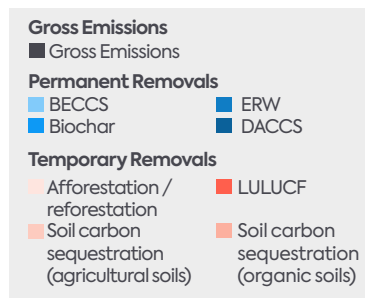
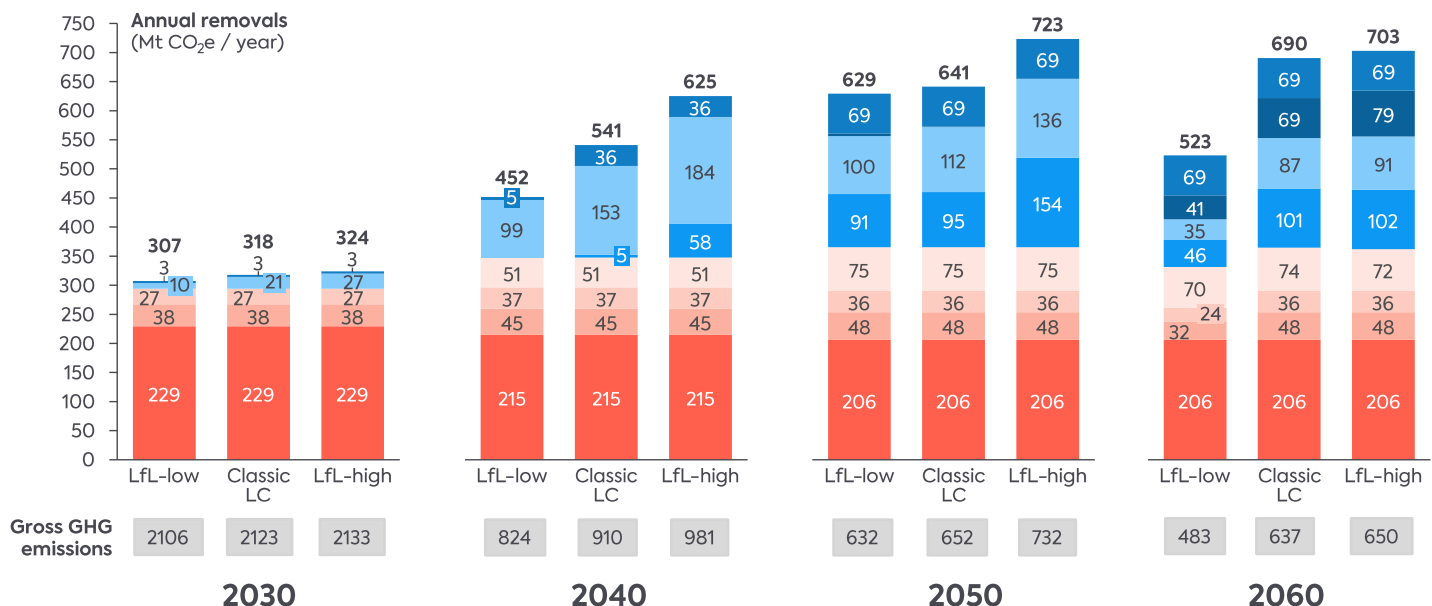


Fig 4: Modelled permanent and temporary CDR volumes can help inform long-term climate planning

What about beyond 2040? Beyond 2040, our modelling estimates gross emissions, temporary removals and permanent removals from 2030 to 2060 (Fig. 4). Variations between scenarios over time – particularly in the scale and composition of the permanent CDR category – reflect the different decarbonisation strategies they represent. These trajectories offer critical insights for shaping the EU's post-2040 climate strategy, highlighting the need to scale permanent CDR early and support a diversity of methods.



WHAT SHOULD THE EU DO NOW?



Set separate 2040 targets for gross emissions reductions, temporary and permanent CDR

Targets for CDR must be disaggregated from emissions reductions, and from each other. This distinction prevents over-reliance on removals to delay decarbonisation, clarifies the role of each, and enables tailored delivery policies. Our modelling shows that the maximum potential of temporary removals is used by 2040, while permanent CDR needs can vary depending on the emissions reductions strategy applied (Fig. 2); but in all cases, separate targets are both feasible and necessary to meet climate goals under a range of scenarios. Crucially, rather than betting on a single CDR method, the EU should prioritise building a diverse portfolio of solutions in both the permanent and temporary categories (Fig. 3). Deploying a range of carbon removal methods is important since each method serves different functions, follows different deployment timelines, and faces specific risks, requiring tailored policy interventions.



Develop a tailored EU policy package to deliver a portfolio of permanent CDR at scale

Even under optimistic emissions reductions assumptions, permanent CDR must reach at least 100 MtCO₂/year by 2040, and far more if reductions or temporary removals fall short. Yet today, the EU lacks the full breadth of policy tools to support this scale-up. Once 2040 contributions are defined, a dedicated policy package is needed to enable early deployment, cost reduction and long-term scaling. This package should include [dedicated funding](#) and support for first-of-a-kind projects, investment in infrastructure for CO₂ transport and storage, and market pull mechanisms such as contracts for difference, [public procurement](#), with eventual integration into compliance markets. Support should span a portfolio of permanent CDR methods to ensure technological diversity, improve resilience, and reduce delivery risk.



Enhance EU and national support to sustain and grow temporary removals

Temporary removals are essential for balancing biogenic emissions and supporting ecosystem resilience. However, despite the support for afforestation, soil carbon, and sustainable land use in the LULUCF Regulation, Europe's land sink is in decline or at best stable. To reverse this trend, Member States must stay the course on targets rather than seeking flexibility and work towards phasing out poor land management practices that undermine climate goals. Additionally, the EU should explore embedding CDR within the Common Agricultural Policy (CAP), forest strategy, and adaptation planning. The EU should also strengthen the regulation and pricing of biogenic emissions to secure demand for temporary removals aligned with the like-for-like principle, ensuring they can grow while not being misused to offset fossil emissions.



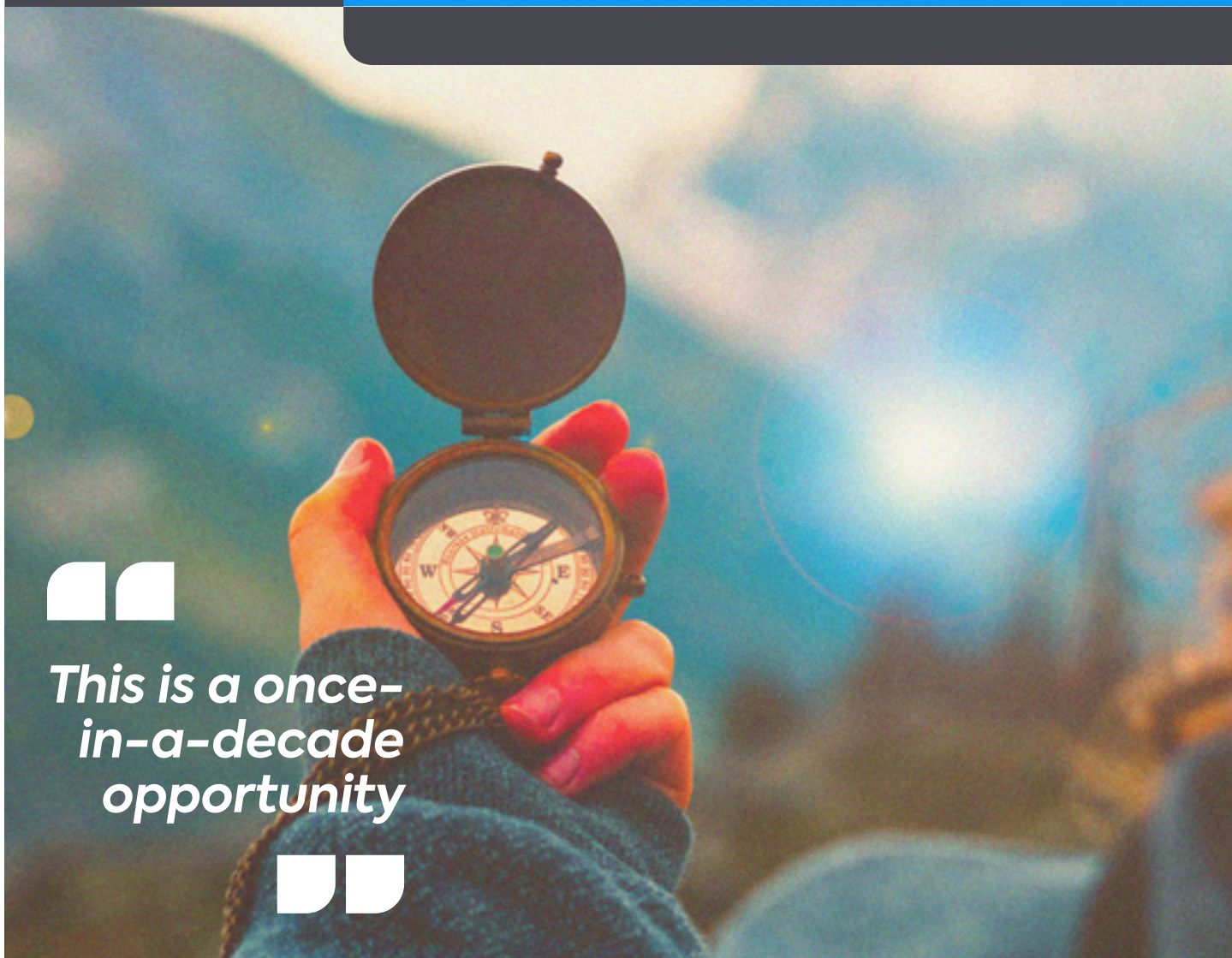
CONCLUSION: CREDIBILITY REQUIRES CLARITY

The EU cannot afford to delay clarity on carbon removal. Our modelling confirms that setting separate targets for temporary and permanent CDR is not only feasible – **it is essential for a transparent, cost-effective and credible path to climate neutrality**. For CDR to materialise at the necessary levels, the EU must clearly define how much CDR is needed, of what kind, and by when, and back those targets with concrete policies to trigger the investment and deployment required.

The revision of the European Climate Law is a once-in-a-decade opportunity to anchor that clarity in EU legislation. Without immediate action, the EU risks locking in higher costs, missing key innovation opportunities, and undermining the credibility of its climate commitments.



This is a once-in-a-decade opportunity



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.

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END NOTES

- 1 The permanent CDR bucket under the [Carbon Removals and Carbon Farming Certification Framework](#) currently includes: direct air capture (DACCS), bioenergy with carbon capture and storage (BECCS), biochar and enhanced rock weathering (ERW);
- 2 The temporary CDR bucket includes afforestation/reforestation (A/R), and soil carbon sequestration performed on agricultural (SCS1) and organic soils such as peatlands (SCS2). In our model, these methods expand the temporary land-based removals beyond the fixed LULUCF base-sink.
- 3 The [like-for-like principle](#) stipulates that fossil emissions must be compensated by geologic removals (geochemical or synthetic) and emissions from the land-use sector by nature and biomass-based methods (enhanced ecosystem management and biomass conversion) to respect the natural carbon cycles and achieve a state of 'durable net zero'.
- 4 This modelling work builds on the scientific foundation laid by the [NEGEM project \(2020–2023\)](#), a major EU Horizon 2020 initiative which assessed sustainable negative emissions pathways for Europe. By adopting the same modelling framework (PET-VTT) and incorporating the latest data, this project further refines and expands NEGEM's findings by testing alternative scenarios and a broader range of CDR methods, in line with evolving EU climate needs.



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