



Industrial Carbon Management

Elaboration on the European Commission's public consultation

Carbon Gap, August 2023

The consultation on Industrial Carbon Management provides an opportunity to make carbon removal an integral part of EU climate policy.

Addressing the immediate threat posed by climate change requires using a broad range of tools. The 2023 IPCC (Intergovernmental Panel on Climate Change) Report¹ recognises that carbon removal must be included in efforts to achieve global climate goals. However, carbon dioxide removal must not detract from the urgent task of cutting emissions.

Reaching the European Climate Law's commitment to climate neutrality by 2050, and net negative emissions thereafter, will require significant emissions reductions alongside net removals of CO₂ already released into the atmosphere. This commitment will require the gradual deployment of Carbon Dioxide Removal (CDR). The capture of CO₂ from the atmosphere or biomass, coupled with its permanent storage, has the potential to permanently remove carbon dioxide and address residual emissions and will be key to delivering on European and global climate targets.

However, the EU is currently failing to realise the potential of carbon removal. Ongoing efforts to deploy and scale up industrial carbon removal are stymied by lacking incentives and an incomplete EU regulatory framework. EU policy proposals and funding instruments were not designed with carbon removal technologies in mind. A dedicated strategy for carbon removal has not yet been developed, and there is yet to be an overarching framework in place to support the creation of a European net zero ecosystem that includes carbon removal.

To make good on the EU's climate commitments, the EU needs an ambitious strategy dedicated to promoting and regulating carbon removal technologies. The European Commission consultation on Industrial Carbon Management provides an opportunity to develop an EU strategy that can guide policymaking and lay the groundwork for achieving net zero by 2050 and negative emissions thereafter.

As the leading independent non-profit organisation focused on mainstreaming carbon dioxide removal in Europe, Carbon Gap calls for the development of a dedicated Industrial Carbon Management Strategy (ICMS) to deploy critical CO₂ infrastructure for industrial

¹ [IPCC_AR6_SYR_LongerReport.pdf](#)

decarbonisation at scale whilst promoting permanent carbon removal. To make negative emissions a reality, the Strategy must set ambitious targets for removals as an integral part of EU climate change policies. The European Commission should adopt the Strategy before the end of the year to enable the deployment of carbon removal technologies and CO₂ infrastructure in time to adequately contribute to broader climate mitigation efforts.

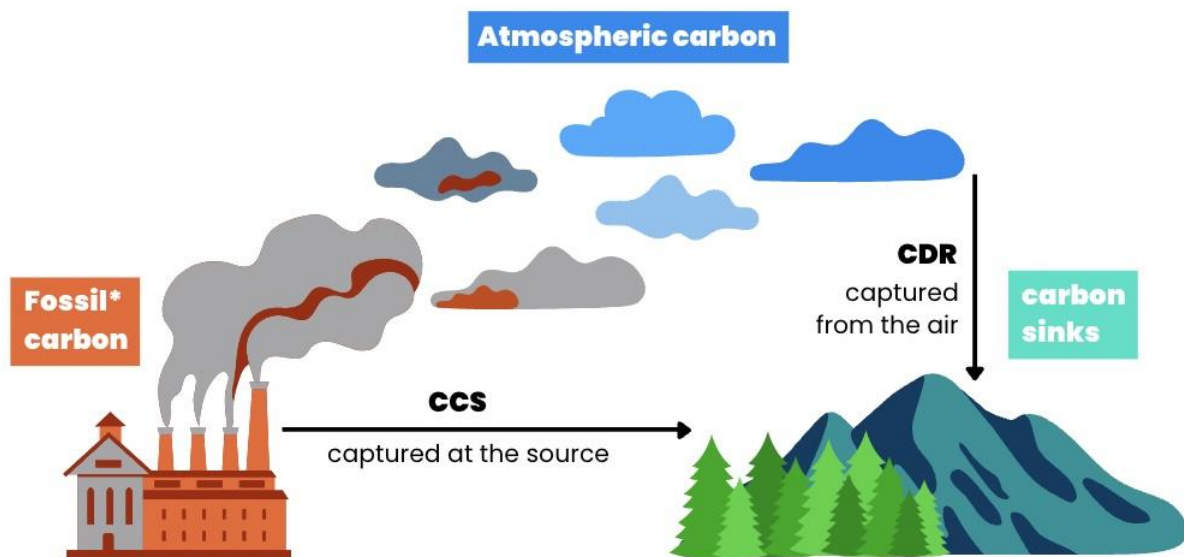
The EU's broader approach to climate mitigation needs to better reflect the importance of carbon removal in delivering on EU and global climate commitments. To highlight potential synergies between climate and other objectives and allow for a more comprehensive approach to tackling climate change, carbon removal should be mainstreamed across EU climate policies, making carbon removal the third pillar of EU climate action – Reduce, Remove, Adapt.

It is essential that the EU give carbon removal sufficient consideration in all relevant policy files, including those focused on land use, agriculture, forestry, industrial infrastructure, and financing of research and innovation projects. Carbon Gap has already started mapping and tracking EU, national and international legislation and policy proposals related to CDR (see <https://tracker.carbongap.org/>). The forthcoming Industrial Carbon Management Strategy must make a clear distinction between carbon removal and carbon capture and storage (CCS) technologies and foresee dedicated funding and policy measures aimed at supporting the development and deployment of CDR technologies in Europe.

At the same time, CCS and CDR technologies often have similar transport infrastructure and storage needs. Policies aimed at supporting the development of such infrastructure can therefore benefit both CCS and CDR. Certain carbon removal technologies include carbon capture technology as part of removing CO₂ from the atmosphere, specifically Direct Air Capture with Carbon Capture and Storage (DACCS – Direct Air Carbon Capture and Storage) and Bioenergy with Carbon Capture and Storage (BECCS – using excess biomass from residual waste use).

The ICMS should treat CCS on its own as a transitional means of addressing emissions from certain industrial activities to be used in certain cases. There are certain instances when CCS can have significant greenhouse gas mitigation potential and can be integrated into existing industrial processes and activities, whilst avoiding significant negative side effects and fossil fuel lock-in. A concrete example is the use of CCS for industrial installations where CO₂ emissions cannot be avoided or where no abatement solution is currently available.



Figure 1: The difference between CCS and CDR



*If biomass is burned, then emissions would be biogenic, which - if durably stored - would constitute CDR.

The Strategy must introduce additional policy measures that create a supportive, comprehensive, and robust legislative framework for all high-durability CDR methods. This framework should include ambitious 2040 targets for carbon removal, deployment incentives, and new rules for CO₂ storage and transport infrastructure. Furthermore, the Strategy must provide clarity on the sectors eligible for, and the potential uses of, carbon removal certificates by certificate-holders to clarify which entities would be responsible for purchasing removal certificates.

Carbon Gap's five main recommendations for Industrial Carbon Management are set out in this position paper, with policy solutions to specific problems shown in the table on the next page.

 Problem	 Solution
Lack of a dedicated legislative framework and absent EU strategy for carbon removals	Development of EU Industrial Carbon Management Strategy
Insufficient interest in, and support for, the use of carbon removals	Dedicated carbon removal targets for 2040
	Ambitious deployment incentives <small>Carbon Central Bank Carbon Contracts for Difference Carbon Removal Purchase Facility</small>
	Dedicated legislation for CO ₂ transport infrastructure to complement the CO ₂ Storage (CCS) Directive
Uncertainties regarding CO ₂ storage capacity and lacking carbon transport infrastructure	EU and member state funding combined with co-investments from oil and gas producers
	More ambitious CO ₂ storage capacity targets for 2030 and beyond based on a detailed mapping
	Mainstream carbon removals as part of broader EU climate mitigation efforts
Low public awareness and support	Introduce guardrails and clear "rules of the road" for carbon removals

1. The EU must chart a path to net negative emissions through ambitious and dedicated carbon removal targets for 2040.

The development of further climate targets for 2040 is an essential step in defining the EU's path to reaching climate neutrality in 2050 and offers a temperature check for the Union's overall climate ambition. It will provide a means of tracking the use of carbon removal and will help clarify the scope and scale of the contribution of removals towards climate neutrality.

For the development of the next climate framework, the European Commission must aim to achieve 95% net GHG (greenhouse gas) emissions reductions by 2040 compared to 1990 levels, recognising that carbon neutrality (net zero CO₂ emissions) must be achieved before climate neutrality (net zero GHG emissions). This ambitious 2040 target should form the basis of the Industrial Carbon Management Strategy and inform the various policies and funding mechanisms dedicated to carbon removal.

The targets for 2040 must separately quantify the role of gross emission reductions and total carbon removal the EU (and its member states) should achieve by 2040.

Furthermore, emissions reductions and removal targets should be further subdivided into biogenic and geological components to enable the EU to realistically quantify CDR's contribution to the 2040 and 2050 climate targets, while avoiding overreliance on the biosphere to counterbalance emissions from the geosphere.

2. The EU must use the Industrial Carbon Management Strategy to identify and address policy gaps in the EU legislative framework for carbon removal.

Carbon Gap welcomes the public consultation on Industrial Carbon Management, which should serve as a starting point for developing a strategy detailing how carbon removal technologies can help decarbonise the EU economy. It comes in the wake of recent Commission proposals for the Net-Zero Industry Act (NZIA) and the Carbon Removal Certification Framework (CRCF). The former serves to identify and prioritise carbon removal technologies as important net zero technologies, and the latter provides a certification framework for CO₂ removals.

Whilst both these proposals are important steps in the right direction, there is a clear and pressing need for a dedicated strategy to address how carbon removal fits in larger EU climate policy. The Industrial Carbon Management Strategy should elaborate on the contribution of CDR towards reaching EU climate targets and global climate commitments and address several specific issues:

- a lack of EU and member state support and incentives for carbon removal coupled with a low and fluctuating carbon price;
- insufficient funding for R&D, innovation and deployment for CDR, and absence of funding explicitly dedicated to carbon removal;
- low public awareness and support for carbon removal;
- uncertain availability of carbon storage capacity and insufficient transport and infrastructure capacity.

3. Europe should introduce ambitious deployment incentives to scale up carbon removal technologies and create a European carbon removal ecosystem.

For carbon removal to make a meaningful contribution to EU net zero climate targets, CDR technologies must be scaled up significantly, despite dissuasive investment costs. There is uncertainty about the future demand for carbon removal, and carbon price fluctuations can deter necessary investments. Until now, CDR has had to rely mainly on Voluntary Carbon Markets, where the demand for carbon removal has failed to motivate the scale-up of projects. These barriers to the development and deployment of CDR must be overcome.

Deploying carbon removal technologies in Europe at a large scale will require stimulating the demand for CDR using compliance markets and public procurement processes. As a nascent technology, CDR will need additional deployment incentives and support from the public sector to establish a market, de-risk high initial upfront investments and achieve the commercial scale-up of methods.

To finance the development of CDR infrastructure and technologies, investors need a clear view of the demand for CDR from private sector entities. The EU will also need further investments in R&D and price stability measures.

Furthermore, the EU should dedicate resources towards carbon removal using a combination of new and existing EU and national funding instruments. The common denominator amongst the possible policy options is the emphasis on dedicated funding for CDR that would deliver price stability and promote investor confidence.

Financial support could be provided through carbon (removal) contracts for difference where a CDR supplier would receive support from the Innovation Fund or another dedicated fund to cover the price difference per tonne removed CO₂ between the auction's winning price (the strike price) on the one hand, and a reference price for CO₂ on the other.

Europe has a proud tradition of down-costing clean technologies, including solar and offshore wind. To encourage investor confidence in the budding European CDR ecosystem, the EU could set up a dedicated Carbon Removal Purchase Facility to guarantee that each tonne of removed carbon will be purchased at a predictable price, thereby rapidly bringing down the costs. This facility could be a public-private funding partnership to aggregate purchasing power for removals (like the EUR 1 billion 'Frontier' fund), with combined contributions from the EU, the private sector and private philanthropy. An EU Carbon Removal Purchase Facility would secure Europe's climate and cleantech leadership role for the next wave of innovative technologies associated with carbon removal, helping create the conditions for wider global uptake of CDR.

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The EU could also support the establishment of a CDR ecosystem through the establishment of a dedicated European Carbon Central Bank inspired by the EU Hydrogen Bank. The dedicated Carbon Bank or another intermediary agency would be mandated to procure physical carbon removal and convert them into carbon removal credits. This conversion process could involve discount factors to account for the risk of leakage or buffer pools to address non-permanence.² The Bank would be empowered to make a clear distinction between nature-based and technology-based removals.

To encourage first movers amongst EU member states, the EU could designate CDR an "[Important Project of Common European Interest](#)" (IPCEI). These projects combine public and private funding and involve only the companies and countries that want to participate, making it possible to get projects off the ground quickly in key locations. There are currently 6 active IPCEIs (focused on batteries, hydrogen, and microelectronics).

² [Making Carbon removal a Real Climate Solution. How to integrate carbon removal into EU Climate Policies \(ecologic.eu\)](#) p. 18

4. The EU must promote non-discriminatory, open-access, cross-border CO₂ transport and storage infrastructure in Europe.

To support the development of a carbon value chain, the EU will need significant CO₂ transport and storage infrastructure to support Carbon Capture and Storage (CCS) in the short term and CDR in the long term. Access to CO₂ transport and storage infrastructure should be free and equal regardless of the source of the carbon dioxide to enable a dynamic and fair carbon value chain.

The ICMS should deal with transport and storage separately to set out policy measures that can meet the needs of the CDR ecosystem. Large scale CO₂ transport and storage will not happen without the commitment of a regulator through both risk sharing mechanisms, regulatory incentives, and public money.

The current storage capacity in Europe is not enough to meet the needs resulting from significant deployment of CDR. There is currently no need for new legislation since the CCS Directive provides a workable framework for the storage of CO₂, but political will and additional resources will be needed to ensure that sufficient storage is identified and made available in Europe as soon as possible.

The Commission proposal for a Net-Zero Industry Act (NZIA) currently under discussion sets a target for annual CO₂ storage capacity of 50 million tonnes by 2030³. This target is welcome as it would commit the EU and its member states to ensure that this capacity is available in the years to come. However, analysis by the environmental NGO Clean Air Task Force shows that this storage capacity is too low, since planned carbon capture, storage and removal projects in Denmark alone would reach this target within the end of the decade⁴.

Furthermore, Clean Air Task Force finds that storage sites are predominantly being developed in western Europe, leaving other areas of the EU behind. The findings suggest that additional storage capacity targets beyond 2030 will be needed to ensure that sufficient storage is available across the EU, keeping pace with industrial decarbonisation and the growing deployment of carbon removal technologies. Such targets could include regional sub-targets to avoid creating capacity constraints at available storage hubs. Storage facilities should be designed to be future proof, meaning that they should not be designed with only the current use cases in mind, but rather in a flexible way that considers connectivity to new and existing pipelines, accessibility for other modes of CO₂ transport and the future possible uses of the infrastructure.

³ [EUR-Lex - 52023PC0161 - EN - EUR-Lex \(europa.eu\)](#)

⁴ [Where will Europe store its CO₂? - Clean Air Task Force \(catf.us\)](#)

To identify the locations and capacity of available storage in Europe, the European Commission should carry out a mapping of EU storage sites, updating the last overview produced in 2011⁵. This mapping should be periodically updated and apply a coherent and consistent methodology identifying minimum and maximum storage capacities.

The mapping should also take stock of the gaps in the European carbon transport infrastructure, looking at both EU-wide capabilities and individual member states. Based on this mapping, the Commission should draft a separate piece of legislation setting out national targets and requirements for the capability to transport carbon via pipelines, rail, and ships within and between EU member states.

There is an urgent need for a fit-for-purpose EU regulatory framework for CO₂ transport infrastructure that complements the CCS Directive by defining targets and requirements for adequate and future-proof CO₂ transport infrastructure in EU member states. Provisions in the TEN-T and TEN-E Regulations related to carbon infrastructure and transport should also be strengthened.

To enable large-scale development of CO₂ the Industrial Carbon Management Strategy should also address transport networks in Europe, the international dimension of offshore storage, and transportation of CO₂. There is a need to further clarify the legal basis for the export of CO₂ for offshore storage under international law, especially in the context of the application of the London Protocol within the EU/EEA. More clarity on the rules would significantly help to accelerate the development and use of CO₂ storage in Europe. The ICMS could also introduce a regime of CO₂ transport and storage go-to-areas to help speed up the permitting process in individual member states or as part of cross-border projects.

Interoperability is crucial for the development of the Europe-wide CO₂ transport and storage infrastructure. Standards and network codes are needed for CO₂ specifications, addressing the different technologies and segments of the CCUS (Carbon Capture, Utilisation and Storage) value chain, also bearing in mind cost effectiveness considerations.

Whilst public funds are needed to scale this important infrastructure in time, other mechanisms should also be considered, such as the extended producer responsibility proposed in Article 18 of the NZIA. Specific private actors involved in the production and commercialisation of fossil fuels should also contribute to the collective effort to remediate climate change. The close involvement of private interests in co-funding and developing CO₂ storage and transport infrastructure is important to ensure that sufficient investments are made into the CDR ecosystem. It will also be important for securing public acceptance for CDR.

⁵ [European CO₂ storage database \(europa.eu\)](https://europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&code=sdg_13_7_1)

Successful deployment of CDR at scale will depend on a proper allocation of liabilities and contracts between the entities operating along the carbon value chain. These contracts must balance risks and rewards and de-risk the needed investments. Risk-sharing and the transfer of liabilities between the storage developer and the regulatory authority or the state is key to supporting project development.

5. The Industrial Carbon Management Strategy must introduce guardrails and clear “rules of the road” for carbon removal.

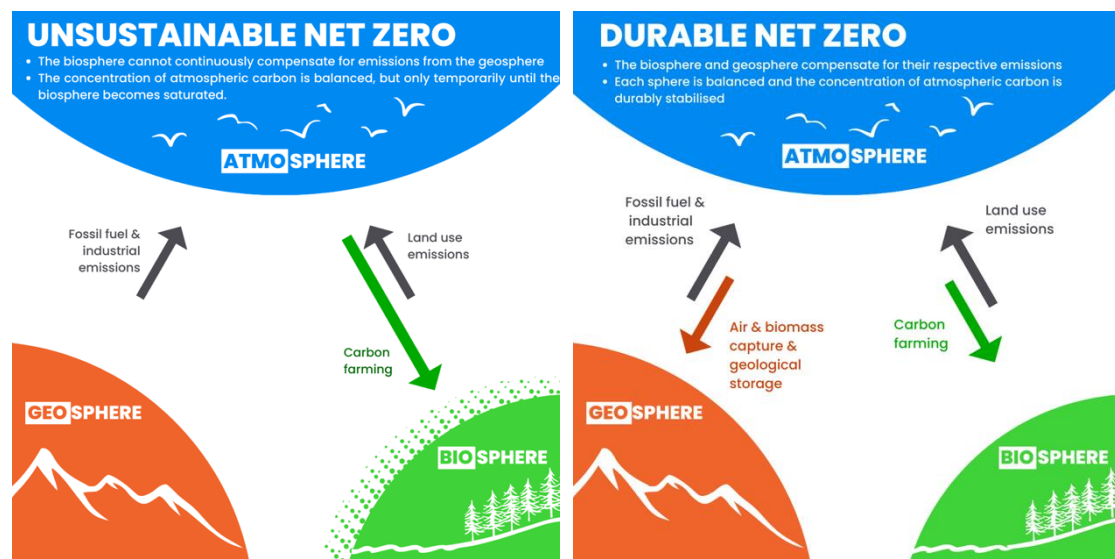
Carbon removal must only be used to address emissions from hard-to-abate sectors and to achieve negative emissions and must not be seen as an alternative to much-needed emission mitigation efforts. The Industrial Carbon Management Strategy must be aligned with this core principle. In addition, the Strategy should establish clear guardrails for carbon removal, building on the CRCF to ensure durable, effective, and credible removals.

The EU must focus its attention on achieving durable removals. Durability is a spectrum (from low to high durability) rather than a binary distinction, where durable carbon storage means high longevity and low risk of reversal. EU legislation and funding instruments should be geared towards rewarding CDR technologies and storage infrastructure that can deliver such durable removals. Steps should be taken to avoid using less durable solutions. The risk of release of carbon back to the atmosphere is also higher for carbon storage products than for carbon removal methods under the permanent storage categories. To achieve the best possible climate benefit, carbon storage in products should not be allowed to compensate for fossil fuel emissions.

To deliver durable carbon removal and achieve durable net zero, the Industrial Carbon Management Strategy must abide by the principle of “like-for-like removals”, where industrial emissions can only be removed from the atmosphere and in geological storage sites and not through biogenic CO₂ removal. Due to its vulnerability and storage capacity limitations, CO₂ removed to compensate for fossil carbon emissions should be returned to the storage medium the fossil carbon originally came from, i.e., geological storage.

While many biogenic carbon sinks can still store significant amounts of carbon and thereby have a considerable climate change mitigation impact, most biogenic sinks’ carbon removal capacity is expected to saturate eventually and become more vulnerable to carbon release as global temperatures increase over the next decades. Applying the like-for-like principle limits pressure on, and the risk of “exhausting”, biogenic carbon sinks, and curbs the risk of stored carbon being released back to the atmosphere. For this reason, the like-for-like principle must form the basis of any policy proposed as part of the Industrial Carbon Management Strategy.

Figure 2: The difference between unsustainable and durable net zero is based on the principle of like-for-like removals where fossil emissions are removed and stored in the geosphere, and land-use emissions are returned to biogenic carbon sinks.



Looking ahead

Carbon Gap welcomes further discussion of carbon removal as part of a forthcoming Industrial Carbon Management Strategy. The Commission's public consultation provides an opportunity to develop a dedicated EU strategy for carbon removal and chart a path to net negative emissions. The Strategy should make carbon removal an integral part of EU climate policy and introduce clear rules of the road for durable carbon removal. A key policy deliverable is the scaling up of carbon removal technologies as part of a European carbon removal ecosystem that relies on non-discriminatory, open-access and cross-border CO₂ transport and storage infrastructure.

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Carbon Gap is an [independent, philanthropically funded, non-profit organisation](#) focused on responsibly scaling up carbon dioxide removal in Europe, as an important complement to emissions reductions. We work across all carbon removal methods, bringing the best technical expertise to inform European policymaking. Our advocacy efforts are focused on Brussels, with additional staff presence in France, Switzerland, and the UK. Carbon Gap LTD is a registered charity (charity number 1200562) and a private company limited by guarantee (company number 13557860), registered in England and Wales. Registered office address: 71-75 Shelton Street, Covent Garden, London, WC2H 9JQ, United Kingdom. Carbon Gap LTD's number in the EU Transparency Register is: 159208346089-06