

Leaning on Uncertainty

Assessing governments' reliance on industrial carbon removals and land sinks to reach climate targets

EUROPEAN UNION CASE STUDY
APRIL 2026



EUROPEAN UNION



This publication has been supported by the European Climate Foundation. Responsibility for the information and views set out in this publication lies with the authors. The European Climate Foundation cannot be held responsible for any use which may be made of the information contained or expressed therein.

At a glance...

For more information on carbon dioxide removals and a glossary, [click here](#).

Although the European Union institutions have successfully analysed and identified risks associated with carbon removals, these risks have not been adequately addressed in policy. Furthermore, the process of setting climate targets and the targets themselves remain opaque.

The European Commission's impact assessments and research conducted to inform its climate and carbon dioxide removals (CDR) policy go in-depth with high levels of detail and transparency. In the process from assessments to proposed or adopted policy, many of these qualities get lost, and multiple inconsistencies and gaps become apparent. For example, this is evident in the impact assessment for the 2040 climate target, which projects high CDR availability by 2040–2050, even though numerous risk assessments are still missing. It is also reflected in net targets that conflate emissions reductions with CDR, despite contrary recommendations from the EU institution's own European Scientific Advisory Board on Climate Change (ESABCC) and several consulted stakeholder groups.

See Table 1 for an overview of the levels of transparency and diligence in the European Commission's removal plans.





 TARGET SETTING	 REMOVALS POLICY	 TRANSPARENCY	 FEASIBILITY
residual emissions definition	industrial removals	land use & sequestration rates	land use & sequestration rates
residual emissions quantification	land sink	technology & energy	technology & energy
general transparency	financing	transport & storage	transport & storage
reliance on international offsets	depth of assessments	biomass	biomass

Table 1: Traffic light graph; cell colours represent the level of transparency, depth, and plausibility of made assessments and plans; green = overall relatively transparent and plausible, yellow = partly lacking transparency or depth, red = severe transparency gaps or identified delivery risks. The classification is meant to provide an overview of key issues and best practices and is relative to the other reviewed countries.

Methodology Note

The case study was developed by reviewing publicly available policy and assessment documents, supplemented by transparency requests to national ministries and agencies. Data on 17 themes, including residual emissions, technology assumptions, and biomass sources, were analysed to identify gaps and best practices in countries' industrial CDR and land sink strategies. From the identified themes, 12 indicators were selected, as visible in Table 1. The collected information was clustered into themes, and key issues were broken down and underscored by references to authoritative documents in the detailed analysis section.

The scope of the analysis was limited to documents created by or on behalf of government ministries and agencies, with supplementary documents included where necessary. Detailed information on the methodology is available in the accompanying report. All reviewed documents and supplementary sources are either directly linked in the text or can be found in the list of sources at the bottom of this document.

Detailed Analysis

Target setting

● Residual emissions and removal targets

An indication of residual emissions sources and quantitative projections are provided in assessments, but clear definitions and political commitments are missing.

The European Commission does not explicitly define residual emissions. Yet it refers to emissions continuing after 2050, primarily from sectors such as agriculture and aviation, where substitution is limited, or mitigation measures are unavailable. While no specific residual emissions target is set, the EU, in its [2040 target impact assessment](#), projects gross emissions will be reduced to 8% of 1990 levels by 2050 (360 Mt CO₂eq) (Part 1, p38). The European Scientific Advisory Board, in its' [advice for the 2040 target](#), estimates residual emissions at 8-24% of 1990 levels (390-1,165 Mt CO₂eq including international transport fuel) (p79).

Made assessments provide a good example of transparency and disaggregation.

While European Union policy does not set separate targets for emission reductions, land-sink sequestration, and permanent removals, separate projections are given in its analysis documents, most notably in the European Commission's 2040 target impact assessment. The detailed analysis transparently and separately communicates scenario modelling approaches, resulting options, and potential trade-offs.

However, numbers in policy documents do not align with assessment scenarios, obscuring the intended plans.

The [2040 target communication](#) mentions that "[...] carbon removals (from the atmosphere through land-based and industrial carbon removal) should reach up to 400 MtCO₂" to deliver a 90% GHG reduction (p6). However, the way this number was determined is not defined, nor does it correspond to any scenario in the impact assessment. This mismatch represents a low level of transparency. An [analysis by researchers at Öko-Institut e.V.](#) examines how a scenario based on the 2040 Target Communication would align with the European Commission's own impact assessment and compares it with recommendations from the European Scientific Advisory Board on Climate Change (ESABCC). The analysis concludes that the European Commission's recommendations for a 90% net emission reduction target would be in line with mean

values between scenarios S2 and S3, but projections for DACCS would exceed the recommendations by ESABCC (p 4).

European Union policies and strategies do not disclose the volume of planned industrial removals.

A timely example of this is the provisionally agreed [2040 Climate Target](#) (Article 1, paragraph 5, section (b)), which mentions using domestic permanent removals under the EU Emissions Trading System (ETS) to compensate for residual hard-to-abate emissions. Neither a clear definition of residual hard-to-abate emissions nor the volume of CDR contributions are mentioned in the proposal.

The impact assessment fails to recommend a scenario to decision-makers, as criticised by the Regulatory Scrutiny Board.

The [impact assessment](#) underlying the 2040 climate target presents quantified projections for the deployment of industrial removals and net LULUCF removals. In the analysis, industrial removals are split into BECCS and DACCS, and separate projections are made. These are exhibited for the short (2030), medium (2040), and long term (2050) in four scenarios. Scenarios 1 (S1) and 2 (S2) portray lower ambition in medium-term climate mitigation, while Scenario 3 (S3) represents a more ambitious approach. The fourth Scenario (LIFE) assumes a rapid reduction in agricultural emissions through lifestyle changes. S3 is mentioned as the preferred scenario, but no clear rationale is provided for this choice. The Regulatory Scrutiny Board (RSB), the European Commission's independent advisory body responsible for quality control of impact assessments, noted this shortcoming multiple times during the review process. ([2040 Target Impact Assessment, Part 1](#), pp90-91)

● **General transparency**

Reviewed EU documents show an apparent disconnect between institutional and authoritative scientific analysis and the proposed policy and strategies.

While scenario modelling and scientific advice operate at a high level of transparency and information disaggregation, the resulting policy documents do not. The European Commission's 2040 Target Communication, the [Industrial Carbon Management Strategy](#)¹, and the following official proposal do not refer to a single scenario as a target, but instead obscure intended plans by setting out rounded numbers as quantified

¹ The European Commission's Industrial Carbon Management Strategy outlines the work ahead to deliver carbon capture technology, transport and storage infrastructure and removal of CO₂ from the atmosphere.

targets. These suggested targets do not correspond to any of the modelled scenarios in its own [impact assessment](#) (Part 3, p13), or those provided by the ESABCC in its [report](#) that gives scientific advice for the target.

The transparency of the impact assessment on the 2040 target is high.

Emissions reductions are quantified at the sectoral level, removal projections are disaggregated by technology (BECCS & DACCS), and the LULUCF pillar, and the models and assumptions used are outlined in the documents.

By proposing a single target for emission reduction and removals, the European Commission does not take the best available science nor stakeholder input into account.

[Advice by the EU institutions' own scientific advisory board, the ESABCC](#), lists disaggregated targets as one of its key recommendations (p8). Additionally, the European Commission's [impact assessment](#) documents a stakeholder consultation process, including an event on 9 June 2023 that gathered feedback from energy sector representatives, industry, think tanks, NGOs, transport, agriculture, SMEs, trade unions, and cities. The participants demanded clear differentiation between emission reductions and removals through separate targets (Part 1, p109).

When stakeholder groups were consulted on the setup of the 2040 climate target in a public consultation, the favoured option for all of them was three separate targets, one for gross emissions reductions, one for industrial removals, and one for the land sink (Part 1, p101). However, neither the revision of the European Climate Law nor the final proposal met these demands. This raises questions about the reasoning behind that decision as well as about transparency and accountability in EU climate policy.

Detail is lost on the way from assessments to proposed policy, obscuring underlying plans and amplifying uncertainty.

The headline 90% reduction target for 2040 in the European Commission's proposal to amend the European Climate Law (ECL), for which the underlying impact assessment was conducted, falls far short of the level of transparency and disaggregation exhibited in related analysis documents. It combines gross emission reductions, industrial removals and land sink sequestrations into a single target and adds international carbon credits as additional potential flexibility. Along the way from the impact assessment, over the 2040 Target Communication to the European Commission's proposal, the contents get steadily more simplified. Starting at a very high level of

disaggregation and detail in the impact assessment, the transparency of documents diminishes throughout the political process, resulting in a proposed single net target.

● Reliance on international offsets

The sudden appearance and imprecise formulation of international carbon credits in the EU Commission's 2040 climate plans go against best available science and raise procedural and delivery concerns.

After neither the impact assessment nor the preceding official [2040 Target Communication](#) mentioned international carbon credits, the [final proposal of a 2040 target](#) opens the door to the possibility of using such credits, beginning in 2036. It fails to issue a new impact assessment that estimates potential effects and explains the preference and necessity for reliance on international credits. The suggested quantification of international credits as 'up to 5% of 1990 EU net emissions' therefore reduces the EU's true domestic ambition for emission reduction from the planned 90% to 85%.

Furthermore, the proposal states that the international credits used would have to be of 'high-quality'. Aside from stating that this would regard issues of permanence and human rights, the proposal does not specify how the quality of credits might be measured. Notably, [the Scientific Advisory Board's advice](#) states that international carbon credits should not be counted towards domestic EU emission reduction targets, yet the current proposal does not comply with this. Reliance on this offsetting mechanism would introduce several risks into EU climate policy², including double counting, low environmental integrity credits, and human rights violations. Given these concerns, the failure to conduct an impact assessment for this policy option becomes even more grave.

Removals policy

● Specific plans and foreseen measures

European Union policy documents do not clearly establish which CDR technologies and measures it plans to apply, or in what volume.

The strategies do not outline the use of removals by different CDR technologies, nor do they provide details on planned approaches to support member states in achieving the

² Joseph Romm, Stephen Lezak, and Amna Alshamsi, . *Are Carbon Offsets Fixable?*, 2025, Annual Reviews, Available at: [annurev-environ-112823-064813.pdf](#)

projected levels of CO₂ sequestration in the land sink. The European Commission's [2040 Target Communication](#) mentions intentions to apply a portfolio approach, including BECCS, DACCS, capturing emissions from biomass processing, and possibly other novel approaches (p18). Given that the underlying impact assessment does not include evaluations of other forms of industrial removal beyond BECCS and DACCS, many technologies envisioned to be used lack feasibility assessments.

Several aspirational targets for removals are raised in European Commission documents, but the origins of those numbers are often unclear, or connections between different documents are not clearly conveyed.

For instance, the [EU Communication on Sustainable Carbon Cycles](#) sets out an aspirational objective to remove and permanently store at least 5 Mt CO₂ from the atmosphere (DACCS) by 2030 through frontrunner projects (p17). The EU's [Industrial Carbon Management Strategy](#) (ICMS) conflates CCS, BECCS and DACCS and estimates captured volumes of about 280 Mt by 2040 and about 450 Mt by 2050 (p2). The document states that half of the annual capture rates would come from biogenic sources or directly from the atmosphere; however, no further detail on feedstocks or potential implications is provided. On page 3, Figure 1 presents the numbers from the impact assessment for the volume of CO₂ captured for storage and utilisation, and their origin (DAC, biogenic, process, fossil fuel). The underlying numbers seem to be averages between S2 and S3 from the 2040 Target Impact Assessment, [as researchers at Öko-Institut e.V. find](#). The lack of cross-references between documents and explanation of how calculations were made results in a lack of clarity, coherence, and transparency.

● Associated financial cost and source of financing

The reviewed documents provide no roadmap for financing engineered removals and land sink expansion at the EU level.

While the [2040 Target Communication](#) mentions the need for 'a balanced and cost-effective contribution of all sectors to greenhouse gas emission reductions and carbon removals' (p26), no planning exercises or strategies for this are referenced. The only indications provided are mechanisms such as the Innovation Fund, frontloading commitments, and 'auctions-as-a-service' (p25).

Nonetheless, the discussion on how to finance CDR is ongoing. The European Commission has recently published multiple reports exploring potential approaches to financing [permanent](#) and [temporary removals](#), without indicating which ideas will be implemented or are preferred. As part of its new Bioeconomy Strategy, the European

Commission has proposed a so-called EU Buyers' Club. This plan aims to stimulate demand for credits certified under the [Carbon Removal and Carbon Farming Certification Framework](#) (CRCF) by coordinating voluntary purchases from private companies to achieve corporate climate commitments. However, the initiative risks delaying decarbonisation by allowing companies to purchase removal credits instead of reducing actual emissions. Additionally, the [CRCF certification methodologies remain insufficiently robust](#) to guarantee real environmental benefits.

Several estimates of financial needs for separate measures and infrastructure are provided, but an overall assessment is missing, leaving unanswered questions about the monetary costs of CDR plans.

Projections made in the 2040 Target Impact Assessment for the financial cost of nature-based removal solutions in the LULUCF sector are conflated with the costs of emission reductions in the sector. Costs are expressed as annual amounts that differ by decade and are shown for LULUCF GHG emissions and non-CO₂ GHG emissions for S1-S3. (Part 1, p64) The [ICMS](#) provides estimates of future DACCS costs of 122-539 EUR/t CO₂ (p15) and BECCS costs of 52-134 EUR/t CO₂ (p15), referencing an academic report³. A study on possibilities of a CO₂ transport network by the Joint Research Centre (JRC) estimates costs of up to €12.2 billion by 2030 and €16 billion by 2040 ([Tumara et al., 2024](#)). However, the reviewed European Union policy and strategy documents on carbon dioxide removals do not include a disclosed separate estimate of overall funding needs for projected plans.

Constraints and risks

● Land use and sequestration rates

Assessments of the potential effects of climate change on land sink expansion still face significant gaps.

The European Commission's [impact assessment for the 2040 climate target](#) projects LULUCF net removals ranging between -100 to -400 MtCO₂eq in both 2040 and 2050 (Part 3, p9, Tab. 4). This 'safe corridor' is based on [research by Pilli et al. \(2022\)](#), which provides a probable range for the LULUCF sink in 2050 while accounting for future climate change impacts under a stringent mitigation pathway (RCP 2.6) (see impact assessment Part 3, p9, fn. 13 and [EEA & ESABCC report](#), p77). The paper emphasises: "[...] our study does not explore a policy scenario but describes a methodological

³ Bednar, J., Höglund, R., Möllersten, K., Obersteiner, M., & Eve, T., *Role of removals in contributing to the long-term goals of the Paris Agreement*, 2023, Available at: <https://www.diva-portal.org/smash/get/diva2:1825937/FULLTEXT01>

framework." (p18), noting that factors such as windstorms, insect outbreaks or changes in tree species composition are not included in their model. The Commission refers extensively to the paper, which was also cited by its Scientific Advisory Board and Environment Agency (EEA & ESABCC, p77), stressing that scenarios exceeding the upper bound of -400 MtCO₂eq "may rely on implausibly high LULUCF net removal levels" (Part 3, p131, fn. 184). Given the remaining factors left unassessed in the underlying paper by Pili et al., this warrants caution and further assessments to address uncertainties.

One potential solution to the challenges of land-based removals is presented, but the policy proposals don't include it.

The modelling in the 2040 impact assessment indicates that following the fourth scenario, LIFE, which depicts the implementation of demand-reducing measures, could reduce land-use pressures and enable a stronger land sink ([Part 3](#), p129). Under this scenario, the land sink could sequester over 50 MtCO₂eq more than in the central scenarios (S2 & S3) (Part 3, p13). The resulting policy proposal to amend the European Climate Law disregards the LIFE scenario and offers no rationale for this decision.

Assessments of indirect land use effects resulting from the deployment of removals are lacking.

[A report by the European Environment Agency](#) (EEA) on Europe's land carbon sink states: "An excessive reliance, either on biomass resources or on LULUCF mitigation, can result in unintended negative consequences, such as carbon leakage from an increase of land use in or biomass imports from third countries." (EEA, 2025, p152). However, the reviewed documents don't contain an assessment of potential land use requirements for additional renewable energy for DACCS or BECCS biomass. By not assessing indirect effects, policymakers risk pushing deforestation pressures beyond the EU's jurisdiction into countries with potentially weaker forest protection.

Optimistic assumptions in land sink projections undermine plausibility.

The European Commission's [impact assessment](#) acknowledges "a high level of uncertainty and the early stage of development of the modelling workstreams" for LULUCF projections, particularly regarding climate change impacts and extreme weather events (Part 3, pp131-138). The description of the modelling clearly outlines underlying assumptions, including that "salvage logging and replanting of the damaged trees occur the same year as the disturbance" and that reduced harvesting rates will partially compensate for disturbance-induced forest loss (Part 3, p136). However, the assessment itself acknowledges that "[...] salvage logging preparation for replanting and

afforestation may take several years due to lack of capacity, which will delay the forest recovery and consequently its capacity as a carbon removal [...]" (Part 3, p138).

● Technology and energy

The European Commission's climate plans' reliance on optimistic volumes of engineered removals introduces significant vulnerability.

By relying on projected DACCS volumes in central scenarios (S2 & S3), highly uncertain technological developments are assumed, and limits in available storage are neglected. Meanwhile, expected sources of necessary additional renewable energy remain undisclosed in the reviewed documents.

Projected DACCS volumes exceed the ESABCC's feasibility estimates.

The [European Commission's assessment](#) indicates that most net-zero technologies needed to meet the 2040 targets have achieved Technology Readiness Level⁴ (TRL) 8 or higher, indicating an advanced deployment stage (Part 1, p78). However, DACCS and BECCS remain less mature (Part 1, p78) despite scenarios relying on them from 2030 onwards (2040 IA, [Part 3](#), p13). Projections by the Scientific Advisory Board estimate the availability of DACCS based on techno-economic constraints and storage capacity to be 0-3 Mt in 2030 and 0-7 Mt in 2040. Comparing these numbers with the projections in the impact assessment for the 2040 targets reveals delivery risks. The two central pathways, S2 and S3, rely on -15 Mt and -42 MtCO₂eq removals from DACCS in 2040 (Part 3, p13). This disparity appears to stem from the lack of explicit limits to DACCS in ESABCC recommendations.

Constraints on other removal pathways pushed carbon removal demand onto DACCS without assessing delivery capabilities.

ESABCC's recommendations to limit land use, as laid out in its [report](#) providing scientific advice for the 2040 targets, led to a reduced reliance on removals from BECCS and LULUCF. The resulting necessary carbon removal in the Commission's impact assessment for the 2040 target was instead displaced onto DACCS because no explicit limits were placed on this technology, and further emission reductions were disregarded. The assessments in the impact assessment do not take into consideration the significant uncertainties surrounding the feasibility of projected DACCS volumes.

⁴ A measure for the maturity of technologies from basic principles (1) to full operationality (9) developed by NASA; http://www.artemisinnovation.com/images/TRL_White_Paper_2004-Edited.pdf

Despite recognising energy as a key concern for the sustainability of industrial removals, no encompassing evaluations have been conducted.

The [2040 target impact assessment](#) acknowledges that high reliance on industrial carbon removals would require significant electricity and heat consumption (Part 3, p29). The Industrial Carbon Management Strategy estimates that carbon capture technologies (Direct Air Capture (DAC) and Carbon Capture and Storage (CCS)) require 1-3 MWh per tonne of CO₂ captured (p2, fn. 11) and notes that DACCS presents particularly substantial energy requirements that raise sustainability concerns if not adequately addressed (p14). The expected energy demand for DAC is slightly lower than [recent peer-reviewed estimates](#), which range from 1.7 to 3.9 MWh/tCO₂.

The 2040 target impact assessment also acknowledges that novel technologies will affect total electricity production and infrastructure needs ([Part 1](#), p78). Nonetheless, no defined solutions or evaluations of possible repercussions are provided. Given that potential energy needs are currently inadequately addressed and that energy demand estimates for DAC are optimistic, there are significant sustainability concerns, as implied by the Commission's [Industrial Carbon Management Strategy](#) (p14).

Due to delivery concerns about DACCS, contingency plans for a shift to BECCS are made.

The [2040 target impact assessment](#) acknowledges that the projected DACCS removal volumes may not materialise; therefore, it includes a sensitivity analysis that estimates effects from a higher biomass demand on LULUCF net removals if DACCS fails to deliver and BECCS must be used to compensate (Part 3, pp131-132) While the in-depth assessment of this contingency represents a welcome first step to recognise and assess this risk, it reveals an intention to rely on volumes of DACCS at the higher end of estimates, despite concerns about non-delivery. While this is highly relevant to transition planning in energy sectors, the circumstances are described in more detail in the section on biomass supply below.

● **Transport and geological storage of CO₂**

EU policies in place mark the first steps toward quantifying and regulating geological storage capacity for industrial carbon removal and CCS.

The [Net-Zero Industry Act](#) (NZIA) set a target of 50 Mt CO₂eq annual geological storage capacity by 2030, though this is not disaggregated between CDR and CCS. Access to geological storage is regulated by the [CCS Directive](#) (2009), which establishes permitting rules "to ensure safety and environmental integrity" of CO₂ storage. The [Industrial](#)

[Carbon Management Strategy](#) (ICMS) summarises that the Member States' National Energy and Climate Plans (NECPs) indicate a cumulative geological storage needs of 34.1 MtCO₂ per year and an annual storage capacity of 39.3 Mt CO₂ in 2030. However, these volumes of CO₂ are mainly derived from CCS rather than CDR (ICMS, p5).

While CO₂ transport infrastructure is recognised as of critical importance, its current strategies remain underdeveloped.

Furthermore, the [ICMS](#) identifies CO₂ transport infrastructure as a key enabler common to all pathways (p3). The strategy outlines plans for CO₂ infrastructure hubs and industrial clusters to serve capture projects, supported by national and EU funding programmes with mandates including cross-border CO₂ transport (ICMS, pp6-7). Currently, the majority of CO₂ transport is expected to occur via "alternative" forms of transportation to the coast, followed by shipping to offshore storage (ICMS, pp6-7). The vagueness of the plans shows that strategies on CO₂ transport are still at an early stage. At the end of 2025, the European Commission launched a [public consultation on CO₂ transportation infrastructure and markets](#), indicating plans to support implementation by coordination and rule-setting.

There are geological storage and techno-economic constraints, but projections by the European Commission exceed identified cumulative limits.

[ESABCC advice for the 2040 target](#) introduces two constraints into its models. First, it mentions a cumulative geological storage capacity limit of 57.2 GtCO₂ (for CCS and removals combined) as a general restraint. Secondly, it raises broad limitations for techno-economic deployment, leading to an estimated maximum deployment of 425 MtCO₂/a across all carbon capture and storage technologies (including industrial applications, DACCS, and BECCS) by 2050 (p79). In the ESABCC model, upper limits for BECCS are estimated at 44 Mt CO₂ in 2030, 207 Mt CO₂ in 2040, and 336 Mt CO₂ in 2050, while DACCS is limited to 3 Mt CO₂ in 2030, 7 Mt CO₂ in 2040, and 22 Mt CO₂ in 2050 (ESABCC report, p79). The limits estimated by ESABCC of 7 Mt in 2040 and 22 Mt in 2050 are exceeded by projected volumes of 15-42 Mt DACCS (S2-S3) in 2040, and 56-57 Mt (S2-S3) in 2050 in the European Commission's [impact assessment](#) (Part 3, p13). This raises delivery risks for projected volumes of DACCS and BECCS, given that the ESABCC includes a combined, cumulative storage capacity threshold valid across all options, depending on geological storage.

● Biomass supply

The 2040 Target Impact Assessment shows that BECCS deployment will be highly sensitive to biomass supply.

It employs two models with divergent projections of BECCS deployment, based on different assumptions about sustainable biomass availability. The POTEnCIA model, with a more relaxed cap on sustainable biomass supply, projects approximately 80 MtCO₂ BECCS deployment in 2040, while the more stringent PRIMES model limits BECCS to 34 MtCO₂ in 2040 and proposes compensating volumes with DACCS instead ([Part 3](#), p11). The projections in the prominent scenarios S1, S2, and S3 stay within this limit set by the more stringent model (maximum of -34 Mt CO₂eq BECCS in S2 in 2040). This raises the question of whether the BECCS volumes constrained by this limit affected decision-making on DACCS volumes.

Uncoordinated biomass demand across sectors risks aggregate demand exceeding sustainable supply.

[A paper by Ecologic Institute](#) reviews the demand for biomass and bioenergy relative to the availability constraints identified in the literature (see the conclusion on p20). While the bioenergy demand mentioned in the European Commission's impact assessment stays within limits, the expected biomass demand is close to availability constraints. Given that the assessment is only done for biomass demand for bioenergy, if other sectors (e.g. materials) require additional biomass, this would exceed the sustainable biomass supply. Thus, competition between sectors for the limited biomass is highly likely as the non-energy sectors currently consume about 40% of the available harvested biomass (p16) and the [European Union plans for economic growth in bioeconomy sectors](#). The BECCS volumes suggested in the European Commission's impact assessments' most prominent scenarios, therefore, represent a risk-prone approach.

The adverse effects of biomass demand through BECCS and bioenergy on the land sink are rigorously assessed, showing potentially devastating effects on land-based removals.

[The 2040 target impact assessment](#) explicitly acknowledges the tradeoff between biomass/bioenergy demand through BECCS reliance and LULUCF net removals, presenting complementary use of DACCS as a solution to limited biomass availability (Part 3, pp11, 119). [The Industrial Carbon Management Strategy](#) similarly reflects "the strong needs for natural resources of bio-CCS as a challenge" (p14). A sensitivity analysis is conducted in the European Commission's 2040 Target Impact Assessment, which

estimates the effects of high biomass needs through BECCS and biofuels: "The increased demand of woody biomass results in a decrease of the LULUCF net removals by around 100 MtCO₂-eq in 2040, and around 65 MtCO₂-eq in 2050." (Part 3, p132). These estimated impacts represent a substantial share of the overall LULUCF sink, with effects in 2040 expected to amount to almost half of the current net land sink in the European Union.

Solutions for managing biomass demand are outlined in the analysis, but policy documents give insufficient attention to the land sink implications.

The proposed solutions in [the 2040 target impact assessment](#) include shifting feedstock from primary biomass to secondary residues, and switching post-consumer wood for bioenergy production, with wood plantations for energy use expected to develop by 2040 and stabilise from 2050 onward to buffer increased biomass demand (Part 3, p120). However, the [2040 Target Communication](#) barely addresses this critical tradeoff. It mentions a need for rules for technologies with high biomass use, such as BECCS, and the possible impacts on the size of the land sink (p22), but does not give any indication of policy plans to resolve tensions. This limited attention leaves the policy to protect the land sink from biomass-heavy removals underdeveloped, risking additional pressures to an already challenging assignment.

Key issues

The European Commission's latest projections in its impact assessments on the 2040 climate targets rely on a fragile construct of DACCS, BECCS, and on highly uncertain levels of sequestration in the land sink. Four overarching key issues were identified:

- 1. Lack of adequate assessments:** Projections in its impact assessment for the 2040 climate targets show significant permanent removals in 2040 and 2050. There are many uncertainties for DACCS, such as financing, technological development, and additional renewable energy sources, that are acknowledged but not addressed through in-depth analysis, policies, or roadmaps.
- 2. Interreliance of removal methods introduces risk:** A substantial volume of BECCS is included in all projected scenarios in the European Commission's impact assessment for the 2040 target. In the case where DACCS does not deliver, the assessment assumes an increase in BECCS to compensate for the shortfall. Consequently, due to the higher demand for biomass, potential impacts on the land sink by up to 100 Mt CO₂eq in 2040 are projected in the assessment. This means that, if technological progress and economic frameworks for DACCS are not as favourable as expected, the burden might shift to the land sink. However, the fact that the land sink is already declining due to member states' non-compliance with Land-Use, Land-Use-Change, and Forestry (LULUCF) targets, and faces pressures from more frequent and severe natural disturbances driven by climate change, exposes critical vulnerabilities in this strategy.
- 3. Uncertainty about biomass demand and sources is not addressed:** The required biomass feedstock for BECCS is not transparently communicated in conducted assessments, presumably hidden behind the overall demand from bioenergy. The possible impact of BECCS on the land sink is acknowledged, and assumptions that might reduce biomass demand are described. However, no measures to mitigate trade-offs between the LULUCF sink and potentially increased biomass demand for bioenergy resulting from BECCS are proposed in policy.
- 4. Significant reliance on the land sink while member states continue failing to identify necessary measures:** The European Commission plans to use removals generated in the land sink to reach climate goals in other sectors. Meanwhile, evidence from the European Environment Agency (EEA) shows that the European Union is currently not on track to reach its LULUCF targets for 2030 (EEA, 2025). Member states' underperformance in identifying sufficient measures to protect

the land sink, combined with flexibility between sectoral targets, and the lack of EU-wide land-sink targets beyond 2030, risks damaging the integrity of the EU climate architecture. Future climate plans that rely on the land sink must be accompanied by stronger efforts to bolster and defend land-based carbon sinks.

Reviewed Documents

- European Commission, *Europe's 2040 climate target and path to climate neutrality by 2050 building a sustainable, just and prosperous society (informally: 2040 Target Communication)*, 2024,
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0063>
- European Commission, *Impact Assessment Report Part 1*, 2025,
<https://data.europa.eu/doi/10.2800/609405>
- European Commission, *Impact Assessment Report Part 2*, 2024,
<https://data.europa.eu/doi/10.2760/171121>
- European Commission, *Impact Assessment Report Part 3*, 2024,
https://eur-lex.europa.eu/resource.html?uri=cellar:6c154426-c5a6-11ee-95d9-01aa75ed71a1.0001.02/DOC_3&format=PDF
- European Commission, *Impact Assessment Report Part 4*, 2024,
https://eur-lex.europa.eu/resource.html?uri=cellar:6c154426-c5a6-11ee-95d9-01aa75ed71a1.0001.02/DOC_4&format=PDF
- European Commission, *Impact Assessment Report Part 5*, 2024,
<https://data.europa.eu/doi/10.2833/827631>
- European Commission, *Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2021/1119 establishing the framework for achieving climate neutrality (informally: 2040 Target Proposal)*, 2025,
eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52025PC0524
- European Commission, *Sustainable Carbon Cycles Communication*, 2021,
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0800>
- European Commission, *Towards an ambitious Industrial Carbon Management for the EU*, 2024,
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52024DC0062>
- European Environment Agency & European Scientific Advisory Board on Climate Change, *Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050*, 2023,
<https://data.europa.eu/doi/10.2800/60940>

Supplementary Sources

Bednar, J., Höglund, R., Möllersten, K., Obersteiner, M., & Eve, T., *Role of removals in contributing to the long-term goals of the Paris Agreement*, 2023, <https://www.diva-portal.org/smash/get/diva2:1825937/FULLTEXT01.pdf>

Ecologic, *Industrial Removals' Resource Use in the 2040 Climate Target Impact Assessment*, 2025, <https://www.ecologic.eu/sites/default/files/publication/2025/50183-industrial-removals-resource-use.pdf>

European Environment Agency, *Enhancing Europe's land carbon sink: Status and prospects*, 2025, <https://data.europa.eu/doi/10.2800/2836317>

European Scientific Advisory Board on Climate Change, *Scientific advice for amending the European Climate Law - Setting climate goals to strengthen EU strategic priorities*, 2025, <https://climate-advisory-board.europa.eu/reports-and-publications/scientific-advice-for-amending-the-european-climate-law-setting-climate-goals-to-strengthen-eu-strategic-priorities>

Official Journal of the European Union, *Regulation (EU) 2024/1735 of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem and amending Regulation (EU) 2018/1724*, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202401735

Öko-Institut e.V., *Discussion of the results of the 2040 Impact Assessment*, 2024, <https://www.oeko.de/fileadmin/oekodoc/discussion-results-2040-Impact-Assessment.pdf>

Öko-Institut e.V., *Second assessment of the draft technical specifications for certification under the EU CRCF*, 2025, https://www.oeko.de/fileadmin/oekodoc/2025_Assessment-CRCF-methodology-DACCS_BioCCS_second_draft.pdf

Tumara, D., Uihlein, A. and Hidalgo Gonzalez, I., *Shaping the future CO₂ transport network for Europe*, 2024, <https://publications.jrc.ec.europa.eu/repository/handle/JRC136709>

Van der Spek, M., Bardow, A., Baum, C. M., Bolongaro, V., Dufour-Décieux, V., Esch, C., ... & Minx, J. C., *An Ecosystem of Carbon Dioxide Removal Reviews-Part 1: Direct Air CO₂ Capture and Storage*, 2025, *Energy & Environmental Science*, <https://pubs.rsc.org/en/content/articlepdf/2025/EE/D5EE01732G>



CARBON MARKET WATCH

Author

Daniel Orth
Policy Expert on Carbon Removals

Editors

Greta Hirschberg
Communications specialist

Gavin Mair
Communications specialist

Design

Noemí Rodrigo Sabio
Communications specialist

Magdalena Zawieracz
Communications specialist

Image source

Canva images

CONTACT

Daniel Orth
daniel.orth@carbonmarketwatch.org

