Leaning on Uncertainty

Are European countries overrelying on carbon removals to reach Climate Targets?

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CARBON MARKET WATCH

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ANALYSIS

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Executive Summary

European governments are increasingly integrating methods to remove carbon dioxide (CO_2) from the atmosphere into their climate strategies. The underlying technologies and practices are more difficult to implement than often assumed and come with significant challenges of their own. If deployed wisely and responsibly, carbon dioxide removals (CDR) can supplement rapid, deep and sustained emission reductions, help the European Union reach climate neutrality, and ultimately enable a state of net-negative emissions. However, CDR can undermine rather than support climate action if it becomes a substitute for, rather than a supplement to, the emissions reductions that remain the foundation of any credible climate strategy.

A key problem is that countries rely heavily on future engineered CDR methods to counterbalance what they define as hard-to-abate or residual emissions, while not accounting for the tradeoffs and potential risks associated with this technology. In fact, carbon removals can cause negative environmental and social impacts, including damage to biodiversity, excessive land and biomass use and high renewable energy demand. If these trade-offs are not taken into account, progress on other fronts may be affected, and they may even cancel out the climate benefits of CDR. In addition, the delivery of the envisioned CDR volumes is currently highly uncertain and poor assessments and governance increase the risks of non-delivery. By betting overconfidently on carbon removals, countries risk reducing pressure on decarbonisation and delaying emission cuts. CDR may worsen the current climate crisis if it fails to deliver at the expected scale, or if removals end up being reversed, for example, by a wildfire in new forest plantations intended to procure land-based removals.

This report examines the overreliance on carbon removals in the climate strategies of European countries. Overreliance on CDR means not only relying on large volumes of removals rather than focusing on decarbonisation, but also ignoring the potential negative side effects of these measures. When countries rely on CDR but fail to account for resource use and social and environmental

impacts, or have insufficiently robust and transparent plans and assessments of CDR, they over-rely on the measure.

We analysed the climate strategies and underlying assessments of six European countries - Austria, Finland, France, Ireland, Italy, and Norway - and the European Commission. Across all reviewed jurisdictions, consistent patterns emerge: heavy reliance on industrial removals while critical feasibility assessments are missing, land sinks are treated as reliable assets but are not protected by consistent policies, and CDR plans are highly fragmented and lack transparency. In total, seven key dimensions of responsible reliance on CDR are identified. These are mapped against each reviewed country in the overview table below. Where significant deficiencies in these dimensions were found, these are interpreted as constituting overreliance on CDR.

All reviewed countries exhibit at least one of these shortcomings, and most exhibit several. Ireland and Finland exhibit clear disregard for scientific advice and take high-risk approaches, while Austria and Italy show greater caution in their reliance and planning of CDR. However, no reviewed country currently presents a fully credible, transparently governed, and robustly assessed CDR strategy. To address these failures, governments must conduct complete and detailed feasibility assessments, transparently communicate CDR plans in coherent public documents, define residual emissions with rigour and transparency, and set binding permanent removal targets in addition to gross emission reduction targets. For carbon removals to play their role effectively in supporting decarbonisation, countries need to establish a separate policy and governance architecture for carbon dioxide removals and plan ahead based on scientific evidence and within the bounds of sustainable resource supply.

Overview of countries' reliance on CDR

	European Commission	Austria	Finland	France	Italy	Ireland	Norway
Thorough assessments for permanent CDR	amber	amber	red	red	amber	amber	red
Plausible timeline for permanent removals	amber	amber	amber	red	green	red	amber
Action in the land sink is coherent with projections	green	grey	red	amber	red	red	red
Caution in land sink plans	green	grey	red	red	red	red	red
Policy coherent with impact assessments and scientific advice	red	red	red	green	amber	amber	amber
Consolidated and transparent information on permanent CDR plans	green	green	amber	amber	amber	red	green
Plausible reliance on geological storage of CO_2 abroad	green	red	amber	amber	green	red	green

Colour coding: green = no or very limited shortcomings present; amber = shortcomings present but partially addressed; red = significant shortcomings present and unaddressed; grey = insufficient data available. See the Methodology Annex for a more detailed breakdown

This table provides an overview of the reviewed countries and the European Commission's climate strategies and their performance across the identified seven **key dimensions of responsible reliance on CDR**. It exemplifies that all countries underperform in at least one category, and the quality of plans on CDR is highly variable. In almost all categories, at least one country shows that better governance of CDR in national climate plans and policies is possible.

Glossary

For a general overview of what negative emissions are and an explanation of the most popular technologies and measures, take a look at the Carbon Negative Handbook.

DACCS

Direct Air Capture with Carbon Storage (DACCS) is a CDR method that removes carbon dioxide directly from the atmosphere and permanently stores it in geological reservoirs. Even though it carries 'CCS' in its name, the process and its application are vastly different from CCS (see below), which, in a climate policy context, is typically limited to the application of CCS to sources of fossil CO_2. For the deployment of DACCS, a main concern is the additional renewable energy demand it creates. Its carbon-absorption and absorption processes are highly energy-intensive. This will not only create competition with other processes that also utilise renewable energy, but risks driving renewable energy prices to prohibitively high levels. Furthermore, there is a risk that finance for DACCS deployment will compete with finance for decarbonisation.

BECCS

Bioenergy with Carbon Capture and Storage uses carbon dioxide absorption technology in an industrial process in which biomass is burned to produce energy. After carbon dioxide is captured, it is permanently stored in geological formations. Main concerns for BECCS are that its deployment may result in higher biomass demand, potentially leading to increased wood harvests and, in turn, increased emissions from forest land. If biomass demand rises, or, in the worst case, dedicated biomass plantations are used for BECCS, land use will increase, potentially exacerbating land-use pressures.

Bio-CCS

Bio-CCS is a term encompassing all industrial carbon dioxide removal processes that utilise biogenic feedstocks, carbon capture technology to absorb carbon dioxide, and permanently store greenhouse gases underground. This includes processes in which biomass is burned to produce energy, such as BECCS, as well as likely more sustainable processes that use biomass feedstocks from residues or food waste and absorb the CO_2 from their fermentation.

Biochar

Biochar is a material produced by heating organic matter (such as wood, agricultural waste, or manure) at high temperatures in a low-oxygen environment, a process called pyrolysis. The result is a carbon-rich solid that can be added to soils or construction materials that might be able to store carbon. Biochar may increase biomass demand, since organic materials are needed for its production. In the best-case scenario, they come solely from organic waste streams; in the worst-case scenario, they come from dedicated plantations that require additional resources, resulting in additional emissions. Thus, planning ahead and transparently reporting biomass sourcing for biochar is essential.

CCS

Carbon Capture and Storage absorbs carbon dioxide from a production facility using fossil fuels, such as a fossil gas power plant, and permanently stores it in geological formations. While this technology may have a role to play in decarbonising the hardest-to-abate industrial emissions, it is inherently different from carbon removals, because it can never result in negative emissions.

CCU

Carbon Capture and Use is a process that absorbs emissions from fossil emission sources and utilises that CO_2 for products or industrial processes. These emissions are then reemitted at the products' end of life or process finalisation. Since capturing emissions is highly energy-intensive and the captured emissions are reemitted shortly thereafter, the climate benefits of this process are very limited.

Engineered removals

Engineered removals are carbon dioxide removals that rely on human technological processes to function. This encompasses not only industrial removals, like DACCS, but also mixed processes that use biomass and convert it into engineered products, such as biochar.

Hard-to-abate

Hard-to-abate emissions are commonly defined as those that are difficult to eliminate in the medium- to long-term due to a lack of available clean alternatives. This differs from residual emissions, which refer to those emissions that would remain at the point of net-zero emissions, and should thus be balanced by removals. Residual emissions usually include hard-to-abate emissions, but may also include emissions that could have been avoided or reduced. High levels of residual emissions make it hard to achieve climate neutrality because the supply of removals is limited. Residual emissions should be defined as those that are impossible to abate given societal and technological considerations.

Industrial carbon management

Industrial carbon management, as used by the European Commission and some EU Member States, is a very broad term that encompasses industrial removals, CCU, and CCS. It conflates three inherently different concepts with distinct challenges and application options. However, since it is used in the reviewed climate strategies, the term appears in our reports.

Industrial removals

The term industrial removals is used in the reports, to refer to industrial processes that capture carbon and permanently store it underground. This includes DACCS, BECCS, and bio-CCS processes.

Land sink

The surplus of carbon removals from land-based sequestration in Land-Use Land Use Change and Forestry (LULUCF) sectors that remains after subtracting carbon emissions from the same sectors.

LULUCF

Land-Use Land Use Change and Forestry is a sectoral distinction used to describe emissions and removals from direct human-induced land management, including forestry, agriculture, and land-use changes.

Transparency gap

Not disclosed or obscured information on decision-making or data, including underlying reasoning and assumptions.

Offsetting

Instead of actually reducing emissions, offsetting is the process of using credits from another entity to compensate for ongoing emissions and claim a lower climate impact.

Permanent removals

Permanent carbon storage requires that the sequestered carbon will not be re-emitted within a climate-critical timeframe. Biogenic stores are unlikely to meet this standard, as they are vulnerable to natural and human disturbances, including climate change itself.

WEM Scenario

The WEM scenario, meaning 'With Existing Measures' scenario, is a commonly used term by countries in their climate modelling for baseline scenarios under measures and policies that are already in place.

WAM Scenario

The WAM, or 'With Additional Measures' scenario, is a commonly used term by countries in their climate modelling for baseline scenarios under measures and policies that have not yet been implemented.

Introduction

Countries in Europe are increasingly integrating Carbon Dioxide Removal (CDR) into their climate strategies. Whilst the International Panel on Climate Change (IPCC) acknowledges that carbon dioxide removals will play a role in counterbalancing residual emissions that are genuinely hard-to-abate, it also clearly states that CDR is not a substitute for emissions reductions. How CDR policy is governed will therefore be decisive: poorly governed reliance on removals risks slowing emissions reduction efforts, locking in negative social and environmental impacts, and ultimately undermining the very climate goals these technologies are meant to support.

CDR involves physically extracting carbon dioxide from the atmosphere and permanently storing it. CDR is an unavoidable supplement to deep, fast and sustained emissions reductions, provided it is deployed within realistic, carefully managed limits. If done wisely, permanent CDR can be used to compensate for truly residual emissions, to stabilise global temperatures, and to ultimately decrease the concentration of CO_2 in the atmosphere, returning to safer temperature levels. However, overreliance on CDR to offset ongoing emissions that could otherwise be eliminated undermines countries' climate commitments and puts the Planet's climate, ecosystems, and people at risk.

About CDR

There are natural, technical, and mixed methods of carbon removal. Natural solutions focus on enhancing carbon sequestration (e.g., CO_2 storage in soils and vegetation) by leveraging natural processes in ecosystems, such as forests, wetlands, and grasslands. These solutions include protecting natural terrains, rewilding, reforestation and afforestation. Moreover, protecting nature-based sinks and increasing sequestration in soils and biomass are critical to addressing the biodiversity and climate crises. Natural CDR should be considered a temporary removal method due to its high vulnerability to human and natural disturbances, which can easily lead to the release of large amounts of carbon back into the atmosphere.

Some technical CDR solutions that apply geological storage can ensure that the carbon removed is not returned to the atmosphere at climate-relevant timescales and are less susceptible to external factors. These methods include Direct Air Capture and Carbon

Storage (DACCS), which removes CO_2 from the air and permanently stores it in underground geological formations, and Bioenergy with Carbon Capture and Storage (BECCS), which separates carbon from a process in which biomass is burned for energy production and likewise stores it in underground geological formations.

A serious concern across all removal methods is that unrealistic expectations for future carbon removal availability will deter emission reductions. This concept, known as 'mitigation deterrence', is well established in scientific literature and represents a real threat to fair and effective climate action. In addition, every CDR approach intended to deliver a permanent carbon removal benefit is subject to many constraints. These include the potential risks of reversal, uncertainties about technological readiness, excessive pressure on scarce sustainable biomass, energy, water, and land, and negative consequences for biodiversity and local communities.

The above uncertainties and trade-offs make CDR, particularly in the short- to medium-term, a finite resource. Its deployment requires dedicated, careful, and transparent planning, grounded in a sustainable supply of resources that accounts for environmental, social, and technological constraints. No matter the level of permanent removals that can be achieved in an environmentally sustainable way, they must never interfere with efforts to reduce emissions. This means that targets and policies for permanent removals should be kept separate from those aimed at reducing emissions and enhancing the land sink.

In addition, carbon removals should only be defined as such if they deliver, throughout their whole life-cycle and including their indirect effects, actual climate benefits and do not result in more emissions being released than removed. This is why targets for carbon removals must be accompanied by robust accounting rules and certification methodologies. Failing to do so undermines the credibility of countries' climate commitments and risks turning carbon dioxide removal activities into a source of additional environmental and societal harm.

European Union policy on permanent carbon removals and land-based sequestration

The policy framework governing permanent CDR and land-based sequestration in the European Union shapes both what member states are required to do and what they are permitted to claim toward achieving climate targets. Understanding this framework is therefore essential to assessing the national strategies reviewed in this report. Where EU legislation sets clear, binding requirements, member states can be held to account; where it is absent or underdeveloped, ambiguity creates space for overreliance to go unchecked.

At the European level, land-based sequestration is governed primarily by the LULUCF Regulation[1], which sets a binding target for Member States to collectively achieve a combined land sink by 2030 that removes 310 million CO_2 more from the atmosphere than it emits. In technical terms, this means achieving a combined net-sequestration level of -310 $MtCO_2eq$. Individual country targets for 2030 are allocated based on their managed land area, and during 2021 to 2025, countries' emissions from the LULUCF sector may not be higher than sequestration in that timeframe.

Legislation on permanent carbon removals, which potentially include industrial removals such as DACCS and BioCCS, is considerably underdeveloped at the time of this report's publishing. A sub-target for industrial removals was suggested in the Impact Assessment for a 2040 target presented by the European Commission in 2024. However, separate targets for removals were not retained in the revised European Climate Law. Thus, a distinct permanent removal target for the European Union and its member states is missing at the EU level, creating a regulatory gap that risks delaying needed action on all fronts, including deep emission reductions, enhancing net-sequestration in the land sink, and the deployment of permanent removals.

The European Climate Law instead foresees the potential use of a limited volume of international carbon credits towards the EU's 2040 target, a portion of which may include carbon removal or land-based sequestration credits sourced from outside the EU. At the time of writing, the European Commission is also looking into ways to incentivise carbon removals in the EU through the EU Carbon Removals and Carbon Farming (CRCF) certification framework. Even though they may eventually involve EU

[1] *Regulation (EU) 2018/841*

member states, these proposals currently rely on the private sector to invest in CDR, which brings offsetting risks and does not represent a dedicated CDR policy.

National territories and economies differ significantly. Therefore, challenges and foundational advantages vary. For instance, the availability of forest land is a key factor for both land-sink removals and sustainably sourced domestic biomass. Countries like Finland and Norway, with a large total forest area, have a stronger starting position to procure removals from the land-sink. While this is already accounted for under the EU LULUCF Regulation, which applies a distribution factor for national targets based on their share of total managed land area, such considerations are yet to be developed in policy for permanent removals at the EU level.

The purpose of this report

The findings in this report are drawing on official national climate planning documents, including Long-Term Strategies, National Energy and Climate Plans, and assessments by national scientific advisory boards. To supplement publicly available information, transparency requests were submitted to relevant national ministries, yielding more than 70 background documents. The reviewed countries were selected based on the extent of their disclosed CDR reliance, the transparency of their strategies, and initial indications of feasibility concerns. They do not constitute a representative sample of European countries, nor a ranking of best or worst performers.

This report assesses the degree of reliance on CDR methods within climate strategies and the credibility of these plans. The degree of reliance is understood as the volume of carbon removals they plan to realise to reach climate targets. The credibility of the envisioned CDR deployment is constituted by (1) the transparency of policy, strategy, and analyses, (2) the existence and depth of assessments, and (3) the mitigation of identified risks in the countries' CDR strategies. All three points are also analysed for their accordance with best available science, as countries have committed to under the Paris Agreement Article 4(1). For this purpose, this report and its underlying country case studies draw on publications by countries' scientific advisory boards (i.e., independent expert groups that provide recommendations based on scientific consensus), where available. A detailed breakdown of the methodology applied in this report is provided in the Annex.

Framing overreliance

Overreliance on carbon dioxide removals occurs when governments embed projected removal volumes into climate strategies that exceed established feasibility constraints or are developed without adequate assessments. For the latter, this is the case if they lack proper valuations of resource constraints, technological readiness, costs, and the practical infrastructure required to deliver them, as well as the economic, environmental, and social consequences of doing so at scale.

Examples of overreliance include failing to assess sustainable biomass supply, land-use tradeoffs, renewable energy demand, and the availability of transport and storage infrastructure, or overlooking the impacts of large-scale deployment. This is in addition to embedding underdeveloped removal technologies in climate strategies without the necessary policies for their development or thorough assessments of costs, financing and readiness.

A lack of transparency fundamentally hinders any possibility of a rigorous external assessment of the extent to which countries rely on carbon dioxide removal. When removal plans are fragmented across documents, technologies are conflated under broad labels (e.g., CCUS), or when key assumptions are unspecified, it becomes impossible to evaluate whether projected volumes are credible, feasible, or consistent with the stated targets. Such transparency gaps are foundational shortcomings. Countries’ climate strategies need to make their plans clear and fully public to build trust, communicate progress and shortfalls, and strengthen accountability.

Legislation and authoritative guidance underpin the need for transparent assessments of reliance on carbon removals and the potential effects of CDR deployment.

The Treaty on the Functioning of the European Union includes a section on the Environment. Article 191 sets out that, "policy on the environment shall contribute to pursuit of the following objectives:

- reserving, protecting and improving the quality of the environment,
- protecting human health,
- prudent and rational utilisation of natural resources,
- promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change"

On the preparation of environmental policy, it states that, "the Union shall take account of:

- available scientific and technical data,
- environmental conditions in the various regions of the Union,
- the potential benefits and costs of action or lack of action,
- the economic and social development of the Union as a whole and the balanced development of its regions."

The same Article also requires that EU environmental policy shall be "based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay." These principles are cornerstones of international environmental law and are important considerations for governmental action to address climate change.

The Governance Regulation, binding on all reviewed countries except Norway, requires Member States to: assess the macroeconomic, health, environmental, social, and skills impacts of planned climate measures[2]; describe interactions between existing and planned policies and ensure that projections on supply security, infrastructure, and market integration are linked to robust energy efficiency scenarios[3]; disclose the assumptions, parameters, and methodologies underlying their projections[4]; and, concerning renewable energy sources, evaluate biomass demand and supply, including the impact of forest biomass use on the land sink[5]. This information must then be

[2] Art. 8, Paragraph 2b
[3] Art. 8, Paragraph 2c
[4] Art. 8, Paragraph 3
[5] Annex 1, Part 2.1.2., iv

presented in countries' Long-Term Strategies and National Energy and Climate Plans[6]. Collectively, these provisions establish a clear legal baseline for the transparency and analytical rigour that national CDR plans must meet.

In addition, the European Court of Human Rights describes five key criteria for climate planning, that highlight the importance of good climate planning: "1) adopting general measures specifying a target timeline for achieving carbon neutrality and the overall remaining carbon budget for the same time frame, or another equivalent method of quantification of future greenhouse-gas (GHG) emissions, in line with the overarching goal for national and/or global climate-change mitigation commitments; 2) setting out intermediate GHG emissions reduction targets and pathways (by sector or other relevant methodologies) that were deemed capable, in principle, of meeting the overall national GHG reduction goals within the relevant time frames undertaken in national policies; 3) providing evidence showing whether they had duly complied, or are in the process of complying, with the relevant GHG reduction targets; 4) keeping the relevant GHG reduction targets updated with due diligence, and based on the best available evidence; and (5) acting in good time and in an appropriate and consistent manner when devising and implementing the relevant legislation and measures."

The provisions above establish a clear and legally grounded baseline for what responsible CDR planning requires. The precautionary and prevention principles strongly support the position that GHG emissions reductions, which can be effected through existing and proven policy measures, should be prioritised. Large-scale deployment of land-based CDR raises major sustainability and feasibility risks, while novel CDR, meaning removal methods that are not yet commercially mature, operates at negligible volumes and faces serious concerns and challenges to scaling up meaningfully. As such, policies that rely heavily on reversing the temperature rise above 1.5°C through CDR are notably risky. Failing to deliver could result in far higher temperature levels, either temporarily or permanently. The Governance Regulation sets out specific obligations to assess impacts, disclose assumptions, and evaluate resource constraints. The European Court of Human Rights criteria require climate plans to be capable of delivering their stated goals, kept up to date with the best available science, and implemented in a timely and consistent manner. Together, these provisions define the standard against which all aspects of governments' climate plans, including any proposed reliance on CDR, can and should be held.

[6] Art. 3, Art. 15

Building on these legal foundations, this report understands overreliance as a twofold problem. We identify substantive overreliance, where authoritative assessments clearly demonstrate the non-feasibility of projected plans, and procedural overreliance, where poor-quality assessments or insufficient implementation pose a high risk of non-delivery of expected volumes.

Findings

Fragmented information on CDR and a wide variation of estimates

Assessing the degree of reliance on engineered carbon removals is a significant analytical challenge, given the limited transparency in the countries' climate plans.

A consistent weakness across the reviewed national climate strategies is the failure to consolidate carbon dioxide removal plans into coherent, accessible documents. This makes it difficult to assess the true scale of reliance on these technologies or to hold governments accountable for their delivery.

An example of this is Ireland. The country's engineered CDR plans have so far not been publicly communicated effectively . Meaningful detail on biochar and BECCS is not communicated in the Irish Climate Action Plan but is instead only available in background documents. Requests for additional information to the relevant ministries preceding this report resulted in a plethora of crucial information on Ireland's climate strategy being released.

Finland, while somewhat more transparent, similarly scatters its plans on industrial removals deployment across multiple documents. It relies on industrial removal processes and relevant supply chains to achieve its 2035 climate target, yet does not disclose sufficient details as to how the necessary resources, infrastructure, and finance would be procured.

Governments routinely conflate carbon dioxide removal technologies such as BECCS and DACCS with fossil Carbon Capture and Storage (CCS) and Carbon Capture and Utilisation (CCU) under broad labels such as 'carbon capture solutions' or 'CCUS'. Furthermore, removal plans are rarely consolidated in a single document. Instead, these are scattered across sectoral strategies and background materials, which include highly fluctuating and sometimes contradicting figures. This fragmentation partly reflects the fact that CDR policy is still emerging, with different technologies falling under different sectoral competencies and planning cycles. However, governments should explicitly state which sources of evidence they are drawing on to design their strategies, and disclose the relative weight assigned to different inputs. Additionally, the residual or 'hard-to-abate' emissions that engineered removals are meant to partly balance at the point of climate neutrality are rarely defined or quantified with rigour.

Projected engineered CDR volumes differ widely across countries, especially in the short term. The reviewed documents did not include projections beyond 2050. Table 1 below summarises the countries' projections of engineered carbon removals. France and Ireland exhibit the heaviest reliance on engineered CDR in the short term. Ireland projects 1.7-2.8 Mt of carbon removals by 2030 from BECCS and Biochar. Nonetheless, this number is conflated with CCS and CCU, according to a background document[7] from the Irish Climate Action Plan 2024 received in response to a request for information.

It is difficult to estimate France's reliance on CDR by 2030 because of ambiguity in its policy documents. According to available documents, France expects 3.4 MtCO_2eq from BECCS and DACCS to be available by 2030. Austria projects 1.7 to 6.3 Mt of carbon removals from BECCS and biochar to be available from 2040 onwards. The upper end of the range is higher than in other countries. Norway projects 0.2 Mt from Bio-CCS, DACCS and biochar to be available from 2030 onwards, and this capacity is expected to remain stable until 2040. Finland only provides an official projection of carbon removals from BECCS and biochar for 2035, the year of its climate neutrality target, after which there are no further noted plans or projections.

For 2050, countries' projections differ even more, with expectations of engineered removals ranging from 1.5 Mt (Norway) up to 20-40 Mt (Italy, however conflated with CCU and CCS) and 21 Mt (France, likewise conflated with CCU and CCS). In background documents, Ireland projects 2.6 Mt of removals from BECCS and biochar to be available by 2050. Austria projects twice this capacity, 5.2 Mt, to be available from BECCS by 2050. At the European Union level, projections also start early in 2030 with 4 Mt of industrial removals, growing significantly to 49-75 Mt by 2040, and finally expecting to reach 114 Mt in 2050.

When looking at countries' projections of engineered CDR, compared to their emission levels in 1990, projected volumes are more convergent. Even though, striking outliers still remain: Ireland with a reliance on engineered removals in 2030 of 2.8-4.6 per cent of its emissions in 1990, Finland with an early reliance in 2035 of about 8.6 per cent of its emissions in 1990, and Austria with a reliance in 2040 of up to 9.6 per cent of its 1990

[7]Department of the Environment, Climate and Communications, *Climate Action Plan 2024: Handover document*, Novermber 2023, p76

emissions. For 2050, Austria's reliance on engineered removals in this regard is far higher than that of most other reviewed countries, with a reliance of 7.9 per cent, while the upper end of Italy's expectations is also showing a relatively heavy reliance on engineered removals, with a share of 7.8 per cent of the country's 1990 emissions.

Country	2030	2035	2040	2050	Technologies Specified
European Union	4 Mt (0.09%)	-	49 - 75 Mt (1.1 - 1,6%)	114 Mt (2.5%)	DACCS, BECCS
Austria	-	-	1.7 - 6.3 Mt (2.5 - 9.6%)	5.2 Mt (7.9%)	BECCS
Finland	-	3 Mt (8.6%)	-	-	BECCS, biochar
France	0.4 /3.4 Mt* (0.07 - 0.6%)	-	-	21 Mt* (4%)	BECCS, DACCS
Ireland	1.7 - 2.8 Mt* (2.8 - 4.6%)	-	-	2.6 Mt (4.3%)	BECCS, biochar
Italy	-	-	-	20 - 40 Mt* (3.9 - 7.8%)	BECCS, DACCS
Norway	0.2 Mt (0.5%)	0.2 Mt (0.5%)	0.2 Mt (0.5%)	1.5 Mt* (3.7%)	Bio-CCS, DACCS, biochar

Table 1: Quantified reliance on industrial/engineered carbon removals in $MtCO_2$ and % of 1990 emissions.[8] *The asterisks mark the following information: red asterisk: industrial removals conflated with CCS and/or CCU; yellow asterisk: ambiguity in reviewed documents; green asterisk: estimation by national climate change expert panel.*

This wide variation in projected engineered CDR volumes partly reflects genuine differences in national circumstances and ambition. However, the variation also reflects a fundamental lack of transparency and comparability across climate strategies. When CDR projections are either conflated with CCS and CCU, vary within the same document,

[8] Austria: 2040 figure: Austrian Carbon Management Strategy; 2050 figure: Austrian Instutute of Technology, Feasibility Study on a CO_2 Collection and Transport Network in Austria; European Union: 2040 Climate Target Impact Assessment; Finland: Annual Climate Report 2025; Ireland: 2030 figures: CAP 24 Handover Document; 2050 figure: ERM consultancy estimates; Italy: Long-term Strategy (2021); Norway: 2030-2040 figures: First Biennial Transparency Report; 2050 figure: Norwegian Climate Change Committee: The transition to low emissions;

or are missing completely, the results in the table above represent an attempt of making countries qualitative reliance comparable, but not a complete picture. Therefore, this comparison exhibits major limitations that are marked with red and yellow asterisks. When removal projections lack transparency and hinder independent verification or comparison, accounting for their delivery becomes hugely difficult.

In addition, isolated figures from engineered CDR projections only tell part of the story. Behind each projected volume lies a set of assumptions about technology readiness, resource availability, infrastructure, and financing that the reviewed strategies rarely make explicit. It is in examining these assumptions that the most significant shortcomings emerge.

Underdeveloped definitions and quantifications of residual emissions

In addition to proper CDR feasibility assessments, clear definitions and quantifications of the emissions remaining at the point of net-zero (or residual emissions) are needed to seriously estimate the potential need for technological carbon dioxide removals and the land sink to reach climate neutrality and net negativity thereafter. How 'hard-to-abate' or 'residual' emissions are understood should also be clarified, and ideally, take societal and political considerations in addition to economic and technological ones into account.

These definitions and quantifications are often vague or absent in the climate planning documents of almost all reviewed countries. The majority of the reviewed countries fail to consider the societal component of the ‘hard-to-abate’ definition and the need to involve civil society and the general public in this decision-making process.

For example, Ireland fails to provide a quantification of expected residual emissions and only identifies them as likely to come from agricultural sectors, with further considerations missing.

Italy quantifies expected residual emissions but provides no clear indication of which sectors these emissions may persist in. It merely broadly labels industry emissions from multiple sectors, the majority of which are energy-related, as 'hard-to-abate' without explaining why or referencing assessments.

On the other hand, Austria demonstrates a notable good practice in defining and planning for residual and hard-to-abate emissions. Austria's Carbon Management Strategy establishes precise, science-based definitions of hard-to-abate emissions, distinguishing between industry and non-industry sources, and suggesting an ongoing monitoring process evaluated against social, ecological, and economic dimensions.

Lack of key assessments of engineered removals

A dominant theme across the reviewed national climate strategies is a notable reliance on engineered carbon removal methods, paired with absent or insufficient assessments of their impacts and trade-offs. Countries including Austria, France, Finland, and the EU are projecting significant volumes of BECCS, DACCS, and biochar in their pathways to net-zero. Yet critical feasibility assessments of resource needs, geological storage, deployment timelines for these technologies, and the envisioned deployment volumes are absent from their strategy documents. If these technologies fail to materialise at the projected scale, the emissions they were meant to remove or counterbalance will simply go unaddressed, undermining climate commitments.

Biomass supply constraints are often acknowledged but left unresolved. France's updated National Energy and Climate Plan notes that biomass demand may exceed domestic supply by 2030, yet no concrete policies exist to bridge that gap. Both Finland and Norway lack any assessment of whether sufficient sustainable biomass is even available for their envisioned BECCS and biochar deployment volumes.

The EU and France stand out for the scale of their projections in total megatonnes of removals. France projects 21 Mt of engineered removals by 2050 in its Draft SNBC3, and the EU relies on 114 Mt of highly uncertain DACCS and BECCS volumes in its 2040 Climate Target Impact Assessment, even as the same documents acknowledge the low technological readiness of these solutions. Finland, by contrast, has already revised and diminished its removal expectations for 2035 because deployment timelines were delayed and the necessary economic incentives did not materialise. Expectations fell from 20 Mt to just 3 Mt, due to updated assessments. This is an example of good practice, where better assessments were updated, leading to a lower reliance.

The EU’s 2040 Target Communication is another example of a lack of assessment. It references a broad portfolio of "novel approaches" that its own underlying impact assessment never modelled, meaning the European Commission’s strategy relies on future technologies that may not yet have been sufficiently explored.

Early reliance on engineered removals

Several reviewed of the countries are counting on engineered carbon removals to meet near-term climate targets. This disregards the fact that reducing emissions in the short term has greater climate benefits and ignores evidence that shows that the necessary technologies will not be available at the required scale within the planned timeframes.

Ireland presents the most severe case, relying on the deployment of BECCS and biochar as early as its 2026-2030 carbon budget period. The reasoning for this is that 26 Mt of emission reductions necessary for the second carbon budget period (2026-2030), about 13 per cent of the total second budget, have not been allocated to a sector. Ireland’s own CCUS Task Force assessments, which were received in response to a request for additional information, warn that CO_2 storage will likely not be available before 2030.

The severity of France’s early reliance on engineered removals is ambiguous, due to internal planning inconsistencies. France’s 2025 Draft SNBC3 cites figures of both 0.4 Mt and 3.4 Mt for 2030 BECCS deployment within the same strategy document. The incongruence most likely results from a transposition error, given that CCS and BECCS figures appear on the same pages. Regardless, it makes it impossible to determine and assess the intended 2030 contribution of BECCS, undermining the transparency of France's removal projections. Norway stands apart as the most conservative performer, projecting a modest -0.2 Mt per year from 2030 to 2040, tied to two specific, existing industrial sites, representing a more credible approach.

Projecting the availability of the land sink, while actions lag behind

A recurring weakness in national climate strategies is the projection of future land sink removals, even as the policies needed to secure and enhance those sinks remain absent or are actively contradicted by other sectoral decisions. The land-use sector's capacity to absorb carbon is treated as a dependable asset in national accounting. But the past has shown that countries may be overly optimistic about the resilience of the land sink, especially where action is lacking, as becomes clear in the reviewed climate plans and pursued policies. Sinks are shrinking, LULUCF targets are being missed, and in some cases, governments are pursuing harvest and forestry policies that directly undermine their own removal projections.

France offers a striking example of this. Its December 2025 Draft SNBC3 documents a sharp decline of more than 20 Mt in its land sink over the last decade due to a forestry crisis. The same document makes clear that France is struggling to reach its net-sequestration target under the EU LULUCF Regulation. Yet it simultaneously outlines plans to increase wood harvesting, a policy direction that risks deepening the very problem it is meant to solve.

Finland's Climate Change Panel has explicitly advised reducing logging to restore the sink, but this advice has been ignored. The Finnish Annual Climate Report 2025 notes that the land-use sector is now a net emitter rather than a net absorber.

Ireland similarly observes that its LULUCF sector is now a net emitter in its own Climate Action Plan. The country relies on high levels of afforestation to recover its land sink - long-term ambitions range from 8,000 to 30,000 hectares per year. However, afforestation rates have consistently fallen short. In 2024, with just 1,573 hectares planted, afforestation implementation was far from the current 8,000-hectare yearly target.

For Norway and Italy, their projections for the land sector under their With Additional Measures (WAM) scenarios are identical to those under their With Existing Measures (WEM) scenarios. This means that despite both having a clear need to recover or expand their land sink to reach their long-term targets, neither country has actually modelled any additional policy interventions to achieve them. This renders the distinction between the two scenarios meaningless and exemplifies the need for additional policies to protect and strengthen the countries’ land sinks.

Risk-taking in land sink plans

Countries’ climate strategies are projecting land sink contributions based on optimistic assumptions that systematically overestimate the impact of planned policy interventions and underestimate climate-driven risks. Norway’s projections for its land sink are based on historical trends that disregard the growing threats posed by climate change, such as pests, fires, or droughts. High uncertainties under a changing climate are acknowledged, including forest growth rates, development, and standing volume, but neither is incorporated into modelling.

Italy's land-sink projections appear to meet its 2030 targets, following a data correction. Nevertheless, the country's Long-Term Strategy warns that planned increases in harvesting could eliminate the sink entirely.

Ireland's approach carries a different kind of risk. A background document from the Irish Climate Action Plan 2024, received in response to a request for additional information and titled “Handover document”, gives in-depth information on how the land sink was modelled. It shows that models in the Climate Action Plan are pushing non-forestry measures, such as wetland rewetting, to their theoretical biophysical limits, meaning that all theoretically available wetlands would be rewetted. The Irish strategy not only fails to consider forestry measures, but it also raises serious questions about whether the measures included in the projections are feasible.

Land-sink projections that ignore higher disturbance risks resulting from climate change or rely on physically implausible interventions unnecessarily surrender crucial benefits for biodiversity, health, the environment, and the climate.

Policy disconnected from impact assessments and scientific advice

Across the reviewed countries, a pattern emerges in which thorough and transparent technical assessments fail to translate into coherent policy. Governments consistently disregard scientific advice, conflating data in ways that obscure risks, or drafting strategies that contradict the very analyses underpinning them.

The EU-wide strategy is an example of this disconnect. The European Commission's impact assessment on the EU's 2040 climate target is notably rigorous, disaggregating emissions reductions, industrial removals, and land sink contributions. Yet, the resulting 2040 Target Communication and the 2040 target in the European Climate Law conflate this carefully separated data into a single net target. This obscures the distinction between actual emission reductions and carbon dioxide removals, directly contradicting its own Scientific Advisory Board's advice.

France also contradicts its own analyses. In the last decade, the French land sink declined from -56 Mt to -35 Mt. The French government attributed this fall to droughts and bark beetle outbreaks in the SNBC3, even though its analyses show that high harvesting levels were a key factor. The Draft SNBC3 projects a continued decline until 2030, followed by stabilisation thereafter. The French government nonetheless plans to significantly increase wood harvesting, a course of action that its own sensitivity analyses warn would further shrink the sink beyond projections.

Finland follows a similar pattern. The government fails to consider the Finnish Climate Change Panel's advice to moderate logging levels, a measure identified as necessary to restore the land sink. Instead, the government proposed loosely defined forest growth interventions that its own modelling showed would not deliver the intended climate impacts.

Italy's climate plans do not adhere to the established need to prioritise rapid, deep, and sustained emission reductions before CDR, as outlined by the IPCC. Italy's Long-Term Strategy inverts this climate mitigation hierarchy by prioritising offsetting through land-sink removals, industrial removals, and CCS/CCU over the necessary structural changes to consumption and production to reduce emissions first. By already labelling challenging but potentially necessary changes in consumption patterns (e.g., diet changes, circular economy approaches) as ‘disruptive’ and only starting work on them after CCS/CCU and industrial removals fall short of expectations, Italy risks delaying necessary emission cuts.

Technical assessments and scientific advisory boards can only serve their purpose if they are considered and, ideally, reflected in policy. Climate Policy must be built on the latest scientific expert advice, or, if overridden, this should be explicitly and publicly justified.

Competing for limited and uncertain geological storage of CO_2 abroad

A fundamental, largely unacknowledged bottleneck undermines the industrial carbon removal plans of multiple countries reviewed. The international CO_2 storage capacity some of them depend on is far more limited, contested, and poorly assessed than their strategies imply.

Finland, Austria, and France all explicitly plan to export captured CO_2 to Norway or the North Sea, having banned or ruled out meaningful domestic storage. However, a Finnish Climate Panel estimate suggests that only around 10 Mt of annual storage capacity will be available for open competition in Northern Europe between 2030 and 2035, with the majority already claimed by competing nations. Norway sits at the centre of this, having signed a Memorandum of Understanding with countries including Finland and France. Yet its own site assessments lack rigorous economic and environmental analysis, leaving the usable volumes, site preparation costs, and the long-term viability of these sites substantially uncertain. Finland faces multiple long-term barriers, given its ban on domestic storage, its high industrial removal targets, and the explicit acknowledgement that available Northern European capacity will be insufficient to meet competing demand.

Ireland's position is similarly precarious, with plans to export CO_2 to the UK or the EU while its own CCUS Task Force analysis affirms that no rigorous feasibility assessment of these international options currently exists.

Conclusion

All reviewed countries and the European Commission show significant shortcomings in their plans on permanent CDR and net-sequestration in the LULUCF sector. Furthermore, they all exhibit at least one shortcoming that is a symptom of overreliance on removals. Notwithstanding, some of them perform better than others in certain parts of the assessment. Countries such as Italy and Norway, which rely more cautiously on engineered removals, demonstrate that better governance is possible.

Generally, expectations for the land sink to deliver removals for net-zero targets are high, while measures in that direction are missing, underdeveloped, or poorly assessed. These inadequate measures, paired with planned increases in harvesting levels, call the credibility of countries' plans to balance, enhance, or recover their land sinks into question, and puts the achievement of climate neutrality commitments in the EU at risk.

In several of the reviewed countries, such as Finland and Ireland, the land-use sector has already become a net source of carbon instead of a net sink. In France and Finland, the sink has declined sharply over the past decade, due to droughts, pest outbreaks, and high levels of harvesting. Two of the reviewed countries, Ireland and France, are relying on land restoration or afforestation rates that have never been achieved in practice, while planning to push land-based measures to their biophysical limits. In some cases, like Norway, Austria, and Italy, no additional policy interventions to recover the sink have been modelled at all. Moreover, the land-sink strategies and projections of all reviewed countries fail to adequately account for climate-driven risks, such as wildfires, pest outbreaks, and drought, which are already eroding sinks across the continent.

For permanent removals, all of the countries' plans show clear signs of overreliance. An overarching shortfall is the lack of key assessments for envisioned permanent removal technologies. Most of the countries in this review fail to include any evaluation of biomass demand for their projected Bio-CCS or biochar deployment. The effects of additional biomass demand on LULUCF sinks are acknowledged by multiple countries, but country-level assessments are missing. The European Commission's impact assessment, however, concludes that effects arising from reliance on BECCS and the associated additional biomass demand might reduce the net land sink in the European

Union by 100 $MtCO_2eq$ in 2040 and by 65 $MtCO_2eq$ by 2050. It can be inferred that the lack of national-level assessments indicates that this crucial factor was not part of the decision-making process for the remaining evaluated countries.

Likewise, assessments of renewable energy demand for projected DACCS volumes lack depth, and considerations of how additional renewable energy capacity would be sourced are widely missing. The high energy intensity of DACCS' technology processes poses a risk to its deployment viability and might lead to competition with other sectors for available renewable energy.

The competition for international CO_2 storage, particularly in Norway and the North Sea, represents a structural vulnerability that most of the reviewed countries have failed to confront honestly. As multiple countries plan to export CO_2 to the same limited storage sites, which already likely have insufficient capacity to meet competing early demand, the permanent CDR projections of several reviewed countries rest on a bottleneck that remains unresolved and largely unacknowledged.

Carbon dioxide removals play a role in European climate policy as an unavoidable supplement to rapid, deep, and sustained emission reductions. But this role is only fulfilled if governed with high transparency, rigour, and precaution. The findings of this report show that this standard is not currently being met. CDR projections are running ahead of assessments and resources, ambitions disregard infrastructure and feasibility considerations, and strategies are disconnected from the scientific advice they should be built on. The result is a set of climate plans that are insufficiently credible and robust, which will defer the deeper emissions cuts and the well-designed CDR policy that will ultimately be required, and reduce the time available to implement them.

Honest, rigorous, and transparent CDR governance is possible, as demonstrated by the positive examples identified in this report. But achieving it requires governments to make a clear choice: to treat carbon dioxide removal as a carefully bounded supplement to deep decarbonisation, assessed and governed accordingly, and reliance based on realistically and sustainably available supply.

Recommendations

The findings of this report point to a clear and urgent need for reform in how the EU and European countries plan, assess, and govern carbon dioxide removal. This can be achieved by:

- Setting separate binding targets for permanent CDR. Emission reduction and removals should never be conflated, as it obscures accountability and enables mitigation deterrence. Separate targets are essential to track whether both are being credibly delivered.
- Resting projections on detailed and comprehensive feasibility assessments. No permanent removal volume should be embedded in a climate strategy without prior assessment of biomass demand, energy demand, land use, availability of permanent geological storage, and financing plans. If an assessment indicates that projections are unachievable, strategies must be revised accordingly.
- Acknowledging the CO_2 storage bottleneck. Countries competing for the same limited international storage capacity must commission independent assessments of what is realistically available and coordinate transparently, rather than basing removal projections on unconfirmed infrastructure.
- Consolidating and clarifying CDR planning documents. Strategies must present projected volumes, assumptions, and risk assessments in a single, publicly available document, free from conflation with CCS and CCU.
- Defining residual emissions transparently and with public involvement. Determining which emissions are genuinely hard to abate is not only a question of technology, but also a societal and political one. Definitions must be science-backed, publicly justified, and regularly reviewed.
- Restoring the land sink with binding policy action. Projecting land sink contributions without reliable measures to deliver them is setting a target without the means to meet it. Forestry and land-use policy must align with climate commitments, and land sink plans must account for climate-driven risks.

Methodology Annex

This section describes the applied methodology and outlines the key considerations underpinning the work leading to this report.

The research questions were formulated to reflect the three core dimensions of responsible CDR planning identified in the literature and in EU legal frameworks: transparency of goals and assumptions, analytical rigour in assessing feasibility and trade-offs, and treatment of risks and uncertainty. Together, they are designed to assess the quality and trustworthiness of removal and net-sequestration plans.

The research was guided by the following question: How responsibly are the selected countries relying on carbon dioxide removals to reach their climate commitments?

To answer this, the analysis explored:

- Do their strategies transparently and comprehensively reflect goals, reasonings, and underlying assumptions?
- Are the countries' strategies underpinned by analyses of feasibility and trade-offs, and, if so, how extensive are these analyses?
- How are they handling uncertainties on the future availability of permanent CDR and temporary sequestration in the land sink?

Themes of Interest

To structure the assessment, fourteen themes of interest were identified across three headings:

Target setting

- Definition of residual emissions.
- Transparency of targets/reliance.
- Scenarios and projections.

Implementation plans

- Removal measures applied.
- Principles for the use of removals.

- Reliance on international offsets.
- Existence of policy roadmaps.
- Implemented public consultations.
- Financial cost and source of financing.

Constraints and risks

- Land use.
- Technological development.
- Energy use.
- Biomass demand.
- Transport and storage of CO_2.

Each case study was assessed against these themes. They reflect the three core dimensions of responsible CDR planning identified in the scientific literature and in EU legal frameworks: transparency of goals and assumptions, analytical rigour in assessing feasibility and trade-offs, and the treatment of risks and uncertainty.

Prioritisation of countries and selection parameters

The selection of countries for the assessment was determined by a variety of factors. It began with a review of the nature and extent of CDR reliance across European countries, based on data collected for a study led by researchers from Oxford University. This dataset included all countries that had submitted Long-Term Low Emission Development Strategies (LT-LEDS) or EU Long-Term Strategies (LTS) in English or French up to 27 May 2024. Drawing on this data, we developed a short list of countries based on a combination of the extent of their disclosed reliance on CDR, the transparency and clarity of their CDR strategies, and initial indications of potential feasibility concerns. The final selection of countries was constrained by the availability of local organisations willing to assist with submitting transparency requests to national authorities. In some cases, countries were excluded from the review when there were indications that significant revisions to their CDR policy were under development, but would not be released in time to be assessed. As a result of these constraints, the final set of countries included in the analysis should not be understood as either a strictly representative sample of CDR reliance across European countries or a list of the worst- or best- performing countries.

Data Sources & Analysis Process

Evidence was drawn from official national climate planning documents, including Long-Term Strategies, National Energy and Climate Plans, Biennial Transparency Reports, and assessments by national environment agencies. Where available, publications by national scientific advisory boards were used as independent references to evaluate the scientific soundness of government projections and policy choices.

To supplement the publicly available data with background information on planning exercises and ongoing developments, transparency requests were submitted to relevant national ministries. The requests yielded more than 70 documents, providing critical background information on countries' strategies and assessments on CDR.

The publicly available documents and received data were then reviewed. The relevant information was extracted and clustered into the themes of interest noted above. Country case studies were then prepared, analysing reliance on CDR in an isolated national context. Then, data across countries were compared for each theme of interest to identify common themes of overreliance. These were then further analysed and summarised in this comparative report. The underlying data and more detailed descriptions of national strategies and specific circumstances are available in the individual country case studies.

This assessment distinguishes between the integrity of countries' plans to procure permanent carbon removals and land-based net sequestration, and their current implementation status. The integrity of plans is understood as the credibility of formulated strategies, specifically whether targets and underlying assumptions are transparently disclosed and whether projections are scientifically sound and adequately substantiated by rigorous assessments. The state of implementation, by contrast, concerns progress in actual delivery, meaning whether the policies, investments, and infrastructure needed to realise planned removals are being put in place. This distinction matters for the methodology of this report because the two dimensions require different types of evidence and carry different implications. Weak plan integrity signals that a country's climate strategy cannot be trusted on its own terms, regardless of what is being done on the ground. Slow or absent implementation means that even well-designed plans are failing to translate into real-world action.

The table rating countries' degree of overreliance on CDR in the body of the report above, is resting on the following explanation of colour codes:

Quality indicators for CDR reliance	Green	Amber	Red
Thorough assessments for permanent CDR	Detailed and transparent feasibility assessments cover all projected technologies, including biomass, energy, storage, and financing.	Some assessments exist, but are incomplete or cover only a subset of technologies or constraints.	Removal volumes are projected without credible feasibility assessments. Critical constraints have not been evaluated.
Plausible timeline for industrial removals	Near-term projections are consistent with current technology readiness levels and tied to existing, operational facilities, or there is no early reliance.	Some near-term reliance is present, but modest in scale or partially tied to existing infrastructure, with risks acknowledged.	Significant removal volumes are projected within timeframes that are inconsistent with technology readiness. Near-term targets depend on technologies unlikely to be available in time.
Action in the land sink is coherent with projections	Land sink projections are supported by a coherent and detailed set of policy measures and by the necessary finance, if allocated.	Some measures exist but are underfunded or inconsistently implemented. A partial gap exists between projections and likely delivery.	Land sink contributions are projected without supporting measures or in direct contradiction to policies, such as harvest increases, that degrade the sink.
Caution in land sink plans	Projections account for climate-driven risks. Sensitivity analyses are conducted, disclosed, and used to stress-test	Some risk factors are acknowledged but not fully modelled. Projections rely on	Projections systematically underestimate climate risks and overestimate policy impacts, disturbance risks are not

	projections.	optimistic assumptions without adequate sensitivity analyses	modelled, or some interventions are physically implausible at the projected scale.
Policy coherent with impact assessments and scientific advice	Policy is consistent with underlying assessments and scientific advice. Departures from advice are explicitly justified.	Assessments and advice are partially reflected in policy. Some recommendations are not acted upon without public justification.	Policy directly contradicts impact assessments or scientific advice. Recommendations are ignored without explanation, or assessments are obscuring risks.
Consolidated and transparent information on permanent CDR plans	CDR plans are consolidated in a single public document with consistent figures, disaggregation by technology, and disclosed assumptions.	Plans are spread across documents, but can be reconstructed. Some inconsistencies or gaps exist, but the overall picture is assessable.	Plans are fragmented across documents; key information is in materials that were not previously public. Figures are inconsistent, technologies conflated, and assumptions undisclosed.
Plausible reliance on geological storage of CO_2 abroad	CO_2 export plans are backed by independent capacity assessments accounting for competing claims, with credible contingency pathways in place.	Some coordination with storage providers exists, but capacity assessments are incomplete, and contingency planning is limited.	CO_2 export plans rest on unconfirmed international storage capacity. Competing claims are unacknowledged, and no contingency pathways exist.

CARBON MARKET WATCH

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