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Avfall Sveriges Utvecklingssatsning ISSN 1103-4092

CRC INTEGRATION IN THE EU ETS



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Avfall Sveriges utvecklingssatsning

Avfall Sverige bedriver utvecklingsverksamhet inom hela avfallsområdet. Detta sker genom utvecklingssatsningen. Syftet med Avfall Sveriges utvecklingssatsning är att genom samordnade insatser främja medlemmarnas verksamhetsutveckling för en miljösäker och långsiktigt hållbar avfallshantering. Utvecklingssatsningen finansieras genom att Avfall Sveriges kommunmedlemmar betalar en särskild utvecklingsavgift.

Förord

Syftet med rapporten är att analysera hur koldioxidborttagning (CDR) och tillhörande krediter (CRC) kan integreras i EU:s utsläppshandelssystem (ETS). För avfalls- och energiåtervinningssektorn är denna fråga avgörande, då möjligheten att neutralisera kvarvarande utsläpp och samtidigt bidra med negativa utsläpp kan bli en förutsättning för långsiktig hållbarhet och konkurrenskraft.

Rapporten innehåller konsultens och referensgruppens förslag på möjliga positioner för avfallsförbränningsbranschen. Texten är avsedd som underlag för Avfall Sveriges fortsatta arbete med att utveckla sina egna ståndpunkter i frågan.

Rapporten utgör därmed ett viktigt underlag för att belysa centrala designfrågor, identifiera styrkor och risker, samt ge Avfall Sverige bättre förutsättningar att driva en välgrundad och framåtsyftande position i EU:s fortsatta arbete.

Projektet har genomförts av projektledare Abtin Salahshor med kollegor vid AFRY Management Consulting. Finansieringen har skett genom Avfall Sveriges Energiåtervinningssatsning.

Preface

The purpose of this report is to analyze how carbon dioxide removal (CDR) and related credits (CRC) can be integrated into the EU Emissions Trading System (ETS). For the waste and energy recovery sector, this issue is of critical importance, as the ability to neutralize residual emissions while also contributing with negative emissions may become a prerequisite for long-term sustainability and competitiveness.

The report presents proposals from both the consultant and the reference group regarding possible positions for the waste incineration industry. The text is intended to serve as a basis for Avfall Sverige's continued work in developing its own positions on the matter.

Accordingly, the report constitutes an important foundation for highlighting key design issues, identifying strengths and risks, and providing Avfall Sverige with better conditions to pursue a well-informed and forward-looking position in the EU's ongoing work.

The project has been carried out by AFRY Management Consulting with Abtin Salahshor as project leader. Funding has been provided through Avfall Sverige's Energy Recovery Development Initiative.

Malmö i september 2025

Christer Lundgren

Tony Clark

Ordförande Avfall Sveriges

Vd, Avfall Sverige

Energiåtervinningssatsning

DISCLAIMER

Key concepts mentioned in this report

CDR VS. CRC

A **Carbon Dioxide Removal** (CDR) is the activity that describes capturing and storing biogenic CO₂. A **Carbon Removal Credit** (CRC) is the subsequent carbon credit that is generated from such an activity.

TEMPORARY VS. DURABLE CDR

The durability of CDR denotes how long it takes before the stored carbon is re-emitted. Typically, **durable** CDR is **engineered** (meaning, driven by human-made technologies), while **temporary** CDR is **nature-based** (based on natural ecosystems or processes).

CDR QUALITY ASSURANCE

Based on **quantifiability** ("the climate benefit of the CDR is measurable"), **additionality** ("the CDR would not happen without the sale of a CRC"), **durability** ("the CDR is long-lasting"), and **sustainability** ("the CDR does not have adverse climate effects").

MITIGATION DETERRENCE

Actions leading to reduced actual emissions reductions.

REVERSAL RISK

The risk that permanently stored carbon is accidentally emitted again.

NET-ZERO VS. NET-NEGATIVE

Net-zero emissions is a state where the total number of positive emissions is either zero, or more than zero but with full compensation through an equal number of negative emissions. Another way of expressing this is that the net emission cap is zero. By contrast, net-negative is a state where the total number of positive emissions is lower than the total number of negative emissions. Another way of expressing it is that the net emission cap is less than zero.

TRADING VIA INTERMEDIARY VS. PEER-TO-PEER

Trading of CRCs within the ETS could either be done directly between buyers and sellers (i.e., peer-to-peer trading) supported by some form of trading platform, or it could be done via an intermediary authority that is responsible for purchasing and selling or distributing CRCs into the market.

GROSS VS. NET EMISSION CAP

A "gross" emission cap limits the tonnes of positive emissions allowed to be emitted within a cap-and-trade system, whereas a "net" cap limits the tonnes of emissions allowed to burden the climate by subtracting negative emissions (via CDR) from positive emissions. This means that a net cap allows for positive emissions above the net cap if those emissions are neutralized by negative emissions, while a gross cap does not allow for positive emissions above the gross cap.

STATIC VS. DYNAMIC COST-EFFICIENCY

Dynamic cost efficiency refers to the long-term cost efficiency of a system, considering potential short-term market failures – such as information asymmetry, failure to fully account for environmental or other externalities, or technology uncertainty – that lead to incorrect near-term price signals. Static cost efficiency considers only the current marginal costs of different actions.

CRCF REGULATION

The Carbon Removal and Carbon Farming (CRCF) regulation is a key piece of legislation that defines and governs the quality assurance of carbon removal credits.

REMOVAL METHOD

Describes the different ways in which CDR can be accomplished. Example methods would be BECCS (including WtE-CCS), DACCS, biochar, or reforestation.



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Summary of proposed Avfall Sverige policy position (1/4)

- Avfall Sverige welcomes integration of CDR into the EU ETS, as this would allow critical infrastructure such as Waste-to-Energy plants to neutralize residual emissions and in some cases contribute to EU-wide decarbonization through the generation of negative emissions. The alternative would be to exclude WtE plants from the EU ETS, or ultimately close WtE plants and risk reducing the sustainability of the waste management system.
- Avfall Sverige believes that quality assurance should be the first priority of an integrated ETS, in order to guarantee public and political acceptance and avoid mitigation deterrence. This could be accomplished by:
 - Excluding or severely limiting the eligibility of temporary and nature-based CDR in the EU ETS (Pos. 1), and focusing on durable CDR methods such as BECCS (including WtE-CCS) and DACCS based on the so-called "like-for-like" principle – where only durable removal methods are allowed to neutralize durable fossil emissions.
 - Supporting and developing the Carbon Removal and Carbon Farming (CRCF) Regulation as the basis for quality assurance (Pos. 2), which sets a clear baseline for ensuring that CDR is quantifiable, additional, durable and sustainable. Removal methods with varying durability,

- such as biochar, should only be considered if robust MRV rules can guarantee sufficient durability (Pos. 3).
- Initially limiting eligible CDR generation to EU-based projects in accordance with CRCF guidelines (Pos. 6).
- Maintaining the gross emission cap to avoid mitigation deterrence (Pos. 10), which would ensure that introduction of CRCs do not dilute the market and indirectly lead to a lowered ambition level for emission reductions.
- Designing and funding CDR-specific support schemes in a manner that avoids mitigation deterrence (Pos. 19-20), for example by indexing CDR subsidy schemes to the EUA price (to avoid over-compensation) as well as avoiding re-directing funds from existing emission reduction financing pools.
- Clearly defining the point of liability for reversal risk (Pos. 4-5). As a default point, liability should reside in permanent storage operators as per the CCS Directive, but further guidelines on liability and reversal risk management should be outlined in the CRCF's Delegated Acts and subsequent methodologies.



Summary of proposed Avfall Sverige policy position (2/4)

- Avfall Sverige believes that the critical role of WtE in sustainably managing society's waste should be duly recognized (Pos. 12) in the Delegated Acts and certification methodologies developed under the CRCF. The sustainability criteria as outlined under the CRCF should not incorrectly devalue waste incineration due to the presence of fossil waste.
- Avfall Sverige believes that a cost-effective integration should aim to minimize restrictions and maximize market-based price discovery. This would ensure faster deployment of CDR with lowered fiscal impact on governments and higher price certainty and stability for market participants. This could be accomplished by:
 - Avoiding upper limits to the allowed number of CRCs (Pos. 7). Such a quantity ceiling could result in unnecessary cost inefficiency. Moreover, the significant price gap between expensive durable CDR and cheaper traditional EUAs effectively works to prevent mitigation deterrence, and can be further enforced through less arbitrary restrictions such as maintaining the gross emission cap (Pos. 10).
 - Avoiding sector- or company-level mandates for CRC purchasing (Pos. 7). Similarly, enforcing end-use

- mandates are unlikely to be effective, since mandates without support schemes are likely to be ineffectual, and the introduction of support schemes are likely to reduce the need for mandates.
- Ensuring that CDR developers within the ETS have the freedom to sell to the highest bidder (Pos. 13-14). For facilities under the ETS that generate CDR, it is essential that CDR is treated as a distinct carbon credit instead of an emission deduction, as this would increase trading flexibility. Moreover, such facilities should be allowed to trade with entities outside the ETS as long as CRCs contribute to the EU's NDC, and support schemes are designed in a way that avoids subsidy over-compensation.
- Avfall Sverige believes that it could be valid to restrict access to the ETS for non-ETS WtE-CCS projects (Pos. 6), since facilities generating such CDR do not bear the carbon cost of the ETS but would benefit from the carbon revenue of selling into it thereby gaining an unfair competitive advantage. The best solution would be to harmonize carbon pricing across the entire EU WtE sector by including all facilities in the ETS. If non-EU CRCs are permitted in the system, a level playing needs to be ensured, e.g., by carbon pricing non-EU WtE facilities through the Carbon Border Adjustment Mechanism (CBAM).

Note: The numbered positions (e.g., "Pos. 1") refer to the preferred policy position for each sub-issue highlighted on Page 19.



Summary of proposed Avfall Sverige policy position (3/4)

- Avfall Sverige believes that the CDR industry requires targeted support to scale fast enough to provide the necessary supply of CRCs by the late 2030s, when the ETS emission cap is nearing zero and price instability is set to increase. This can be accomplished by:
 - Setting an aspirational CDR target for the EU (Pos. 8), which would signal clear political commitment and policy certainty to CDR project developers and unlock new sources of funding.
 - Establishing separate CDR funding mechanisms (Pos. 17) to ensure fast CDR deployment toward the EU-wide target.
 - Allowing sub-targets and sub-financing based on removal method (Pos. 9, 21). Improved long-term cost efficiency can be achieved by investing in different removal methods with the aim to bring down costs for highpotential methods through innovation and experiencebased learning. Focusing solely on the currently cheapest methods might be too limiting.
 - Earmark funds for durable CRCs through existing or new EU funding facilities (Pos. 22), since without clear funding pools, the fiscal impact, administrative burden and public acceptance of CDR integration is more uncertain.

- Over time, Avfall Sverige believes that it is necessary to phase-out quantitative restrictions and phase-in new market mechanisms, to ensure the long-term stability of the integrated ETS. This can be accomplished by:
 - Transitioning from a gross to a net emission cap (Pos. 10), since a gross cap does not leave room for residual emissions to exist and be compensated by CDR. Without this shift, the ETS would cease to function as the cap reaches zero.
 - Phasing out quantitative restrictions and expanding qualitative scope (Pos. 23). Phase-out secures the best of both worlds. In the near-term, market uncertainties and fear of mitigation deterrence is reduced. Long-term, the ETS can increase eligible CRC supply once MRV is wellestablished to stabilize CRC prices at manageable levels for residual emitters.
 - Extending the responsibility to finance net-negative beyond residual emitters (Pos. 24): At some point, the EU needs to go beyond net-zero to reach EU-wide net-negative emissions. Putting the responsibility of EU-wide net-negative on residual emitters alone (including WtE plants without CCS) would not only be unfair but also most likely make it more difficult to generate net-negative emissions at the desired scale.





Summary of proposed Avfall Sverige policy position (4/4)

- Finally, there are two key market design areas where Avfall Sverige does not have a clear position.
 - Both peer-to-peer and intermediated CDR trading model could be beneficial (Pos. 15). Whether CDR trading is done directly between buyers and sellers (i.e., peer-topeer) or via an intermediary authority, it is crucial that clear roles, responsibilities and accountability is established in the system. Moreover, Avfall Sverige does not have a clear preference for the mandate of an intermediary authority (Pos. 16), if such as authority is considered preferable.
 - Both price-based and quantity-based subsidy schemes could be beneficial (Pos. 18).



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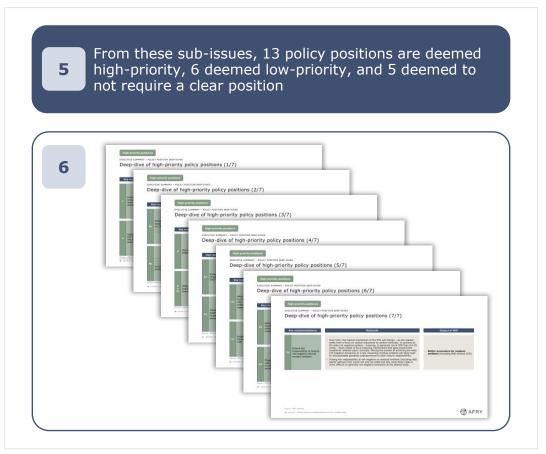


This report is an internal document for Avfall Sverige to develop its policy position for the inclusion of carbon removal credits (CRCs) into the EU ETS

WHY CDR INTEGRATION MATTERS FOR AVFALL SVERIGE

- Sweden's Waste-to-Energy (WtE) sector faces a major economic challenge due to rising carbon prices within the EU ETS
- Integration of carbon dioxide removals (CDR) in the EU ETS⁽¹⁾ will be critical for WtE plants to neutralize residual emissions and generate new revenue
- There are three main integration approaches, with several market design issues that must be considered to determine which is most appropriate
- A suitable market design is determined in this project by assessing 24 sub-issues related to quality / quantity controls, governance, support systems, and timing

PROPOSED POLICY POSITION FOR AVFALL SVERIGE



(1) CDR integration is currently under review in the EU. By mid-2026, the EU is expected to publish its findings for public consultation.

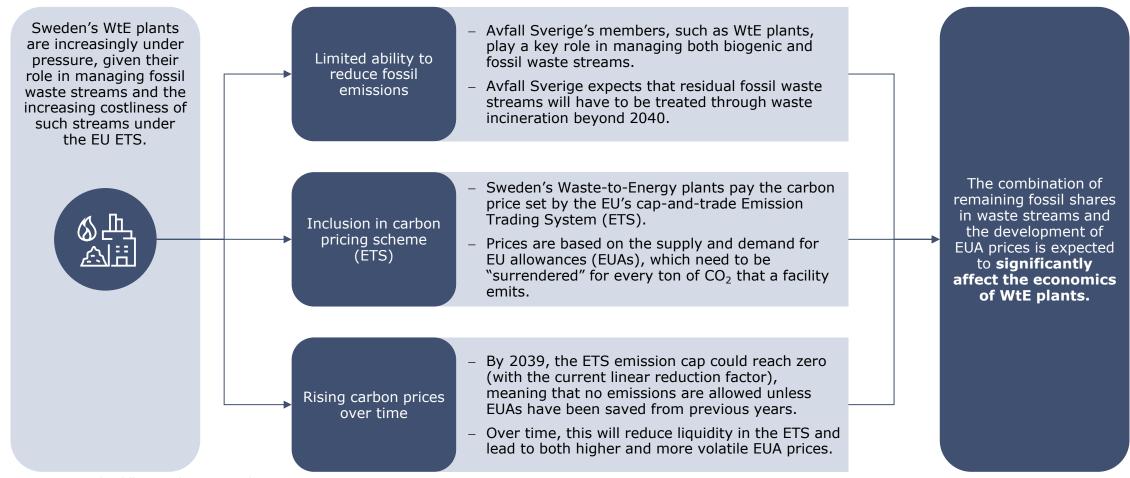


A three-step approach has allowed Avfall Sverige to involve an Expert Working Group at the project start and end to validate the report's results

Establish assessment framework Identify and assess key options Validate and select final options Close collaboration between AFRY and Expert AFRY working independently to synthesize and Final workshop with the Expert Working Group Working Group to establish the correct categorize market design options and provide to review initial assessment and make assessment baseline. initial short-list. necessary adjustments. (A) AFRY (A) AFRY (A) AFRY An **initial workshop** was conducted to A **literature review** was initiated by A **final workshop** was conducted to agree agree on market design issues and on market design choices by providing identifying ~30 articles of relevance, feedback on and validating the analysis. evaluation criteria. focusing on 12 prioritized articles. From the literature, 24 sub-issues and A final preferred market design was related policy positions were identified developed and presented based on highbased on an initial AFRY assessment. priority and low-priority policy positions. The policy positions were further validated by considering three perspectives (societal, WtE with CCS, WtE without CCS), confirming initial design choices.



Sweden's Waste-to-Energy (WtE) sector faces a major economic challenge due to rising carbon prices within the EU ETS

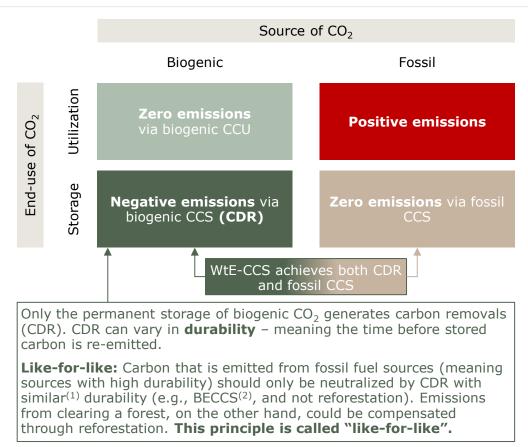


Source: AFRY and Avfall Sverige's Expert Working Group



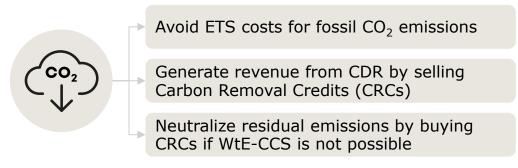
Integration of carbon dioxide removals (CDR) in the EU ETS will be critical for WtE plants to neutralize residual emissions – and generate new revenue

TYPES OF CO₂ CAPTURE, UTILIZATION AND STORAGE (CCUS)



WHY CDR IS CRITICAL FOR THE WTE SECTOR

- Integrating Carbon Dioxide Removal (CDR) into the EU ETS could address the WtE sector's carbon price problem:
 - For WtE plants without CCS, it will be critical to buy CDR credits, also called Carbon Removal Credits (CRCs) to compensate residual (fossil) emissions within the ETS.
 - For WtE plants with CCS, CRCs will be an important way to neutralize their residual (fossil) emissions as well as further support EU-wide decarbonization and strengthen the core business with revenue from CRC sales.
- The CDR market still immature, with few buyers and an entirely voluntary structure with no integration to the ETS.
- The benefits of CCS for the WtE sector summarized:



Source: Carbon Gap | (1) While durable CDR may not strictly have the same durability as fossil fuels, durability of >1000 years can be considered equal to address climate change. | (2) BECCS = Bioenergy with Carbon Capture and Storage. BECCS is done by permanently storing carbon in similar geological formations as fossil fuels were initially extracted from.

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Carbon removals are currently only partly reflected in EU's climate policy framework as a whole, limiting their ability to contribute to targets

Three interlinked issues currently prevent the inclusion of durable carbon removals in the EU's climate policy framework

Only nature-based (and temporary) removals included as of now

- The existing system only allows temporary, nature-based removals (e.g., from forest growth or soil carbon sequestration) under the LULUCF Regulation. A limited share of these removals can also be transferred to the ESR.
- However, durable removals (e.g., from BECCS or DACCS) are currently excluded from both LULUCF and ESR compliance pathways.
- The EU ETS does not currently include the concept of carbon removals – neither nature-based (temporary) nor engineered (permanent) removals.

International credits not allowed to contribute to EU's internal targets

- International carbon trading under Article 6 of the Paris Agreement offers another channel for incentivizing removals.
- But credits acquired through this mechanism whether bilaterally (Article 6.2) or via a centralized system (Article 6.4) can only count toward the EU's NDC under the Paris Agreement, not toward domestic EU climate obligations under ETS, ESR, or LULUCF.
- In effect, the EU has drawn a clear line between international climate cooperation and internal compliance mechanisms.

Lacking standards for durable removals in greenhouse gas (GHG) inventory

- The greenhouse gas (GHG) inventory system underpins all EU and international reporting.
- While inventories are well-established for emissions and land-based removals, they lack standardized methodologies and data structures to account for engineered, durable removals. Without inclusion in the inventory, these removals cannot be recognized in regulatory targets.

As an effect, the voluntary carbon market (VCM) has been the driving vehicle for early investments into durable carbon dioxide removal (CDR), based on a set of independent standards and methodologies certifying engineered removals for voluntary (and often corporate) buyers. However, this market lacks the scale, transparency, and liquidity needed to support CDR deployment at climate-relevant levels. Purchases remain niche and fragmented, limiting their systemic impact.

Source: EU Commission



There are three main integration approaches, with several market design issues that must be considered to determine which is most appropriate

Integration can be defined in various ways. Here, we define integration as *allowing Carbon Removal Credits to be used interchangeably with allowances within the EU ETS.* In addition to integration, the ETS could be used to finance a separate removal market – but this would not be defined as an integration.

No integration Full integration

Disconnected markets (with optional financing link)

- The ETS and removal markets are completely disconnected.
- The ETS does not make use of any CRCs, although CRCs could be used outside of the ETS.
- ETS revenues (via EUA auctions) could still be used to finance a separate removal market.



This does not resolve WtE's residual emission problem, unless WtE is excluded from the ETS.

Connected via intermediary authority

- The ETS and removal markets are connected via a public authority, who buys and sells / distributes CRCs in the ETS (thus, controlling supply of CRCs into the ETS).
- CRCs can then be used in the ETS in several ways (e.g., in reserves, as free allocation and as extra allowances at auctions).



Connected with supply and/or demand controls

- The ETS and removal markets are connected directly, enabling peer-to-peer transactions between ETS-covered entities and CRC sellers.
- The government still places qualitative/quantitative limits on transactions between the two markets to manage CRC demand and supply.

Allowance Removal Market

Unrestricted integrated markets

- The ETS and removal markets are fully integrated, which means that the generated CRCs are interchangeable with traditional EUAs without any further restrictions.
- There are no limitation on the number of CRCs that can be used in the ETS, and there are limited (if any) quality controls.

Allowance Removal Market

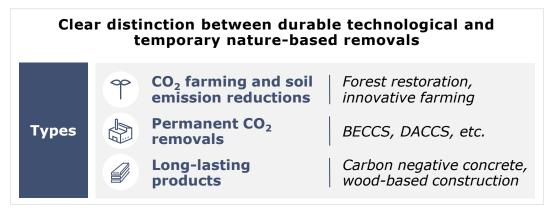
Several **market design issues** need to be considered to determine which approach is most suitable (see next).

Source: La Hoz Theuer et al. (2021), European Scientific Advisory Board on Climate Change (2025) | CRC = Carbon Removal Credit



The Carbon Removal and Carbon Farming (CRCF) establishes an EU standard for quality assurance of CRCs – but short-comings need to be addressed

KEY CONTRIBUTIONS





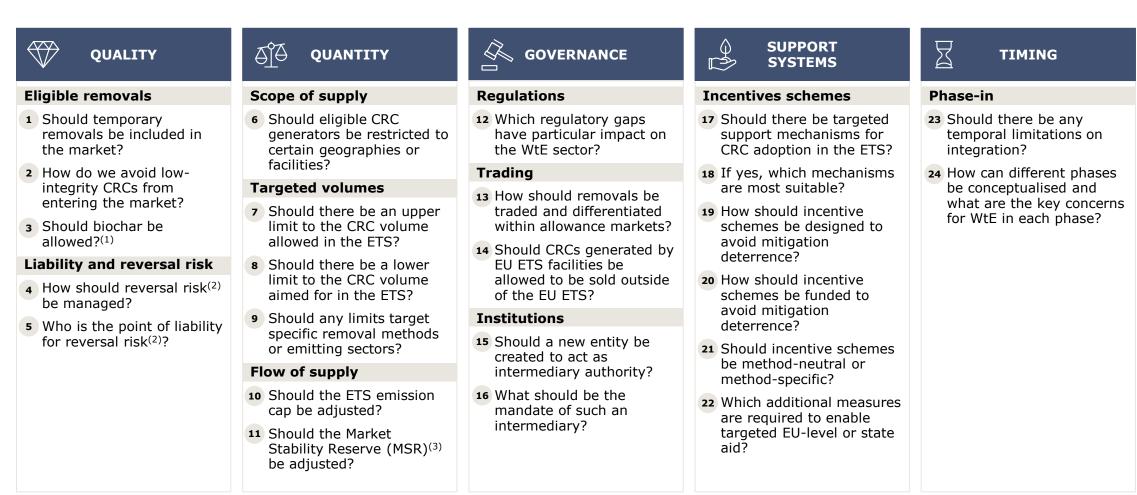
Source: EU Commission

LIMITATIONS AND SHORTCOMINGS

- Since neither the CRCF delegated acts nor specific methodologies have yet been developed, there are a policy gaps that create uncertainty around the CRCF's ability to resolve quality issues.
- Example issues:
 - Specific rules and methodologies for MRV and appropriate market oversight.
 - Adherence to "do no significant harm" principle is only required "where appropriate", leaving room for interpretation.
 - Undefined and mostly optional sustainability safeguards
 - Lack of binding requirement for CDR projects to run a climate risk assessment and include relevant adaptation measures.
- CRCF does not promote non-EU CDR since certified CRCs must:
 - Contribute to EU's NDC excluding CRCs that contribute to third-party NDCs or compliance schemes.
 - Contribute to EU climate objectives such as the European Climate Law, which requires balancing domestic emissions and removals by 2050 – excluding EU from reliance on CRCs delivered in non-EU jurisdictions to achieve net-zero target.
- However, CRCF certificates can contribute to climate targets of non-EU corporate entities (unless they are covered by an international compliance scheme).



A suitable market design is determined by assessing 24 sub-issues related to quality / quantity controls, governance, support systems, and timing



Source: AFRY and Avfall Sverige's Expert Working Group | CRC = Carbon Removal Credit | (1) Biochar has been included as its own topic due to the significant attention it receives in the academic literature. | (2) Reversal risk is the risk that stored emissions are unintentionally re-emitted. | (3) The MSR aims to stabilize EUA prices.

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Main category

Design issue

X Sub-issue



From these sub-issues, 13 policy positions are deemed high-priority, 6 deemed low-priority, and 5 deemed to not require a clear position

SUPPORT QUANTITY GOVERNANCE **QUALITY SYSTEMS** Exclude or limit temporary (6) Initially limit to EU-based Ensure fair treatment of Establish separate funding removals (at least in early waste incineration in CRCF mechanism for CDR projects based on CRCF, market development) and consider excluding methodologies non-ETS WtE plants(2) Treat removals as distinct Support and develop the (7) Avoid upper supply limits (18) Both price- and quantity-CRCF Regulation as the and sector- and companycredits (instead of based subsidy schemes basis for quality assurance level mandates automatic emissions could be beneficial deductions) 3 Include biochar based on 8 Set aspirational EU-based Allow ETS-based CRCs to (19) Index support to price of traditional EUAs to avoid adherence to CRCF CDR target trade outside ETS, with controls to avoid subsidy requirements mitigation deterrence over-compensation (20) Avoid financing CRC 4) Default point of reversal Allow sub-targets based (15) Both peer-to-peer and intermediated trading liability in permanent on removal method support schemes with CO₂ storage operators (connected to Point 21) could be beneficial mitigation funding pools (10) Maintain gross emission (5) Managing reversal risk (16) Mandate of a potential (21) Allow sub-financing based dependent on governance cap and transition to net intermediary authority on removal method - buffer pools(1) may apply could vary significantly cap over time (connected to Point 9) (11) No clear view on required Earmark funds for durable adjustments for the MSR CRCs through existing or new EU funding facilities



TIMING

- Phase-out quantitative integration restrictions over time to achieve acceptable prices
- Extend the responsibility to finance EU-wide netnegative beyond residual emitters

Source: AFRY analysis | (1) Buffer pools are a form of "over-purchasing" of CRCs that are not accounted in targets to act as insurance if some carbon removals are unintentionally and unexpectedly reversed. | (2) Currently, only Swedish and Danish WtE is covered by the ETS.

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High-priority position
Low-priority position
No position



1 2 3 4 5 6

EXECUTIVE SUMMARY - BACKGROUND AND POSITION DEEP-DIVES

Deep-dive of high-priority policy positions (1/7)

Key recommendations

Exclude or limit temporary removals (at least in early market development)

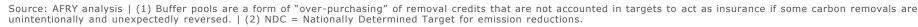
Support and develop the CRCF Regulation as the basis for quality assurance

Rationale

- Temporary removals such as nature-based reforestation or agroforestry pose major quality assurance risk due to challenges related to Monitoring, Reporting and Verification (MRV) as well as lacking additionality and durability of credits. This increases the risk of mitigation deterrence, reversals, and difficulty of enforcing long-term obligations.
- This issue is further enhanced by the weak track record and lack of public trust in historic temporary removals markets (e.g., via the Kyoto Protocol).
- Focusing on durable CDR (e.g., BECCS, DACCS) based on the "like-for-like" principle will significantly simplify quality assurance mechanisms (for example, reduced need for demand and supply controls to manage mitigation deterrence, or CO₂ buffer pools⁽¹⁾ to manage reversal risk).
- The Carbon Removal and Carbon Farming (CRCF) regulation creates a strong certification baseline across the EU, establishing strict requirements on certified CDR to be quantifiable, additional, sustainable, and durable. While there are still uncertainties regarding the yet-to-be-developed CRCF Delegated Acts and methodologies, CRCF is a good starting point for quality assurance.
- Moreover, CRCF ensures a reasonable level of market openness. It allows coclaiming of CRCs for non-EU corporate entities (so long as the CRC also contributes to the EU's NDC⁽²⁾ and is not covered by an international compliance scheme). In the near-term, it also limits eligible CDR projects to those that are based in the EU (see Point 6 on the next page). Such quantity restrictions may be eased over time.

Impact of WtE

- Higher CRC prices in the nearterm, driven by limits on (typically cheap) temporary removals.
- Higher focus on durable CDR methods such as BECCS (including WtE-CCS), DACCS or some forms of biochar.
- Lower risk of greenwashing claims against CRC buyers, since quality assurance is easier.
- Higher CRC prices in the nearterm, driven by limits on cheaper removals of lower quality.
- Assurance of high flexibility for CRC sellers to sell to third-party corporate entities.
- Lower risk of greenwashing claims against CRC buyers, since CRCF is politically recognized.





Deep-dive of high-priority policy positions (2/7)

Key recommendations

Initially limit to EUbased projects based on CRCF, and consider

6b on CRCF, and consider excluding non-ETS WtE plants

Rationale

- CRCF does not promote non-EU CDR since certified CRCs must (1) contribute to EU's NDC (thereby excluding CRCs that contribute to third-party NDCs or compliance schemes), and (2) contribute to EU climate objectives such as the European Climate Law, which requires balancing of domestic emissions and removals by 2050 (thereby excluding EU from reliance on CRCs delivered in non-EU jurisdictions to achieve the net-zero target).
- While this may limit the supply of CRCs into the ETS in the near-term, it is likely to significantly increase public acceptance, simplify quality assurance, and strengthen the economics of EU-based CDR projects (such as Swedish WtE-CCS). Over time and as more countries adopt certification frameworks similar or identical to CRCF, restrictions could potentially be lifted and supply increased, thereby favoring residual emitters within the EU ETS.
- Currently, not all EU-based WtE plants are subject to ETS prices. As WtE plants (to some extent) compete internationally to offer waste management services and source waste, this gives non-ETS WtE plants a cost advantage.
- If non-ETS WtE-CCS projects would be allowed to sell their CRCs into the ETS, they would stand to benefit from the revenue potential of carbon pricing without bearing the cost of carbon pricing within the same system. This is arguably an unfair and inconsistent approach to carbon pricing.
- The best solution would be to harmonize carbon pricing across the entire EU WtE sector by including all facilities in the ETS. A possible partial step would be to limit ETS access for non-ETS WtE plants in the meantime. If non-EU CRCs are permitted in the system, a level playing could be ensured by carbon pricing non-EU WtE facilities through e.g., CBAM(1)

Impact of WtE

- **Higher CRC prices in the nearterm**, driven by limits to international CDR projects of less clear quality.
- Higher focus on development of **EU-based CDR projects** (including Swedish WtE-CCS).
- Lower risk of greenwashing claims against CRC buyers, since quality assurance is easier.

More equitable and consistent application of carbon pricing mechanism for the European WtE sector.

Source: AFRY analysis | (1) CBAM = Carbon Border Adjustment Mechanism



Deep-dive of high-priority policy positions (3/7)

Key recommendations

Set aspirational EUbased CDR target

- Allow sub-targets and sub-financing based on removal method

Rationale

- Setting a CDR target would signal clear political commitment and policy certainty to CDR project developers. It would enable expanded and targeted subsidies (based on EU state aid rules) to stimulate near-term growth in CRC generation and sales.
- There is currently a significant policy gap in this regard. The CO₂ injection capacity target for permanent storage by 2030 (set through the Net-Zero Industry Act) does not specifically target CDR but rather CCS as a whole. Moreover, there is no specific 2040 target for neither CCS nor CDR specifically. Finally, the carbon sink target of 310 MtCO₂/year in 2030 for the LULUCF sector covers only temporary (nature-based) removals, and not durable (engineered) removals.
- Today, there are significant cost disparities between different CDR methods (e.g., BECCS vs. biochar). From a near-term or "static" cost efficiency view, only the cheapest methods (which meet the set quality standard) should be supported to ensure cost-efficient deployment of CDR.
- However, these cost differences do not necessarily reflect the long-term potential of each method – also known as their long-term or "dynamic" cost efficiency. Improved long-term cost efficiency can be achieved through method-based sub-targets and financing, by bringing down costs for highpotential methods through innovation and experience-based learning.
- Another reason to support specific methods is to diversify the EU's portfolio of methods – given that we do not know beforehand which methods will have the highest long-term potential.

Impact of WtE

 Faster near-term CRC deployment driven by enabled support mechanisms and increased market participation due to increased market certainty.

- Deployment of a broader suite of durable removals resulting in higher risk diversification, higher R&D and innovation, and more experiencebased learning.
- Possibility for targeted support for WtE-CCS projects even if they are more expensive than other eligible removal methods.



Deep-dive of high-priority policy positions (4/7)

Key recommendations

Ensure fair treatment of waste incineration in CRCF methodologies

Rationale

- The CRCF Delegated Acts / methodologies are not yet established leaving some uncertainty on how the sustainability criteria will be interpreted.
- While there is ample support that waste incineration plays a critical role in ensuring sustainable waste management, the WtE sector should proactively make this point to ensure that developed methodologies do not incorrectly frame their operations. One such potential risk could be derived in the Waste Framework Directive's waste hierarchy, which may lead to CRCF methodologies to consider fossil waste incineration as unsustainable practice (based on the argument that fossil waste should preferably be re-used or recycled).
- While this is not considered a likely risk, it should still be considered seriously and proactively.

- Treat removals as distinct credits (instead of automatic emissions deductions)
- Within the ETS, CRCs generated through CDR projects could be accounted for and traded either as a deductions from reportable emissions (thereby resulting in a lower obligation to purchase traditional EUAs), or as a separate credit (CRC, thereby maintaining the same allowance obligation but serving it with a combination of CRCs and traditional EUAs).
- The latter approach is preferable, as it would mean that facilities under the ETS that generate CDR would have higher flexibility in how they use or trade CRCs. Accounting-wise, they could use CRCs themselves, sell them to another ETS facility, or sell them to an entity outside of the ETS – with corresponding adjustments to avoid accounting issues such as double counting.
- This ensures maximum trading flexibility and thus better sales opportunities.

Impact of WtE

 Ensures WtE-CCS eligibility for CRC sales based on reporting methodologies established under the CRCF.

 Increased flexibility for CRC sellers to maximize returns either within or outside of the EU ETS.



Deep-dive of high-priority policy positions (5/7)

Key recommendations

subsidy overcompensation

Allow ETS-based CRCs to trade outside ETS, with controls to avoid

Rationale

- As mentioned, allowing facilities under the ETS that generate CDR to sell their CRCs both within and beyond the ETS could lead to higher revenues, thereby impacting the near-term market deployment of CDR. This is important considering the current significant cost gap between traditional EUAs and durable CDR.
- As mentioned, the CRCF itself does not place restrictions on sale to third-party corporate entities, so long as the CRC contributes to the EU's NDC.
- If the CRC is generated with the help of subsidies that are based on ETS prices, there is a risk of subsidy over-compensation if it is sold beyond the ETS. However, such risks should be mitigated through proper subsidy design rather than a categorical restriction on non-ETS sales.

Impact of WtE

 Increased flexibility for CRC sellers to maximize returns either within or outside of the EU ETS.

- Establish separate funding mechanism for CDR
- There is consensus in literature that durable removals require additional support to spur the innovation and experience-based cost reductions necessary to scale supply. There is also considerable support behind the idea that CDR supply needs to be scaled quickly to reach sufficient volumes by 2040 to prevent destabilization of the ETS market, as the emission cap falls closer to zero.
- While there is currently some forms of support (e.g., through the EU Innovation Fund), there are significant funding gaps across all stages of the innovation cycle.

 Faster near-term CRC deployment driven by stronger support mechanisms and increased market participation due to improved project economics and price certainty.



Deep-dive of high-priority policy positions (6/7)

Key recommendations

Rationale

Impact of WtE

Earmark funds for durable CRCs through existing or new EU funding facilities

- Without clear funding pools, the fiscal impact, administrative burden and public acceptance of CDR integration will be more uncertain.
- There is an opportunity to strengthen funding through the Innovation Fund, Horizon Europe, LIFE Programme as well as extending the Recovery and Resilience Facility beyond 2026 or strengthening the collaboration between the European Innovation Council and European Investment Fund to address gaps in venture capital and de-risk private investments.
- Faster near-term CRC deployment driven by stronger support mechanisms and increased market participation due to strengthened political ambition and improved funding certainty.

Phase-out quantitative integration restrictions over time to achieve acceptable prices

- Most of the early restrictions imposed to assure quality could be phased-out over time and with experience – as best practices regarding certification and MRV are established and both public and institutional trust grows. This is especially the case if the EU decides to impose particularly strict quantitative limits on CRCs to reduce near-term uncertainty regarding mitigation deterrence.
- Phase-out secures the best of both worlds. In the near-term, the ETS can manage near-term market uncertainties and fear of mitigation deterrence. In the long-term, it can increase eligible CRC supply once MRV is wellestablished to stabilize CRC prices at manageable levels for residual emitters. This approach allows for an increasingly free market-based (and therefore cost-efficient) system over time.
- Higher CRC prices in the nearterm, driven by limits on cheaper removals of lower quality.
- Higher focus on durable CDR methods such as BECCS (including WtE-CCS), DACCS or some forms of biochar.
- Lower CRC prices over mid- to long-term as the market stabilizes with the inclusion of additional CRC volumes from previously restricted locations, facilities or methods.



Deep-dive of high-priority policy positions (7/7)

Key recommendations

Extend the responsibility to finance EU-wide net-negative beyond residual emitters

Rationale

- Over time, the market mechanism of the ETS will change as the market shifts from a focus on carbon reductions to carbon removals. To achieve an EU-wide net negative system meaning, to generate more CDR than the EU emits there needs to be a financing mechanisms that goes beyond the traditional "polluter-pays" principle. Placing the burden of achieving EU-wide net-negative emissions on a few remaining residual emitters will likely lead to unsustainable penalties unproportional to their historic responsibility.
- Putting the responsibility of EU-wide net-negative on residual emitters (including WtE plants without CCS) would not only be unfair but also most likely make it more difficult to generate net-negative emissions at the desired scale.

Impact of WtE

 Better economics for residual emitters (including WtE without CCS).



Deep-dive of low-priority policy positions (1/3)

Key recommendations

Include biochar based on adherence to CRCF requirements

Default point of

operators

reversal liability in

permanent storage

Rationale

- Biochar is a (possibly durable) CDR method that differs from BECCS and DACCS in two important ways: (1) it is generally cheaper, and (2) its durability is more controversial, varying from decades to millennia depending on the methodology. Because of this, there has been considerable discussion on whether biochar should be eligible within an integrated ETS or not.
- Categorical inclusion of biochar would benefit WtE without CCS, as it would likely reduce CRC prices, while the opposite applies for WtE with CCS (which would prefer higher CRC prices). Regardless of who it benefits, the logically consistent way of including biochar would be to base it on each biochar project's ability to meet the durability criteria set out by the CRCF and related methodologies. This ensures a balanced and consistent approach to all durable CDR projects and maintains the legitimacy of the CRCF as a certification framework.
- In the CRCF, liability is addressed with reference to the ETS Directive and CCS Directive, indicating that permanent storage operators are ultimately liable and must surrender EUAs if reversal occurs. This provides a clear default point of liability that strengthens accountability.
- Of course, there is always the risk that such market participants cease to exist (for example, due to a bankruptcy). In such cases, there should be another mechanism to manage liability. The CRCF notes that certification methodologies approved under the CRCF should include appropriate liability mechanisms to address cases of reversal and leaves the details open to interpretation.

Impact of WtE

- Lower CRC prices in the near-term, driven by inclusion of some EU-based biochar CDR projects that meet strict quality criteria.
- Better balance in CRC supply considering other restrictions that currently benefit durable CDR methods such as BECCS (including WtE-CCS) and DACCS.

 Clear point of liability reduces uncertainty and financial risk toward CDR developers (e.g., WtE-CCS).



Deep-dive of low-priority policy positions (2/3)

Key recommendations

Avoid upper supply limits and sector- and company-level mandates

Maintain gross emission cap and transition to net cap over time

Source: AFRY analysis

Rationale

- Calls for a potential CRC quantity ceiling is mainly driven by fear of mitigation deterrence. However, the choice of a ceiling is in practice arbitrary and based on regulators' limited knowledge of the future. While it may be desirable to limit CDR to residual emissions, the definition of such emissions is not clear and thus hard to set in advance. A ceiling could result in unnecessary cost inefficiency if residual emissions turn out to be higher than expected.
- Moreover, setting a ceiling may be unnecessary to begin with, if eligible removals are restricted to durable and EU-based CDR (in line with the CRCF). The significant price gap between expensive durable CDR and cheaper traditional EUAs effectively works to prevent mitigation deterrence, and can be further enforced through more market-based restrictions such as maintaining the gross emission cap (see Point 10 below)
- A "gross" emission cap limits the tonnes of positive emissions allowed in a cap-and-trade system *irrespective* of the use of CDR, while a "net" cap allows higher positive emissions if those are neutralized with negative emissions.
- An effective way to avoid mitigation deterrence is to maintain the gross cap when CRCs enter the ETS. This means that when one CRC is used in the ETS, it "retires" one traditional EUA – thereby maintaining the reduction path of the gross cap. While this is not in the direct interest of WtE, it is a popular position. Adopting it would increase the legitimacy of Avfall Sverige and weaken calls for other (and potentially more arbitrary) restrictions.
- As the gross cap starts to near zero, it would be reasonable to shift toward a net cap to allow the existence of residual emissions compensated by CDR (which is not possible with a gross cap).

Impact of WtE

- Reduced risk of cost inefficiency due to arbitrary and ultimately incorrect market restrictions.
- Better conditions for WtE-CCS project development.

- Higher near-term public acceptance of CDR integration and lower risk of public and political backlash.
- Cost-effective durable CDR supply by freely allowing CRCs to replace traditional EUAs on the basis of cost competitiveness.
- Clear mechanism to manage residual emissions by switching toward a net cap.



Deep-dive of low-priority policy positions (3/3)

Key recommendations

Index support to price of traditional EUAs to avoid mitigation deterrence

Rationale

- Irrespective of the support mechanism, care must be taken to avoid over-compensating CRCs in relation to traditional EUAs. Introducing CDR-specific support will skew the ETS price signal and could potentially counteract efforts made to avoid mitigation deterrence, such as qualitative and quantitative restrictions imposed on CRCs.
- While this is not a primary concern for WtE, adopting a position that avoids this will increase the legitimacy of Avfall Sverige and increase public acceptance for CDR-specific support schemes.
- A simple approach would be to index CRC subsidy levels to reflect expected future EUA prices. Another way would be to have an intermediary authority responsible for assessing the risk of mitigation deterrence and adjusting compensation levels to reflect changes in the market.

Impact of WtE

- Higher near-term public acceptance of CDR integration and lower risk of public and political backlash.
- Some (reasonable) restrictions to CDR deployment based on ensuring a cost-effective energy transition.

Avoid financing CRC support schemes with CO₂ mitigation funding pools

- In addition to directly over-compensating CRCs in the market, another form
 of mitigation deterrence is by indirectly affecting the flow public funding redirecting it away from carbon mitigation and toward carbon removal.
- While this is not a primary concern for WtE, adopting a position that avoids this will increase the legitimacy of Avfall Sverige and increase public acceptance for CDR-specific support schemes.
- Public CRC funding should not come from funding pools that are earmarked for carbon mitigation efforts. Such an approach could reduce the efficiency of climate efforts, while also generating political and public backlash.
- Higher near-term public acceptance of CDR integration and lower risk of public and political backlash.
- Some (reasonable) restrictions to CDR deployment based on ensuring a cost-effective energy transition.



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PROJECT BACKGROUND AND METHODOLOGY

This report is an internal document for Avfall Sverige to develop its policy position for the inclusion of carbon removal credits (CRCs) into the EU ETS

CHALLENGE

- Waste-to-Energy plants are increasingly under pressure, given their role in managing fossil waste streams and the increasing costliness of such streams under the EU ETS or adjacent carbon pricing schemes.
- Large-scale Carbon Dioxide Removal (CDR) is a potential solution, but is hampered by a lack of market maturity.

SOLUTION

Integrating Carbon Removal Credits (CRCs) in the EU ETS is one way to ensure mid- to long-term market maturation, allowing the WtE industry to manage its residual emissions and further contribute with negative emissions to manage the risk of carbon budget overshoot.

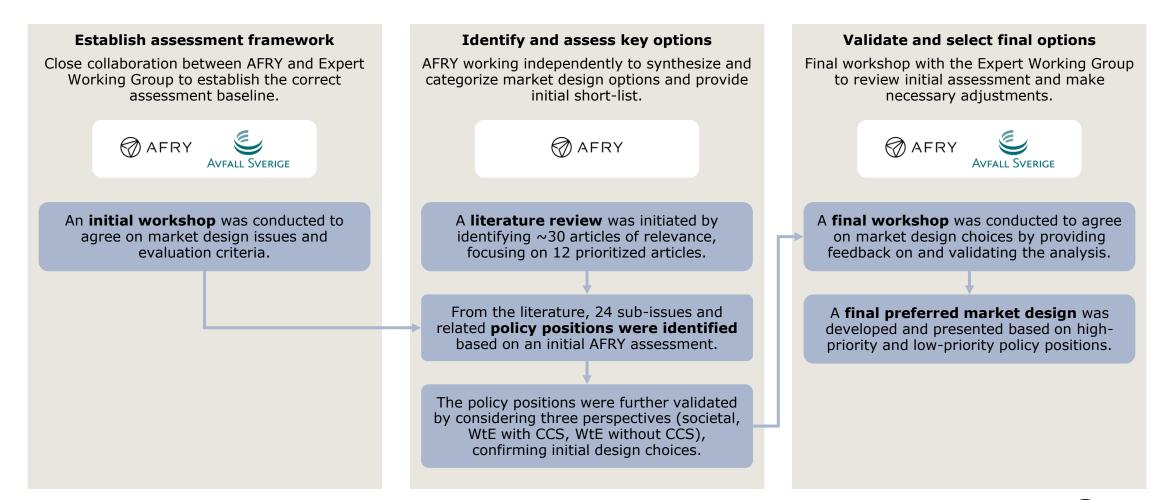
PROPOSED APPROACH

- This report aims to answer two questions:
 - Should CRCs integrate into the EU ETS, or a separate system with flexibility toward ETS?
 - Which market design options for CRC integration align with Avfall Sverige's interests?
- The report has been executed through a co-development process to assess CRC integration design options, considering specifically the challenges facing WtE plants.
- The report is delivered in PPT format, serving as an internal-use material to engage stakeholders and influence EU policy development.



PROJECT BACKGROUND AND METHODOLOGY

A three-step approach has allowed Avfall Sverige to involve an Expert Working Group at the project start and end to validate the report's results





PROJECT BACKGROUND AND METHODOLOGY

Overview of literature review (1/2)

#	Article	Citation	Priority
1	Incitament och bokföring av permanenta upptag i EU:s klimatpolitik till 2040	Naturvårdsverket (2025)	High
2	Integrating durable removals into the EU ETS	Levihn (2025)	High
3	The Balancing Act: Risks and Benefits of Integrating Permanent Carbon Removals into the EU ETS	CATF & CONCITO (2024)	High
4	Scaling up carbon dioxide removals – Recommendations for navigating opportunities and risks in the EU	Edenhofer et al. (2025)	High
5	Emissions Trading Systems and Net Zero: Trading Removals	ICAP (2021)	High
6	Denmark's position paper on integrating permanent carbon dioxide removals in the EU ETS	DEA (2024)	High
7	Sequencing Carbon Dioxide Removal into the EU ETS	Sultani et al. (2024)	High
8	Scaling Carbon Dioxide Removals (CDR): Towards integrating CDR into the EU ETS	Confidential (2025a)	High
9	Carbon Dioxide Removals integration into the EU Emissions Trading System	Confidential (2025b)	High
10	Carbon Removals Meet Emission Trading System Design: A Precautionary Path Towards Integration	Verbist et al. (2024)	High
11	Integrating Carbon Dioxide Removal Into European Emissions Trading	Rickels et al. (2021a)	High
12	Envisioning a carbon removal strategy for Europe	Carbon Gap (2024)	High
13	Procure, Bank, Release: Carbon Removal Certificate Reserves to Manage Carbon Prices on the Path to Net-Zero	Rickels et al. (2021b)	Medium
14	Conditional fungibility: sequencing durable removals into emissions trading systems	Burke & Schenuit (2024)	Medium
15	In or Out: What's best for carbon removals and the EU ETS	Sandbag (2024)	Medium
16	Permanence and Liability: Legal Considerations on the Integration of Carbon Dioxide Removal into the EU Emissions Trading System	Schuett (2024)	Medium



PROJECT BACKGROUND AND METHODOLOGY

Overview of literature review (2/2)

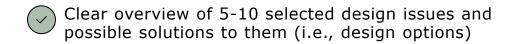
#	Article	Citation	Priority
17	Carbon Dioxide Removal: Climbing up the EU Climate Policy Agenda	Schenuit & Geden (2022)	Medium
18	Build carbon removal reserve to secure future of EU emissions trading	Rickels (2024)	Medium
19	A new EU framework for carbon removal certification	Sia (2024)	Medium
20	The role of carbon dioxide removal in contributing to the long-term goal of the Paris Agreement	IVL (2023)	Medium
21	Making Carbon Removals a Real Climate Solution: How to integrate carbon removals into EU Climate Policies	Meyer-Ohlendorf (2023)	Medium
22	Integrating carbon dioxide removal into EU climate policy: Prospects for a paradigm shif	Geden et al. (2018)	Medium
23	Putting the 'Net' in Net Zero: Carbon Removals and the EU Emissions Trading System	Carbonfuture (2023)	Low
24	Eine »Kurzfriststrategie Negativemissionen«: Politikoptionen für den Hochlauf von CO2-Entnahme	Schenuit & Treß (2025)	Low
25	Developing carbon dioxide removal policy and anticipatory perspectives in the United Kingdom and United States	Harvey et al. (2023)	Low
26	European Carbon Dioxide Removal Policy: Current Status and Future Opportunities	Tamme & Lee Beck (2021)	Low
27	Next stop carbon dioxide removal? German climate policies and the risky road to negative emission technologies	Haas & Schoppek (2024)	Low



PROJECT BACKGROUND AND METHODOLOGY

Clarification of project scope

IN SCOPE OF THE STUDY



- Qualitative reasoning of why certain design options are preferable for the WtE industry, based on agreed-upon evaluation criteria and AFRY's internal expertise
- Written summaries of each recommended design option in a final internal-use report, which can be used as supporting material in a public consultation response or other forums
- Workshops with selected members from Avfall Sverige to collect expert input via an Expert Working Group

OUT OF SCOPE

- Proposed market design options including proposed written amendments to official legal documents
- Quantitative modelling to support recommendation of various market design options
- (imes) Public report to be shared with external stakeholders



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KEY TERMINOLOGY AND CONCEPTS

Description of acronyms (1/1)

Acronym	Meaning	Acronym	Meaning
BECCS	Bioenergy with Carbon Capture and Storage	EUA	EU ETS Allowance
CBAM	Carbon Border Adjustment Mechanism	LULUCF	Land Use, Land-Use Change and Forestry
CCfD	Carbon Contract for Difference	MRV	Monitoring, Reporting and Verification
CCS	Carbon Capture and Storage	MSR	Market Strategic Reserve
CDR	Carbon Dioxide Removal	NDC	Nationally Determined Contribution
CEEAG	Circular Economy and Environmental Aid Guidelines	R&D	Research & Development
CRC	Carbon Removal Credit	RED	Renewable Energy Directive
CRCF	Carbon Removal and Carbon Farming Regulation	SBTi	Science Based Targets initiative
DACCS	Direct Air Carbon Capture and Storage	TNAC	Total Number of Allowances in Circulation
ESR	Effort Sharing Regulation	VCM	Voluntary Carbon Market
ETS	Emission Trading System	WtE	Waste-to-Energy



KEY TERMINOLOGY AND CONCEPTS

Decription of terminology (1/4)

Terminology	Description
Additionality	A CDR is additional if the removals would not have occurred without revenue from the sale of carbon credits. Additionality is essential to the environmental integrity of a carbon project.
Biochar	Biochar is a stable, carbon-rich substance produced by heating organic biomass in a low-oxygen environment - a process called pyrolysis. It is used primarily to improve soil health and fertility, but it also serves as a method of long-term carbon storage, since the carbon in biochar can remain locked in the soil for decades to millennia.
Buffer pools A form of "over-purchasing" of removal credits that are not accounted in targets, instead used to act as insurance if some carbon removals are unexpectedly reversed. As such, it is an important way to manage reversal risk.	
Cap-and-trade system	A cap-and-trade system limits total emissions and allows companies to buy, sell, and trade emission allowances, creating a financial incentive to reduce emissions.
Carbon leakage	When emission reductions in one geographic area lead to higher emissions elsewhere due to shifts in production or trade.
CBAM	The Carbon Border Adjustment Mechanism (CBAM) is a climate policy instrument developed by the EU to impose a carbon price on imports of specific non-EU goods. Its goal is to prevent carbon leakage, which is the risk of businesses shifting activities to nations with weaker climate regulations, leading to higher global emissions.
CCfD	Carbon Contract for Difference (CCfD) is a special type of long-term delivery contract and support mechanism used to close the gap between a "strike price" (meaning, a guaranteed compensation level) for an activity, and the current willingness-to-pay for that activity. It can help reduce the gap between the willingness-to-pay for durable CDR and the cost of generating durable CDR.
CEEAG	The Circular Economy and Environmental Aid Guidelines (CEEAG) are European Commission guidelines on the rules for state aid to support environmental and circular economy projects, ensuring that public funding for these projects align with EU competition rules and sustainability goals.
CRCF Regulation	The Carbon Removal Certification Framework (CRCF) regulation is an EU-wide voluntary framework for certifying carbon removals, carbon farming, and carbon storage in products. It sets EU quality criteria and monitoring processes to encourage investment in innovative carbon removal technologies and sustainable farming solutions, while preventing greenwashing.
Durability / Permanence	Durability refers to the length of time carbon is stored before it is released back into the atmosphere. We use the term "durability" because it is less absolute than "permanence" and acknowledges the temporal variability inherent to most forms of carbon storage.



Decription of terminology (2/4)

Terminology	Description
Dynamic cost efficiency	Dynamic cost efficiency refers to the long-term cost efficiency of a system, taking into account potential short-term market failures – such as information asymmetry, failure to fully account for environmental or other externalities, or technology uncertainty – that lead to incorrect near-term price signals.
Engineered / Technological CDR	Engineered solutions involve advanced technologies to directly capture and store carbon dioxide from the atmosphere, such as BECCS or DACCS. It involves human-made technologies that focus on mitigating emissions directly, rather than relying on natural ecosystems or processes.
ESR	The Effort Sharing Regulation (ESR) is an EU regulation that sets binding targets for each EU member state to reduce greenhouse gas emissions in sectors not covered by the EU Emissions Trading System (EU ETS), such as transport, agriculture, buildings, and waste.
Exchange factors	Values or coefficients used to convert different types of emissions or CRCs into a common metric - typically CO ₂ -equivalents - to ensure consistency in carbon accounting.
Extended emitter's responsibility	Proposed principle where today's greenhouse gas emitters would be held accountable to help fund or deliver future carbon removals to clean up their emissions, easing the burden on future generations and supporting the shift to net-negative emissions, through mechanisms like an expanded EU ETS or separate funding instruments.
Fiscal impact	Fiscal impact refers to the effect a policy, decision, or event has on a government's revenue and spending.
Gross emission cap	A "gross" emission cap limits the tonnes of positive emissions allowed to be emitted within a cap-and-trade system. A system based on a gross emission cap that falls to zero has no room for residual emissions neutralized by CDR, since no positive emissions are allowed.
Intermediary authority	Entity that facilitates transactions between buyers and sellers of carbon credits or allowances, handling trading, verification, or administrative processes without being the end user or emitter.
Intertemporal flexibility	Intertemporal flexibility refers to the flexibility to shift or reallocate mitigation efforts throughout time. For example, the ability to shift climate mitigation efforts over time by using future carbon removals to offset current or past emissions, potentially lowering overall costs if removal technologies become cheaper.
Learning curve	The process by which individuals or organisations become more efficient in using new technologies over time through innovation and experience-based cost reductions.
Liability	Financial and legal responsibility of companies to take action based on a pre-defined agreement. In the context of this report, it is mainly considered as liability for managing reversals of stored carbon.
Like-for-like	Like-for-like implies that CO ₂ that came from durable storage (such as fossil fuels), must be returned to permanent storage (through, for example, BECCS or DACCS).



Decription of terminology (3/4)

Terminology	Description
LULUCF Regulation	The Land Use, Land-Use Change and Forestry (LULUCF) Regulation aims to ensure that land-use activities contribute to the EU's climate goals, particularly the Climate and Energy Framework and achieving net-zero emissions by 2050. The regulation ensures that emissions from deforestation, land degradation, and other land-use changes are properly monitored, reported, and included in EU-wide climate efforts.
Market liquidity	Market liquidity is the ease with which assets can be bought or sold without impacting their price. High liquidity implies quick and stable transactions, while low liquidity implies higher difficulty in finding a counter-party and higher potential price fluctuations in the market.
Market uptake	The ability of the market to accept and adopt a new product, service, or idea, like carbon credits or carbon removal technologies, and how quickly or widely these are used or traded within the market.
MRV	Monitoring, Reporting and Verification (MRV) is a process used to track and assess the progress of climate actions, ensuring transparency and accountability.
Nature-based removals	Climate mitigation approaches that rely on natural processes, such as reforestation, soil carbon sequestration, or wetland restoration, to remove CO ₂ from the atmosphere.
NDC	Nationally Determined Contribution (NDC) are climate action plans submitted by countries under the Paris Agreement, outlining their targets and actions to reduce greenhouse gas emissions and combat climate change.
Overshoot management	Refers to the mechanisms required to ensure that net-negative emissions are generated to permanently store emitted carbon that may have contributed to an over-extension of a region's carbon budget.
Fungibility	Fungibility refers to the property of an asset or item where individual units are interchangeable or mutually replaceable with others of the same kind and value. Full fungibility between CRCs and traditional allowances (EUAs) would mean that they are interchangeable as units of value, both representing the same climate value.
Partial fungibility	The extent to which CRCs can substitute emission allowances, in order to account for the higher risk that removals (especially nature-based) may be reversed over time.
Peer-to-peer trading	Decentralised trading system where individuals trade directly with each other, bypassing intermediaries, often facilitated by a platform.
Price signals	Price signals are market-based cues that influence behavior by reflecting the cost or value of something. In climate policy, like the EU ETS, price signals refer to the carbon price set by the cap-and-trade system for emission allowances (EUAs).
Price volatility	Refers to the extent to which the price of an asset or commodity fluctuates over a period of time. High volatility means prices change rapidly and unpredictably.



KEY TERMINOLOGY AND CONCEPTS

Decription of terminology (4/4)

Terminology	Description
Reverse auction	Reverse auctions are a policy and financing tool used by governments or organizations to procure CDR volumes or other energy solutions. Winners are selected based on the lowest bid (as opposed to the highest bid in normal auctions). Contracts are awarded to the most cost-effective solutions meeting set requirements.
Reversal risk	The possibility that carbon removals are accidentally undone over time, releasing previously stored CO ₂ back into the atmosphere due to natural or human-induced events.
SBTi	Science Based Targets initiative (SBTi) is a global movement that helps companies and financial institutions set science-based targets for reducing greenhouse gas emissions in line with the latest climate science.
Static cost efficiency Statis cost efficiency refers to the near-term cost efficiency of a system, taking into account only the current price signals in the market.	
Takeback obligations A takeback obligation requires entities to remove or financially support carbon removal, with the obligation tied to their emissions.	
VCM	Voluntary Carbon Market (VCM) is a market where individuals and businesses voluntarily purchase carbon credits to offset their emissions, outside of compliance markets.
Willingness-to-pay	The maximum amount of money a person, company, or organization is willing to spend for a good, service, or outcome based on the value they place on it.
Quantifiability / Measurability	The extent to which a net carbon removal benefit of a CDR activity is measurable and monitorable.



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How does the EU's carbon accounting framework affect the Swedish Waste-to-Energy (WtE) sector?



EU emissions are covered through three accounting pillars – ETS, ESR, and LULUCF – with the Swedish WtE sector included under the ETS

	ETS1: Emission Trading System	ESR: Effort Sharing Regulation	LULUCF: Land Use, Land-Use Change and Forestry
Scope – which emitters are covered?	Large emitters in power and heat generation, energy-intensive industry, shipping, and intra-EU aviation	Road transport, buildings, agriculture, and small industry	Forests and harvested wood products, croplands, grasslands, wetlands, and settlements
Does WtE pay?	Sweden and Denmark pay ETS price	Remaining EU countries do not pay ETS price	-
Mechanism – is there a market?	Yes – CO ₂ pricing through cap-and-trade system with a declining cap on total emissions and tradeable allowances	No – National caps without EU-wide trading; but some transfer flexibility across years, Member States, and LULUCF	No – Compliance through national accounting and fulfillment of removal targets
Share of EU GHG emissions	~40%	~60% Through ETS2, a large share of the ESR is becoming market-based.	Natural carbon sink
Climate target	62% reduction by 2030 (comp. to 2005)	40% reduction by 2030 (comp. to 2005) at EU level; binding national targets based on GDP/capita and cost-effectiveness	310 MtCO_{2e} net removals by 2030 at EU level; binding national targets from 2026 onward
Current focus – reductions or removals?	CO ₂ reductions (not removals)	CO ₂ reductions (not removals)	CO ₂ removals, with some focus on limiting emissions from degraded land use

Source: EU Commission



The EU ETS1 is a cap-and-trade scheme that currently covers CO₂ emissions from large stationary installations as well as air and maritime transport

EU ETS OVERVIEW

- The EU Emissions Trading System (EU ETS) is the EU's primary tool for reducing greenhouse gas emissions in a cost-effective way. Operating on a cap-and-trade principle, it sets a limit on total emissions from covered sectors, which decreases over time to drive reductions.
- Companies receive or purchase allowances (EUAs), each permitting one ton of CO₂ emissions. EUAs can be traded, creating a financial incentive to reduce emissions.
- ETS1 covers power generation, energy-intensive industries, and aviation within the European Economic Area, with maritime shipping being phased in from 2024. A separate ETS2 for buildings and road transport will launch in 2027.
- The European Commission oversees the system, with national authorities ensuring compliance. To maintain stability, the Market Stability Reserve (MSR) adjusts the EUA supply, preventing excessive price volatility.
- Revenues generated from EUA auctions support climate action through the Innovation Fund (funding low-carbon technologies) and the Modernisation Fund (supporting energy transition in lower-income Member States).

WHO PAYS?



Power plants
larger than 20 MW



Industry

In certain carbonintensive sectors



Shipping operators for their cargo & passenger



Airlines
for their innerEuropean flights

... in the EU, Norway, Iceland, Liechtenstein

Emissions cap (2024)

1,415 MtCO2e in 2024

Emissions covered

 \sim 40% (ETS1) of geographic total

Average price (2024)

€63.7/t

Penalty

€100/t for non-compliance (and still required to submit shortfall in EUAs)

Free allocation

Phasing out as CBAM phases in

Source: EU Commission



Since Sweden's Waste-to-Energy (WtE) sector pays the ETS carbon price, it faces a major challenge as fossil CO₂ emissions become increasingly costly

WASTE-TO-ENERGY IS INCREASINGLY UNDER PRESSURE

- Sweden's Waste-to-Energy plants are increasingly under pressure, given their role in managing fossil waste streams and the increasing costliness of such streams under the EU ETS or adjacent carbon pricing schemes
 - By 2039, the ETS emission cap could reach zero (with the current linear reduction factor), meaning that no emissions are allowed unless allowances (EUAs) have been saved from previous years
 - Over time, this will reduce liquidity in the ETS and lead to both higher and more volatile EUA prices
- The combination of remaining fossil shares in waste streams and the development of EUA prices is expected to affect the economics of WtE plants

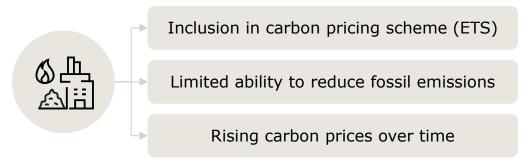
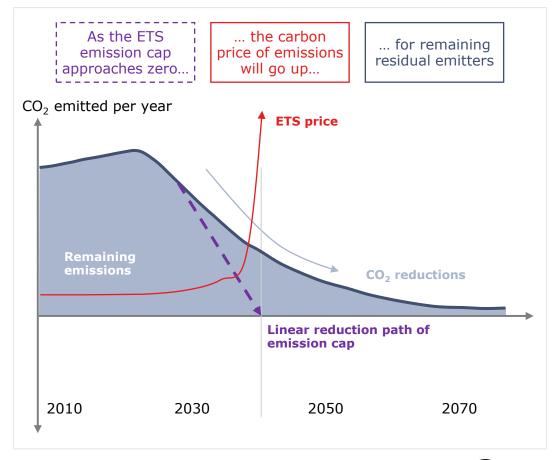


ILLUSTRATION OF RISING CARBON PRICES



Source: EU Commission



Carbon removals could address this issue by neutralizing residual emissions and generating net negative emissions

CO2 REMOVALS ARE A POTENTIAL SOLUTION

- Integrating Carbon Dioxide Removal (CDR) into the EU ETS could address the WtE sector's carbon price problem:
 - For WtE plants without CCS, it will be critical to buy CDR credits, also called Carbon Removal Credits (CRCs) to compensate residual (fossil) emissions within the ETS.
 - For WtE plants with CCS, CRCs will be an important way to neutralize their residual (fossil) emissions as well as further support EU-wide decarbonization and strengthen the core business with revenue from CRC sales.
- The CDR market still immature, with few buyers and an entirely voluntary structure with no integration to the ETS.
- The benefits of CCS for the WtE sector summarized:

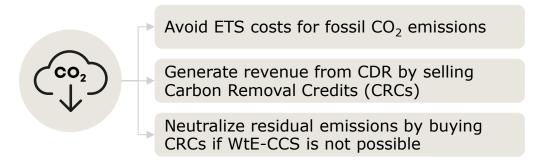
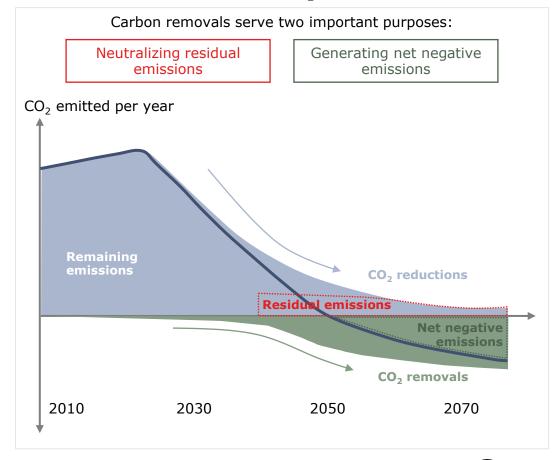


ILLUSTRATION OF THE ROLE OF CO, REMOVALS



Source: AFRY view



What is the current status of carbon removals within the EU's carbon accounting framework?



Carbon removals are currently only partly reflected in EU's climate policy framework as a whole, limiting their ability to contribute to targets

Three interlinked issues currently prevent the inclusion of durable carbon removals in the EU's climate policy framework

Only nature-based (and temporary) removals included as of now

- The existing system only allows temporary, nature-based removals (e.g., from forest growth or soil carbon sequestration) under the LULUCF Regulation. A limited share of these removals can also be transferred to the ESR.
- However, durable removals (e.g., from BECCS or DACCS) are currently excluded from both LULUCF and ESR compliance pathways.
- The EU ETS does not currently include the concept of carbon removals – neither nature-based (temporary) nor engineered (permanent) removals.

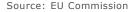
International credits not allowed to contribute to EU's internal targets

- International carbon trading under Article 6 of the Paris Agreement offers another channel for incentivizing removals.
- But credits acquired through this mechanism whether bilaterally (Article 6.2) or via a centralized system (Article 6.4) can only count toward the EU's NDC under the Paris Agreement, not toward domestic EU climate obligations under ETS, ESR, or LULUCF.
- In effect, the EU has drawn a clear line between international climate cooperation and internal compliance mechanisms.

Lacking standards for durable removals in greenhouse gas (GHG) inventory

- The greenhouse gas (GHG) inventory system underpins all EU and international reporting.
- While inventories are well-established for emissions and land-based removals, they lack standardized methodologies and data structures to account for engineered, durable removals. Without inclusion in the inventory, these removals cannot be recognized in regulatory targets.

As an effect, the voluntary carbon market (VCM) has been the driving vehicle for early investments into durable carbon dioxide removal (CDR), based on a set of independent standards and methodologies certifying engineered removals for voluntary (and often corporate) buyers. However, this market lacks the scale, transparency, and liquidity needed to support CDR deployment at climate-relevant levels. Purchases remain niche and fragmented, limiting their systemic impact.





The VCM and Article 6 of the Paris Agreement are important certification and trading frameworks but will likely link to the ETS through the CRCF

CORPORATES LEVERAGE THE VCM TO SATISFY STAKEHOLDERS

- The Voluntary Carbon Market (VCM) currently contains a wide range of carbon credits: avoidance offsets, temporary removals, and durable removals (BECCS would count to the latter).
- Virtually all credits traded to date are avoidance offsets (e.g., renewable energy) or temporary removals (e.g., reforestation).
- However, the small volume of durable removals that has been traded (<0.5% of total voluntary market) has attracted high prices.
- Some corporations are prepared to pay high prices as durable removals are seen as the only way to neutralize residual emissions, and hence validate the net-zero claims their stakeholders are demanding.
- Removal credits are not yet included in the EU ETS –
 as such, VCM removal credits and EUA prices can differ.
 Low-quality VCM credits can be significantly cheaper than
 EUA prices, while high-quality VCM credits are often
 significantly costlier.

STATES LEVERAGE ARTICLE 6 TO MEET THEIR NDC(2) TARGETS

- Article 6 of the Paris Agreement allows countries to voluntarily cooperate to achieve emission reduction targets set out in their NDCs.
 - Article 6.2 allows bilateral agreements to generate so-called ITMOs⁽¹⁾, which can be counted toward NDCs⁽²⁾ in the Paris Agreement. Some countries have already formed bilateral deals under Article 6.2 ahead of its finalization⁽³⁾ despite the lack of a clear framework.
 - Article 6.4 provides a centralized CDR crediting platform run by a Supervisory Body under the auspices of the UN.
- During the most recent international Climate Conference, parties reached agreement on outstanding implementing rules, formalising authorisation procedures for Article 6.2 deals, and setting standards for Article 6.4 trading (incl.environmental safeguards and additionality checks).
- Meanwhile, carbon credit quality concerns remain, as emissions avoidance credits from a predecessor international carbon offsetting scheme (the Clean Development Mechanism) will be allowed in Article 6.4 trading without material additional checks, risking to water down the market and disadvantaging CRCs.



Today, Swedish WtE-CCS would interact both with the EU ETS (by avoiding fossil CO₂ emissions) and the VCM (through the sale of CRCs)

EU Emissions Trading System (EU ETS)

CO₂ origin Fossil CO₂

Typical emitters Conventional power, Cement, Steel, Hydrogen

Method Fossil CCS, WtE-CCS (for Sweden, Denmark)

Driven by EU regulation

Liquidity High liquidity with large volumes traded

Up next Inclusion of missing sectors¹ into EU ETS2 in 2027

Voluntary Carbon Removal Market (VCM)

Biogenic (including atmospheric CO₂)

Bioenergy power, Paper & Pulp, Biogas

BECCS, DACCS, WtE-CCS (for all), Biochar, etc.

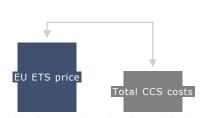
Private corporate entities (e.g., Microsoft, Frontier)

Low liquidity with no standardized market

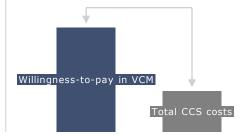
Decision on inclusion of removals in EU ETS in 2026

Economic rationale for CCS

Market profile



If the EU ETS price is higher than the total CCS cost and no other mitigation actions are cheaper, a CCS project will be profitable.



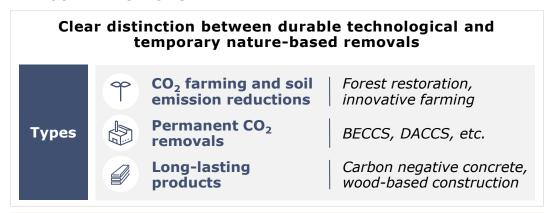
In the VCM, willingnessto-pay for CRCs may be higher than in the ETS, resulting in an even higher carbon removal margin.

Source: AFRY analysis | (1) Road transport, building heat and small industrial facilities



The Carbon Removal and Carbon Farming (CRCF) establishes an EU standard for quality assurance of CRCs – but short-comings need to be addressed

KEY CONTRIBUTIONS





Source: EU Commission

LIMITATIONS AND SHORTCOMINGS

- Since neither the CRCF delegated acts nor specific methodologies have yet been developed, there are a policy gaps that create uncertainty around the CRCF's ability to resolve quality issues.
- Example issues:
 - Specific rules and methodologies for MRV and appropriate market oversight.
 - Adherence to "do no significant harm" principle is only required "where appropriate", leaving room for interpretation.
 - Undefined and mostly optional sustainability safeguards
 - Lack of binding requirement for CDR projects to run a climate risk assessment and include relevant adaptation measures.
- CRCF does not promote non-EU CDR since certified CRCs must:
 - Contribute to EU's NDC excluding CRCs that contribute to third-party NDCs or compliance schemes.
 - Contribute to EU climate objectives such as the European Climate Law, which requires balancing domestic emissions and removals by 2050 – excluding EU from reliance on CRCs delivered in non-EU jurisdictions to achieve net-zero target.
- However, CRCF certificates can contribute to climate targets of non-EU corporate entities (unless they are covered by an international compliance scheme).



Targets and price signals set in EU climate policies point to a growing role of both temporary and durable carbon removals in driving net-zero

	2030	2040	2050	Post 2050
European Climate Law	Net emission reduction target of -55% from 1990 levels, with maximum contribution of 225 MtCO ₂ removals.	No formal proposal yet, but communication from the European Commission indicates net emission reduction target of -90%.	Net Zero GHG emission by 2050. No formal proposal yet on 2030-2050 GHG budget.	Aim to achieve net negative GHG emissions thereafter
LULUCF ⁽¹⁾ Regulation	Net LULUCF sink of 310 MtCO ₂ .			
Net Zero Industry Act	 ✓ 50 MtCO₂ injection capacity with individual obligations fossil fuel for fossil fuel producers. No distinction between removals and fossil CCS. 			
EU ETS Directive	Emission cap to decrease by -62% from 2025, with removals excluded. Integration of removals to be examined in 2026 review.	Cap to reach zero by 2039 (2045 for aviation)		

Source: Edenhofer et al. (2025) | (1) LULUCF = Land Use, Land-Use Change and Forestry.



What is the best way to incentivize durable carbon removals in the EU's carbon accounting framework?



There are several pathways to incentivize carbon removals – for WtE plants without CCS, integration into the EU ETS is of critical importance

Price-based Quantity-based	Instrument	Туре	Description	Variants and methods	
Emission pricing	Integration into a carbon tax system	•	Set a uniform carbon price for emissions and removals by taxing emissions and rewarding removals at the same price	Other pathways may incentivize CDR, but do not help WtE without CCS to manage residual emissions in ETS. As such, ETS integration is critical.	
(CO ₂) instruments	Integration into cap-and-trade system, such as the EU ETS	•	Set a net emission cap target with a cap-and-trade scheme, where removals are part of the decarbonisation path	EU ETS integration methods: - Direct, unconstrained - With supply and demand controls - Via intermediary authority	
Mandates and takeback obligations	-	•	Impose obligations on emitters or fossil fuel producers to remove emissions, or contribute financially to removals	Requirement imposed on: - Fossil fuel producer or importer by carbon takeback obligations upstream - Downstream mandate on emitters	
	Capital support and RD&D grants	•	Provide capital grants and loans for RD&D	Research and development grantsCapital demonstration grants	
Subsidies and public procurement	Subsidies and fiscal incentives	•	Provide subsidies and fiscal incentives at fixed prices per ton of CO ₂ removed	CCfDs and feed-in tariffsTaxes and fiscal incentives	
	Public procurement		Procure removals by providing financial support to actors deploying removals	 Reverse auctions 	

Source: Edenhofer et al. (2025) | RD&D = Research, Development & Deployment | CCfD = Carbon Contract for Difference



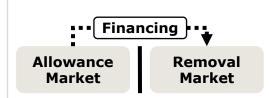
There are three main integration approaches, with several market design issues that must be considered to determine which is most appropriate

Integration can be defined in various ways. Here, we define integration as *allowing Carbon Removal Credits to be used interchangeably with allowances within the EU ETS.* In addition to integration, the ETS could be used to finance a separate removal market – but this would not be defined as an integration.

No integration Full integration

Disconnected markets (with optional financing link)

- The ETS and removal markets are completely disconnected.
- The ETS does not make use of any CRCs, although CRCs could be used outside of the ETS.
- ETS revenues (via EUA auctions) could still be used to finance a separate removal market.



This does not resolve WtE's residual emission problem, unless WtE is excluded from the ETS.

Connected via intermediary authority

- The ETS and removal markets are connected via a public authority, who buys and sells / distributes CRCs in the ETS (thus, controlling supply of CRCs into the ETS).
- CRCs can then be used in the ETS in several ways (e.g., in reserves, as free allocation and as extra allowances at auctions).



Connected with supply and/or demand controls

- The ETS and removal markets are connected directly, enabling peer-to-peer transactions between ETS-covered entities and CRC sellers.
- The government still places qualitative/quantitative limits on transactions between the two markets to manage CRC demand and supply.

Allowance Removal Market

Unrestricted integrated markets

- The ETS and removal markets are fully integrated, which means that the generated CRCs are interchangeable with traditional EUAs without any further restrictions.
- There are no limitation on the number of CRCs that can be used in the ETS, and there are limited (if any) quality controls.

Allowance Removal Market

Several market design issues need to be considered to determine which approach is most suitable (see next).

Source: La Hoz Theuer et al. (2021), European Scientific Advisory Board on Climate Change (2025) | CRC = Carbon Removal Credit



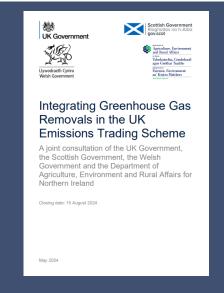
The UK ETS is actively exploring integration of CRCs and has established a joint consultation presenting the UK's key considerations

UK AND EU ETS COMPARISON

- The UK Emissions Trading Scheme (UK ETS) is a cap-and-trade system that commenced on January 1, 2021, as a central component of the UK's climate change strategy.
- The UK and EU ETS share a common foundation (due to the UK's inclusion in the EU prior to 2021):

Feature	UK ETS	EU ETS
Start	2021	2005
Coverage	Power, heavy industry, aviation (considering maritime, waste)	Power, heavy industry, aviation, maritime (considering waste)
Cap reduction	4.8% annually	4.3%-4.4% annually
Market size	UK only (smaller)	EU-wide (larger)
Carbon price	Generally lower	Generally higher
Link to other markets	Not linked (potential future linking with EU ETS)	Linked to Switzerland, open for further links
Free allowances	Phasing out, considering other policy mechanisms to support industry	Gradually phasing out
Carbon removals	Actively exploring integration	Not yet included, under discussion

UK'S JOINT CONSULTATION ON CRC INTEGRATION



Explores practical integration by 2028, especially for scalable technologies such as DACCS and BECCS. The report focuses on achieving net-zero, ensuring market integrity, and environmental sustainability.

Key proposed market design features:

- An upper limit on CRC supply within the overall ETS cap while maintaining a gross emission cap
- Demand controls to regulate which entities that can purchase CRCs, targeting "hard-to-abate" sectors (i.e., sectors with residual emissions)
- Restrictions on the share of CRCs used for compliance (e.g., starting at 5% and increasing over time)
- Limited to UK-based CDR projects
- Exploring allocation methods and eligibility criteria to meet MRV standards

Source: AFRY analysis, UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland



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Market design is assessed by resolving issues related to quality assurance, quantitative constraints, governance, support systems, and timing





Restricting **QUANTITY**



Establishing **GOVERNANCE**



Establishing **SUPPORT**



Establishing **TIMING**

Avfall Sverige should support a **certification and MRV framework** that ensures public acceptance and trust in carbon removals by only allowing CRCs with sufficient quality to enter the ETS.

To build trust, the integration approach needs to minimize the risk of **mitigation deterrence** – meaning a reduced ambition level in emissions reductions. It also needs to legitimately address **reversal risk** – meaning the risk that permanently stored carbon is accidentally emitted again.

Avfall Sverige should strive to **minimize restrictions** to a level that guarantees quality assurance and avoids mitigation deterrence. Too many and too arbitrary restrictions could reduce the market's cost efficiency and near-term development.

Similarly, EU-wide targets can be set to stimulate CDR development, but mandates aimed at specific firms to buy CRCs should be avoided.

It is difficult for regulators to know what level of CDR will be required in the future, and by whom. Attempts to predict the future should be minimized – and market-based price discovery should be maximized.

Avfall Sverige should ensure that the critical societal **role of waste incineration is recognized** in the many amendments and new regulations that are under development, and which can be critical in determining the eligibility of WtE-CCS under a new certification framework.

Moreover, Avfall Sverige should ensure that WtE-CCS projects have maximal **flexibility to sell and trade** CRCs, so long as it does not lead to subsidy overcompensation.

Avfall Sverige should promote **targeted support schemes** aimed at growing the CDR industry in the nearterm. Such support should aim to increase innovation and experience-based cost reductions in different removal methods.

Importantly, support should be allocated both toward methods with the highest near-term impact (static cost efficiency) and those that have the highest long-term potential with sufficient R&D (dynamic cost efficiency).

Finally, support schemes must be designed and funded in a way that avoids mitigation deterrence.

Avfall Sverige should consider accepting a step-wise integration of CRCs into the EU ETS. As quality assurance of and public trust in CRCs improve,

restrictions can be phased-out. This should take the form of a growing scope of eligible CDR (e.g., expanded regions, facilities or methods) within the chosen certification and MRV framework.

Moreover, as the ETS changes from a net-zero to a net-negative emission system, Avfall Sverige should ensure that the new market mechanisms do not unfairly and unproportionally impact the few residual emitters left in the system.





A suitable market design is determined by assessing 24 sub-issues related to quality / quantity controls, governance, support systems, and timing

GOVERNANCE

QUALITY Eligible removals 1 Should temporary removals be included in the market? 2 How do we avoid lowintegrity CRCs from entering the market? 3 Should biochar be allowed?(1) **Liability and reversal risk** 4 How should reversal risk(2) be managed?

5 Who is the point of liability

for reversal risk(2)?

QUANTITY

Scope of supply

6 Should eligible CRC generators be restricted to certain geographies or facilities?

Targeted volumes

- 7 Should there be an upper limit to the CRC volume allowed in the ETS?
- 8 Should there be a lower limit to the CRC volume aimed for in the ETS?
- 9 Should any limits target specific removal methods or emitting sectors?

Flow of supply

- 10 Should the ETS emission cap be adjusted?
- 11 Should the Market Stability Reserve (MSR)(3) be adjusted?

Regulations

12 Which regulatory gaps have particular impact on the WtE sector?

Trading

- 13 How should removals be traded and differentiated within allowance markets?
- 14 Should CRCs generated by EU ETS facilities be allowed to be sold outside of the EU ETS?

Institutions

- 15 Should a new entity be created to act as intermediary authority?
- 16 What should be the mandate of such an intermediary?

SUPPORT SYSTEMS

Incentives schemes

- 17 Should there be targeted support mechanisms for CRC adoption in the ETS?
- 18 If yes, which mechanisms are most suitable?
- 19 How should incentive schemes be designed to avoid mitigation deterrence?
- 20 How should incentive schemes be funded to avoid mitigation deterrence?
- 21 Should incentive schemes be method-neutral or method-specific?
- 22 Which additional measures are required to enable targeted EU-level or state aid?



TIMING

Phase-in

- 23 Should there be any temporal limitations on integration?
- 24 How can different phases be conceptualised and what are the key concerns for WtE in each phase?

Main category Design issue

X Sub-issue



Source: AFRY and Avfall Sverige's Expert Working Group | CRC = Carbon Removal Credit | (1) Biochar has been included as its own topic due to the significant attention it receives in the academic literature. | (2) Reversal risk is the risk that stored emissions are unintentionally re-emitted. | (3) The MSR aims to stabilize EUA prices. 61 2025-04-25 COPYRIGHT AFRY AB | CRC INTEGRATION INTO THE EU ETS - FINAL REPORT

From these sub-issues, 13 policy positions are deemed high-priority, 6 deemed low-priority, and 5 deemed to not require a clear position

SUPPORT QUALITY QUANTITY GOVERNANCE **SYSTEMS** Ensure fair treatment of Exclude or limit temporary (6) Initially limit to EU-based (17) Establish separate funding removals (at least in early waste incineration in CRCF mechanism for CDR projects based on CRCF, market development) and consider excluding methodologies non-ETS WtE plants(2) Support and develop the 7 Avoid upper supply limits Treat removals as distinct (18) Both price- and quantity-CRCF Regulation as the and sector- and companycredits (instead of based subsidy schemes basis for quality assurance level mandates automatic emissions could be beneficial deductions) 3 Include biochar based on (19) Index support to price of (8) Set aspirational EU-based Allow ETS-based CRCs to traditional EUAs to avoid adherence to CRCF CDR target trade outside ETS, with requirements controls to avoid subsidy mitigation deterrence over-compensation (20) Avoid financing CRC 4) Default point of reversal Allow sub-targets based (15) Both peer-to-peer and intermediated trading liability in permanent on removal method support schemes with CO₂ storage operators (connected to Point 21) could be beneficial mitigation funding pools (10) Maintain gross emission (5) Managing reversal risk (16) Mandate of a potential (21) Allow sub-financing based dependent on governance cap and transition to net intermediary authority on removal method - buffer pools(1) may apply could vary significantly cap over time (connected to Point 9) (11) No clear view on required Earmark funds for durable adjustments for the MSR CRCs through existing or new EU funding facilities



TIMING

- Phase-out quantitative integration restrictions over time to achieve acceptable prices
- 24 Extend the responsibility to finance EU-wide netnegative beyond residual emitters

Source: AFRY analysis | (1) Buffer pools are a form of "over-purchasing" of CRCs that are not accounted in targets to act as insurance if some carbon removals are unintentionally and unexpectedly reversed. | (2) Currently, only Swedish and Danish WtE is covered by the ETS.

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High-priority position
Low-priority position
No position



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Overview | Robust quality assurance of CDR is a fundamental issue with impact on the eligible CRC supply and public acceptance for CRC integration

OVERVIEW OF THE QUALITY ISSUE

- Quality assurance is critical to ensure that the market maintains integrity and actually contributes to the EU's climate targets.
- The Carbon Removal and Carbon Farming Regulation (CRCF) is the EU's key regulation on this matter, acting as a potential gatekeeper for high-integrity credits – meaning, credits that meet necessary requirements for quantifiability, additionality, durability and sustainability.
- Quality assurance governs both proactive measures (e.g., certification schemes, pricing of reversal risk) and corrective measures if reversal occurs (e.g., liability).

MARKET IMPACT

- Restriction to ensure quality will affect the eligible CRC supply and thereby CRC prices.
- Higher restrictions may be necessary to secure public acceptance for CRC integration into the EU ETS.

SUB-ISSUES

Issue	Key sub-issue ^{(1), (2)}	
Eligible removal types	Should temporary removals be included in the market?	
	How do we avoid low-integrity CRCs from entering the market?	
	Should biochar be allowed?	
Reversal risk and	How should reversal risk be managed?	
liability	Who is the point of liability for reversal risk?	





Should temporary removals be included in the market?

- Carbon removals are typically segmented into nature-based (often temporary) and engineered/technological (often durable) removals. The Carbon Removal and Carbon Farming (CRCF) regulation makes a clear distinction on this basis, by distinguishing durable carbon removals from so-called carbon farming and soil emission reduction practices.
- Nature-based removals suffer from multiple short-comings that risk reducing their quality and public acceptance:
 - **Proving additionality:** It is difficult to establish clear quantitative baselines and prove that temporary removals are not "passive" but based on "active / anthropogenic" (i.e., human-led) activity.
 - **Ensuring or managing permanence/durability:** Temporary removals have lower permanence/durability, meaning that credits need stricter MRV⁽¹⁾ and a mechanism for renewal (or termination) to maintain their climate benefit over time.
- Carbon markets have suffered considerable backlash due to the under-performance of nature-based carbon offsets (e.g., Verra's carbon standard). A study of forestation offsets operated by the California Air Resources Board found that the way in which project baselines were set resulted in systematic over-crediting amounting to 30 MtCO₂e (Badgley et al., 2022).
- The low comparable price of nature-based CRCs has significant market consequences. Higher reversal risk, MRV challenges, and the fact that the EU ETS has historically focused on permanent emissions reductions, mean that temporary nature-based removals most likely fit poorly into the ETS market and risk undermining confidence in durable CDR methods (e.g., WtE-CCS).
- To ensure permanence/durability, the so-called "like-for-like" principle is a critical component. Like-for-like implies that "CO₂ that came from permanent storage, such as fossil fuels, must be returned to permanent storage" (Carbon Gap, 2023). This would limit the applicability on temporary removals in the ETS.

CONCLUSION

- Only allow durable removals in the ETS (i.e., "like-for-like" principle) to ensure public acceptance and quality assurance.



How do we avoid low-integrity CRCs from entering the market?

- In the literature review, the issue of low-integrity CRCs is rarely explicitly mentioned. Rather, it is typically characterized as a CO₂ mitigation deterrence risk, driven by cheap CRCs entering the market. According to McLaren (2020), mitigation deterrence can come from:
 - Substitution and failure: The CRC does not deliver the removed tonnes required to replace emission reductions (e.g., due to lower technical performance, higher reversal, higher cost than expected, or failed additional support).
 - Rebounds: The CRC leads to indirect and unintended consequences, triggering additional emissions (e.g., by maintaining fossil value chains with emissions beyond those directly compensated with CRCs).
 - Mitigation foregone: The CRC indirectly leads to actors lowering their ambition level for emission reductions.
- There is consensus on the need for a CDR certification methodology with strict requirements on quantifiability/measurability, additionality, permanence/durability, and sustainability. Since these requirements form the backbone of the Carbon Removal and Carbon Farming (CRCF) regulation under current development, the CRCF could act as an appropriate gatekeeper for high-integrity durable carbon removals entering the EU ETS.
- However, there extent to which "baselines in CRCF methodologies mitigate risks of over-crediting and systematic biases is yet to be determined" (Edenhofer et al., 2025).

CONCLUSION

- The only viable option is deemed to be a robust CRC certification framework. Most likely, this framework will have its basis in the Carbon Removal and Carbon Farming (CRCF) regulation.
- However, a lack of quality and public acceptance of yet-to-be defined CRCF-approved certification methodologies may warrant additional safeguards for mitigation deterrence.





Should biochar be allowed?

- Biochar is a type of carbon removal (alongside other types such as Bioenergy with Carbon Capture and Storage (BECCS) or Direct Air Capture and Storage (DACCS)). Biochar differs from BECCS and DACCS in two important ways:
 - Considering the full value chain, biochar's carbon abatement cost is generally cheaper on the order of 60-70 USD/tCO₂ according to Rickels et al. (2021).
 - The permanence/durability of biochar is more controversial, varying from decades to millennia depending on the methodology (ICF, 2024). Moreover, the topic lacks large-scale, long-duration studies (Edenhofer et al., 2025).
- Taken together, these factors present a dilemma for the sector. Inclusion of biochar in the EU ETS might reduce the price gap between eligible CRCs and traditional EUAs (and thus the fiscal impact of stimulating durable carbon removal uptake in the ETS) – but it might also increase the CO₂ reversal risk.
- One of two approaches could be adopted to manage this risk: either to rely on the prevailing certification framework (i.e., CRCF), or to require additional safeguards beyond it specifically for CRCs integrated into the EU ETS.
 - Manhart (2025) argues that adding another quality assurance layer is redundant unless the CRCF is deemed poorly designed,
 and, in which case, that is the problem to address instead of adding another layer of quality assurance and compliance.
 - The fact that the CRCF has permanence/durability as a key evaluation criteria should alleviate the issues of biochar on the basis of individual projects, as is the case for other methods.

CONCLUSION

- The inclusion or exclusion of biochar should be determined for each individual project, based on the requirements outlined in biochar methodologies approved by the CRCF. Categorical exclusion of biochar, or adding an additional layer of quality assurance and compliance, does not make sense in light of the considerable effort placed into developing the CRCF.

Source: AFRY literature study (2025)



How should reversal risk be managed?

- The primary mentioned method to address reversal risk (in addition to holding actors accountable through liability) is to factor in the reversal risk when selling or using CRCs in the EU ETS. This would be accomplished by adjusting the exchange factor, or fungibility, between a CRC and a traditional EUA, so that it is less than 1:1.
- Low exchange factors would in practice lead to a "buffer pool" of removals that are unaccounted for in the ETS (since one tonne of CDR would translate to less than one tonne of allowances in the ETS), which acts as a form of insurance if a certain amount of permanently stored CO₂ is somehow re-emitted.
 - Examples are found in the VCM. Independent crediting bodies such as Gold Standard have previously forced forestry projects to maintain a buffer amount of 20% in "risk of losses from fire, or pest infestation" (Ghaleigh, NS & Macinante, J, 2023)
- There is no clear indication of what such a value should be in the literature. The exchange factor would have to be set based on a risk assessment done by a certification authority and should be re-assessed at some pre-determined interval. The exact liability mechanisms are to be defined by applicable certification methodologies set out in yet-to-be-published Delegated Acts pursuant to the CRCF's Article 8, put point to measures such as "collective buffers or up-front insurance mechanisms and, as a last resort, direct cancellation of units" (CRCF, 2024).
- Arguably, exchange factors are less important if only durable removals are allowed, and if there is robust liability forcing
 market actors to bear the cost of reversals. With such a structure, reversals would both be proactive and reactively managed,
 albeit with a potential time delay. Such a delay could have short-term climate impacts, depending on the size of the reversal.

CONCLUSION

 Exchange factors could be set by a central authority (e.g., EU legislators, Carbon Central Bank) or delegated to certification bodies based on project- or category-level risk analysis. However, exchange factors are less important if only durable removals are included – thereby reducing complexity and relying on liability for corrective maintenance.

Source: AFRY literature study (2025)



Who is the point of liability for reversal risk?

- As mentioned, liability is another way to incentivize market participants to manage reversal risk but more importantly, to
 ensure corrective maintenance on any reversal that actually happens. In the CRCF, liability is addressed with reference to the
 ETS Directive and CCS Directive, indicating that permanent storage operators are ultimately liable and must surrender EUAs if
 reversal occurs (CCS Directive, 2024).
- The CRCF also notes that certification methodologies approved under the CRCF should include "appropriate liability mechanisms to address cases of reversal" and leaves the details open to interpretation (CRCF, 2024).
- As a rule, liability for CO₂ reversals could either fall on CRC buyers, CRC sellers, other value chain participants (e.g., transport and storage operators), government entities, certification bodies, or other stakeholders. In the literature, there is limited mention of a preferable point of liability. To the extent that regulations set the standards for CRC contracting, permanent storage operators are the point of liability (CRCF, 2024).
- The point of liability might impact the risk-taking of individual project developers but should be treated as an acceptable risk and "cost of doing business".

CONCLUSION

 The point of liability is assumed to be CDR storage operators, unless otherwise agreed on between contracting parties. The CRCF must define appropriate liability mechanisms for non-standard cases, such as if contracted storage operators cease to exist (e.g., due to bankruptcy),.

Source: AFRY literature study (2025)



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Overview | Restrictions or targets on the CRC quantity will directly impact the available CRC supply as well as system complexity and cost efficiency

OVERVIEW OF THE QUANTITY ISSUE

- Quantitative restrictions could be deemed necessary to manage certain quality issues unresolved by the chosen certification framework, or to address additional issues such as CO₂ mitigation deterrence.
- Quantitative targets could be deemed necessary to drive early-stage CRC purchasing or create mechanisms for late-stage purchasing (in the EU ETS's so-called "end game").
- Quantitative constraints both restrictions and targets can add complexity and arbitrariness to the market, leading to less cost efficiency.

MARKET IMPACT

- Clear target-setting can improve CDR project economics and the timing of investment decisions.
- Too many or arbitrary restrictions can reduce available CRC supply and thereby increase CRC prices as well as system complexity and cost.

SUB-ISSUES

Issue	Key sub-issue ⁽¹⁾	
Scope of supply	Should eligible CRC generators be restricted to certain geographies or facilities?	
Targeted volumes	Should there be an upper limit to the CRC volume allowed in the ETS?	
	Should there be a lower limit to the CRC volume aimed for in the ETS?	
	Should any limits target specific removal methods or emitting sectors?	
Flow of supply	Should the ETS emission cap be adjusted?	
	Should the MSR be adjusted?	





Should eligible CRC generators be restricted to certain geographies or facilities?

- Three positions have been considered:
 - No restrictions: CRCs can be sourced globally, likely reducing costs by enabling higher supply and promoting CRC trading in line with Article 6 of the Paris Agreement. Yet, weak or varying governance across regions could lead to carbon leakage and over-reliance on removals, discouraging direct emission reduction (ICAP, 2021).
 - Limited to EU-based CDR projects: CRCs are restricted to guarantee compliance with EU climate regulations and MRV⁽¹⁾ practices. ICAP (2021) argues that this could safeguard high-integrity removals and support EU-based innovation, albeit at the risk of limited supply, higher prices, and potential trade conflicts.
 - Limited to certain facilities: CRCs restricted to existing facilities to reduce the risk of unsustainable biomass use, or to
 WtE facilities covered by ETS pricing (but not those outside of it). The latter approach is not described in literature but could
 be based on ensuring fair competition across the EU's WtE sector, since inclusion in the ETS brings an additional cost burden.
- A highly restrictive approach will reduce the number of eligible removals, likely increasing CRC prices. It may discourage CDR investment outside the EU. Supply limits may be favorable to CCS-equipped WtE facilities, resulting in less competition and potential public support spread over fewer installations. By extension, the opposite applies to WtE facilities without CCS.
- CRCF does not promote non-EU CDR since certified CRCs must (1) contribute to EU's NDC⁽²⁾ (excluding CRCs that contribute to third-party NDCs or compliance schemes) and (2) contribute to EU climate objectives such as the European Climate Law, which requires balancing of *domestic* emissions and removals by 2050 (excluding EU from reliance on CRCs delivered in non-EU jurisdictions to achieve the net-zero target) (Edenhofer et al., 2025).

CONCLUSION

 Minimising restrictions on eligible CDR projects is preferable, assuming that projects are found to comply with CRCF and related methodologies. However, in the near-term, this likely means restricting CDR to EU-based projects.



Should there be an upper limit to the CRC volume allowed in the ETS?

- In the literature, the discussion on a potential upper limit on CRCs (i.e., a quantity ceiling) is often in the context of CO₂ mitigation deterrence. Some argue that supply and/or demand controls are motivated for this reason. Since the choice of an upper limit is in practice arbitrary, several suggested approaches are found in the literature. Since these approaches only vary in the arbitrary limit set by each proposal, they can be interpreted as variations of the same solution:
 - Maximum 10% of base-year emissions based on Science Based Targets initiative (SBTi) guidelines, although Höglund (2025) argues that this limit should be softened to reflect that even "if 10% is a reasonable estimate of the economy-wide need for CDR, many companies have greater [hard-to-abate emissions] where CDR may be the optimal mitigation choice".
 - CATF & CONCITO (2024) highlight demand controls such as "only allowing certain sectors to use carbon removals (e.g., 'hard to abate' sectors), by allowing the use of carbon removals only up to a maximum percentage of the entities' emissions (e.g., 5% rising over time), or by allowing the use of removals only for process emissions."
- However, others argue such an approach is not necessary, since the significant price gap between expensive durable CRCs and cheaper traditional EUAs effectively work to prevent CO₂ mitigation deterrence. If anything, La Hoz Theuer et al. (2024) argues that a lower limit may be necessary to boost demand in the short term.
- While it may be desirable to limit CDR to residual or "hard-to-abate" emissions, the definition of such emissions is not clear and thus hard to set in advance. Levihn (2025) argues that the market will discover residual emissions at the EUA price point where the marginal abatement cost of CDR matches traditional mitigation efforts.

CONCLUSION

 Avoid imposing static upper limits due to the difficulty of defining the appropriate levels. It is preferable to rely on less arbitrary quantitative measures to address the risk of CO₂ mitigation deterrence (e.g., maintaining the gross emission cap).





Should there be a lower limit to the CRC volume aimed for in the ETS?

- In the literature, the case for a potential lower limit on CRCs (i.e., a quantity floor) is often of boosting CRC uptake, achieving learning curves and ensuring technology maturity given the timeframe of EU targets (Meyer-Ohlendorf, 2023). A lower limit could either be imposed as a mandate or aspirational target, either directly toward emitters / sectors or the EU as a whole.
- As with an upper limit, a lower limit would be arbitrary. As such, several approaches are found in the literature:
 - The Californian Carbon Removal Development Act would mandate a percentage of emissions to be removed by entities already covered by their cap-and-trade system (Edenhofer et al., 2025). In the proposal, the percentage would increase over time from 1% by 2030, to 8% in 2035, 35% in 2040 and 100% in 2045 for individual firms.
 - Naturvårdsverket (2025) highlights a similar quota-based approach based on Carbon Removal Obligations (CRO:s) for hard-to-abate sectors, ideally implemented at the EU level. The quota could shift over time, starting at a lower ratio (e.g., 0.5:1 meaning half a tonne of CDR purchased for every one ton of emissions) and increasing to 1:1 or even beyond that to incentivize overshoot management.
 - In addition to company mandates, the EU could set interim CDR targets to drive the ambition level and agenda for CDR support systems. The EU Commission's Impact Assessment Report (2024) points to a need for 42-243 MtCO2/year of permanent storage by 2040, while Edenhofer et al. (2025) point to 48-179 MtCO2/year by 2040.
- Financial incentives to stimulate CRC supply are likely to be needed prior to or together with the implementation of quotas, to ensure sufficient CRC supply. Then, the question becomes if a lower limit is in itself necessary, given such policies since firms will always seek the cheapest eligible carbon abatement approach. As such, an EU-level target may be a more balanced way to signal the importance of and prioritize CDR, compared to CRC mandates which likely require separate enforcement structures.

CONCLUSION

- Avoid imposing company mandates and focus on setting an EU-level CDR target combined with the right incentives scheme.





Should any limits target specific removal methods or emitting sectors?

Timing

- In addition to whether there should be a quantity floor or ceiling for CRC integration into the EU ETS, there is also a question regarding which entities should be subject to such quotas or mandates.
- In the literature review, the discussion centers on different types of entities:
 - **Sectors**, as in limiting the CRC purchases to sectors that have "hard-to-abate" or residual emissions (La Hoz Theuer, 2024).
 - **Removal methods**, as in promoting CRC supply from expensive methods with particularly high potential (e.g., in terms of learning curves or scalability) (CATF, CONCITO, 2024).
- Setting sector- or method-specific restrictions further increases the arbitrariness of CRC integration, and therefore the risk of incorrect price signals and fundamental market inefficiencies.
 - As mentioned, there is still no consensus on what constitutes a hard-to-abate or residual emission (Levihn, 2025). As such, setting sector-level mandates poses a high risk of creating inefficiencies with added enforcement structure.
 - La Hoz Theuer et al. (2024) argues that method-specific policies entail challenges due to uncertainties in policy design, the maturity and scalability of different methods, and their market potential. Nonetheless, there could be value in promoting technological innovation by funding R&D and pilot projects. This could be motivated on the basis of "dynamic" or long-term cost efficiency (i.e., the future potential of a technology) or "technology risk hedging" (i.e., ensuring that multiple pathways are tried and testing to ensure a feasible path toward net-zero by 2050).

CONCLUSION

 Allow promotion of technological innovation through removal method-based policies for R&D but avoid sector-based mandates given the difficulty of defining residual emissions.



Should the ETS emission cap be adjusted?

- Once there is agreement on the scope of available and targeted volumes of CRCs, there is the matter of how CRCs flow into the EU ETS – and how this impacts prices of traditional EUAs. Again, the primary concern in the literature is CO₂ mitigation deterrence. Two concepts must be understood regarding the ETS emission cap.
 - First, a "gross" cap indicates how many tonnes of positive emissions are allowed to be emitted. Second, a "net" cap indicates how many tonnes of emissions are allowed to burden the climate by subtracting negative emissions (via CDR) from positive emissions. This is currently not in play for the EU ETS.
 - If a gross cap goes to zero, no positive emissions are allowed not even residual positive emissions neutralized by negative emissions. If a net cap goes to zero, positive emissions are still allowed, to the extent that they are neutralized by CDR.
- A primary concern is that the entrance of CDR-based allowances would increase the gross cap of the EU ETS. In such a case, if CRCs are used instead of traditional EUAs, the supply of traditional EUAs would rise and the price would fall thereby increasing the risk of mitigation deterrence (Verbist, 2024). While this type of integration with no cap adjustment would be simple and preferable for CDR developers, it is likely to face significant political and public resistance.
- As such, the literature is fairly aligned on promoting a maintained gross cap based on a "one-in-one-out" principle, where CRCs used within the EU ETS as CDR-based allowances should cancel out traditional allowance under the existing cap, thereby maintaining the reduction path (CATF, CONCITO, 2024).
- The Danish Energy Agency (2025) argues that once the cap reaches zero, a "second ETS phase" could allow for issuance of CDR-based allowances above the cap to allow the ETS to operate for residual emissions. Incentives could be structured to ensure some degree of continued abatement where possible. Arguably, it would be reasonable to shift from a gross cap to a net cap to enable this, once trust in CDR quality assurance has been established and as the cap is closing in on zero.

CONCLUSION

Uphold the emissions reduction path by maintaining the ETS gross cap when CRCs are sold or retired, based on a "one-in-one-out" principle. As the gross cap closes in on zero, consider shifting from a gross cap to a net cap.





Should the ETS emission cap be adjusted?

Gross emissions increase over time Gross ETS emissions fall over time. Gross ETS emissions fall within and CRCs do not contribute to net and CRCs contribute to net trajectory, CRCs contribute to net emissions reductions. emissions reductions. emissions reductions. Any overdelivery increases gross ETS Incentive to decarbonize provided Incentive to decarbonize provided emissions with no impact on net by the ETS undermined by by the ETS maintained in line with emissions. unconstrained CRC supply. net zero cap trajectory. The red line indicates the Incentive to decarbonize provided Over time, ETS likely no longer emission quantity acheived by ETS strengthened by initial sustains CRC demand needed for with certainty by the reduction to auction supply. net zero. selected cap option Allows for unlimited supply of CRCs to compensate residual emissions Arrows show uncertainty once net cap reaches zero. around CRC supply **CRCs** CRCs **CRCs** Traditional EUAs Traditional EUAs Traditional EUAs Traditional EUAs Counterfactual: No CRC integration Option 1: Increase gross cap Option 2: Maintain gross cap Option 3: New net cap

Source: Integrating Greenhouse Gas Removals in the UK Emissions Trading Scheme (2024)



Should the Market Stability Reserve (MSR) be adjusted?

- The Market Stability Reserve (MSR) is a mechanism to provide price stability in the ETS by adjusting the number of allowances to be auctioned in the market. This adjustment is based on predefined thresholds related to the "total number of allowances in circulation" (known as the TNAC), ensuring that the EUA prices remain stable in the event of supply or demand shocks.
- The introduction of CRCs into the ETS might spur additional price volatility and affect the efficacy of the MSR. Since the MSR adjusts the TNAC retroactively (before a new auctioning period), it might be an insufficient instrument to drive price stability.
- In the literature, this problem is mainly addressed by establishing a new form reserve to manage removals:
 - Rickels et al. (2022) suggest that instead of immediately releasing purchased CRCs into the EU ETS, an intermediary could
 accumulate a reserve. This reserve could replace or complement the current MSR, releasing credits only if ETS prices become
 volatile or exceed set price thresholds. Such an intermediary could potentially replace the traditional MSR function.
- However, under the assumption that CRC integration (1) only applies to durable removals and is done with (2) a cap
 adjustment, the impact on price volatility should be fairly contained at least prior to the ETS cap nearing zero. The reasoning
 being that CRCs are unlikely to flood the market if only high-priced options are included, and that cap adjustment reduces the
 impact on traditional EUAs.
- Even without intermediation, the MSR would need to properly account for the influx of CRCs so that it does not counteract liquidity and price stability – for example, by not counting CRCs toward the TNAC unless they have been sold or retired.

CONCLUSION

 Given high quality assurance and cap adjustment, the MSR likely only requires minor adjustment. In the case of an intermediated governance approach, a CRC reserve could be added to the mix.





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Overview | The choice of governance will affect the efficiency of the integration market as well as its fiscal impact and market stability

OVERVIEW OF THE GOVERNANCE ISSUE

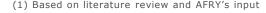
- Bad governance in the form of (1) overbearing or incoherent regulation, (2) restrictive or costly trading rules, and/or (3) poorly functioning institutions – can at best add substantial cost to CRC trading, and at worst prevent it altogether.
- Inconsistent, untransparent or volatile government decision-making may lead to unstable and unpredictable market conditions (thereby lowering market attractiveness), while too little involvement may lead to lowered ability to remedy unanticipated issues (thereby affected market integrity and trust, even with a strong certification framework).

MARKET IMPACT

- Too much bureaucracy or centralized control may affect system complexity, fiscal impact, trading flexibility and cost efficiency.
- Too little control could affect price certainty and regulatory clarity.

SUB-ISSUES

Issue	Key sub-issue ⁽¹⁾	
Regulation	Which regulatory gaps have particular impact on the WtE sector?	
Trading	How should removals be traded and differentiated within allowance markets?	
	Should CRCs generated by EU ETS facilities be allowed to be sold outside of the EU ETS?	
Institutions	Should a new entity be created to act as intermediary authority?	
	What should be the mandate of an intermediary authority?	





Which regulatory gaps have particular impact on the WtE sector?

- There are significant short-comings in existing climate legislation hindering the integration and uptake of CRCs, such as:
 - Lack of CDR targets for 2040 and 2050 (e.g., European Climate Law, LULUCF Reg., and Net-Zero Industry Act).
 - Lack of distinction between CO₂ reductions and removals (European Climate Law).
 - No compliance pricing mechanism for durable removals (EU ETS, LULUCF Reg., ESR).
 - Lack of deep support schemes aiming to scale removals (e.g., Innovation Fund, Horizon Europe)
 - Lack of policies / ambition on biomass sustainability (e.g., LULUCF Reg., REDII/III, CRCF, Governance Reg.)
 - Potential accounting issues concerning biogenic and fossil fractions (Monitoring and Reporting Reg.)
- Without addressing these issues, ETS-compliant WtE plants will experience reduced competitiveness and economic viability over time, since (1) neutralisation of residual emissions and (2) additional revenue from CDR are critical to the business case of WtE without and with CCS, respectively.
- WtE plants stand to benefit from the CRCF. However, the Waste Framework Directive establishes a waste hierarchy in which recovery and disposal are at the bottom. This implies "limits to CCS on the biogenic fraction of waste incineration, as it could be applied only to truly unavoidable and non-recyclable waste" (Edenhofer et al., 2025).
- While this still allows WtE plants to sell CRCs, it could in theory affect how WtE-based CDR projects are viewed in terms of sustainability in CRCF methodologies. Thus, it may be relevant for the WtE sector to argue for its role in waste sustainability and clarify the short-comings of alternative waste management systems.

CONCLUSION

- Ensure fair treatment of waste incineration in CRCF methodologies based on sustainability of waste management practices.





Quality Quantity

Governance

Support

Timing

MARKET DESIGN ISSUES AND SOLUTIONS

How should removals be traded and differentiated within allowance markets?

- Carbon removals generated through CDR projects could be accounted for/traded in different manners within a compliance market:
 - As a deduction from reportable emissions: Facilities under the EU ETS that generate removals could be asked to report their emissions such that removals are deducted from actual emissions (similar to emissions from zero-rated biomass). This would reduce their obligation to purchase traditional ETS allowances.
 - As a separate credit (CRC): Rather than automatically reducing a facility's reportable emissions, the facility could report
 its actual emissions, and in addition, every tonne of CO₂ removed could generate a Carbon Removal Credit.
- Having a separate CRC is a prerequisite for allowing this credit to be traded flexibly in different markets:
 - If traded outside of the EU ETS in the voluntary carbon market, the CRC would have no impact on an ETS facility's emissions, carbon obligation, or the wider EU ETS cap.
 - If traded within the EU ETS, the CRC could be sold or retired under the EU ETS, and would satisfy part of a facility's carbon obligation. To avoid mitigation deterrence, the cap could be adjusted by retiring one allowance for each sold or retired CRC.
 - As a differentiated ETS allowance: To indicate the different nature of this allowance, its origin could be traceable within the registry – thereby conveying some informational value.
 - As an undifferentiated ETS allowance: A CDR-based allowance could be entirely undifferentiated from traditional allowances. This would eliminate the distinction between traditional allowances and CDR-based allowances.

CONCLUSION

 Treat carbon removals as separate credits (rather than automatic emissions deductions) to maintain flexibility toward both the EU ETS and voluntary markets, and differentiate CRCs from traditional ETS allowances to enhance informational value.





Should CRCs generated by EU ETS facilities be allowed to be sold outside of the EU ETS?

- Whether or not CRCs generated by ETS facilities are allowed to be sold outside the ETS is not widely explored in the literature.
 As mentioned earlier, the CRCF requires certified projects to contribute to the EU's NDC⁽¹⁾ but allows co-claiming for non-EU corporate entities. It would be reasonable to expect that CRCF-certified CRCs generated within the ETS by ETS facilities should be subject to a similar logic.
- One argument against CRC sales by ETS-covered facilities to non-ETS facilities would be subsidy dependence and the priceskewing effect it has.
 - Assume that a CDR project by an ETS facility has received significant subsidies to produce CRCs that are economically viable within the ETS system. Then assume that similar price signals are missing in non-ETS pillars (ESR and LULUCF) or that the willingness-to-pay is much higher in the Voluntary Carbon Market (VCM).
 - In such a case, there is a risk of over-compensation if the CRC is sold outside of the ETS with the support of subsidies that are priced based on traditional EUAs. This could result in cost inefficiency or even mitigation deterrence.
- Arguably, this is a manageable issue. First of all, non-ETS pillars are highly unlikely to have higher willingness-to-pay for CRCs than the carbon-priced ETS. In the rare cases it might generate some economic inefficiency, it would still contribute to the EU's NDC. Second, if generated CRCs are deemed to be over-compensated, the VCM is unlikely to deem them as additional, and thus, the private markets will be less willing to buy such credits. As such, it is a self-regulating system. Finally, ETS-based compensation could be held back until a final sale / retiring of CRCs has occurred within the ETS.

CONCLUSION

 Allow CRC-generating ETS facilities to sell CRCs outside the ETS by designing support schemes to minimise risk of overcompensation in other EU climate law pillars.

Source: AFRY literature study (2025) | (1) NDC = Nationally Determined Contribution



Should a new entity be created to act as intermediary authority?

- In the literature, multiple sources argue that existing governance structures may be insufficient to manage the scale, complexity, and long-term needs of integrating carbon removals into the EU ETS or broader climate frameworks.
- In particular, three problems might be difficult to address without an intermediary authority:
 - Ensuring dynamic cost efficiency: Market failures for example, due to information asymmetry, failure to fully account for environmental or other externalities, or technology uncertainty may lead to incorrect pricing of reductions and removals despite the presence of a price signal for both. An intermediary could have more dynamic and discretionary approach to resolving such issues by adjusting restrictions or subsidies in the face of new information on costs, risks and technology.
 - Enabling new market functionality: Introducing CRCs may require entirely new functions, such as long-term liability enforcement (particularly for temporary removals), intertemporal allowance/credit flexibility (primarily post-2040), and overshoot management (primarily post-2050). Responsibilities across sectors, jurisdictions, and time may remain unclear and disputed in the absence of a coordinating institution.
 - Institutional focus: Without a dedicated entity, there is a risk that integration challenges are not properly addressed by EU institutions with broader responsibilities and lower accountability toward CRC integration.
- Other issues such as ensuring price certainty, market liquidity, sufficient near-term incentives, or quality assurance and oversight – could arguably be delivered through a peer-to-peer model as well. It is important to note that an intermediary might also result it worse outcomes if run poorly, resulting in e.g., reduced price certainty, market trust and cost efficiency.

CONCLUSION

- An intermediary could help balance static and dynamic cost efficiency while enabling new market functionality.
- Peer-to-peer trading is also an option, considering that a poorly run intermediary may cause more harm than benefit.



What should be the mandate of an intermediary authority?

- As mentioned, intermediaries are primarily responsible for maintaining market functionality, investment stability, and environmental integrity. An intermediary's role could vary from a limited to broader mandate.
 - Arguably, a limited mandate would be to procure durable carbon removals, pool and translate them into allowances, and manage their entry into the EU ETS on the basis of restrictions and specific targets set by policymakers as part of revisions to the EU ETS Directive (CATF & CONCITO, 2024).
 - A broader mandate might include to provide technical advice to the legislation process, standardize MRV across Member States and coordinate national certification bodies in accordance with the CRCF, manage the emissions cap, manage issues around non-permanence/durability and liability with variable durability CRCs (e.g., biochar), manage a CRC reserve to regulate the timing and quantity of CRCs entering the ETS, or offer forward purchasing and other creative incentive schemes.
- Edenhofer et al. (2024) argues for a coordinated institutional framework comprising of:
 - A European Carbon Central Bank to regulate and allocate Carbon Removal Credits (CRCs)
 - A Carbon Removal Certification Authority to enforce MRV standards and permanence/durability
 - A **Green Leap Innovation Authority** to fund CDR innovation and manage R&D pipelines
- At this stage, it is challenging to assess whether one particular institutional set-up is preferable.

CONCLUSION

 Both a limited mandate (concentrating on CRC procurement and supply management) and a broader mandate (including multiple additional functions) could be beneficial.





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Overview | Without additional support, CRCs are unlikely to reach needed scale by 2040 – but subsidies could also lead to some cost inefficiencies

OVERVIEW OF THE GOVERNANCE ISSUE

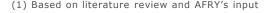
- The current price gap between durable CDR and traditional EUAs mean that even with unrestricted integration, the market uptake of high-quality CRCs would likely be limited (if credits are limited to durable removals).
- As such, there is broad consensus that additional support would be needed to incentivize generation and sales of CRCs in the near-term – to ensure sufficient learning curves and scale by the time CRCs are needed.
- However, subsidies or other support schemes introduce price-skewing into the market, which could lead to inefficient market outcomes unless managed carefully.

MARKET IMPACT

- Additional support will impact the pace of CDR deployment by stimulating demand, innovation and experience-based cost reductions.
- Preferential policies for CDR could introduce a degree of market inefficiencies and lead to political backlash.

SUB-ISSUES

Issue	Key sub-issue ⁽¹⁾
Incentive scheme	Should there be targeted support mechanisms for CRC adoption in the ETS?
	If yes, which mechanisms are most suitable?
	How should incentive schemes be designed to avoid mitigation deterrence?
	How should incentive schemes be funded to avoid mitigation deterrence?
	Should incentive schemes be method- neutral or method-specific?
	Which additional measures are required to enable targeted EU-level or state aid?





Should there be targeted support mechanisms for CRC adoption in the ETS?

- In the literature review, there is broad consensus that, even with ETS integration, durable CRCs are too expensive compared to traditional EUAs to have any widespread near-term market uptake. As such, additional public support might be warranted not on the basis of the current marginal cost efficiency but rather the long-term potential (Levihn, 2024). This means that the premise of directed government support is two-fold:
 - That significant climate value can be created from CRCs if early investments in innovation are ensured.
 - That support is needed immediately to ensure sufficient CRC supply by the late 2030s, otherwise risking the fundamental stability of the ETS system as the emission cap reaches zero.
- Arguably, public funding support is a topic entirely separate from the integration topic. One can imagine a scenario where full CRC integration into the EU ETS is allowed immediately but without any CRC-specific funding support. In such a scenario, durable CRCs are unlikely to disrupt the traditional EUA market (assuming high quality assurance), considering the significant price gap. Proponents of such an approach to integration would argue the following:
 - That the purpose of integration is to create a level playing field for abatement and removal technologies.
 - That CRCs should not be scaled until the EUA prices are high enough to warrant CRC investments.
- While an "integration-without-support" approach is possible, it is deemed insufficient to stimulate the desired market uptake to ensure learning curves and sufficient supply as the ETS cap falls toward zero.

CONCLUSION

- Additional support is deemed necessary to stimulate the desired durable CRC uptake in the ETS.



If yes, which mechanisms are most suitable?

- Support mechanisms can be categorized into two broad categories:
 - **Public procurement:** A more "quantity-based" form of support, for example through R&D funding (e.g., using the Innovation Fund) or reverse auctions (currently applied for BECCS deployment in Sweden).
 - Price mechanisms: A more "price-based" form of support, for example through Carbon Contracts for Difference (CCfDs, currently applied in Denmark), tax credits (applied in the US) or the distribution of free EUAs based a pre-determined compensation mechanism (similar to what is currently done to stimulate use of sustainable aviation fuel in the EU).
- Both price- and quantity-based incentives can yield regulators significant control over the supply of CRCs. Moreover, both types
 of incentives can be differentiated to promote certain technologies either by differentiating procurement volumes or
 compensation levels.
- However, Naturvårdsverket (2025) argues that price-based incentives risk being less cost effective due to significant
 uncertainties in technology development and deployment, and the difficulty of pre-setting compensation levels to accurately
 reflect the marginal costs in the market. Nonetheless, countries like the US and Denmark have applied price-based
 mechanisms, likely due to the procedural simplicity and price certainty it affords.
- This study determines that both mechanisms could be relevant to consider.

CONCLUSION

Both price- and quantity-based mechanisms could be relevant.



How should incentive schemes be designed to avoid mitigation deterrence?

- Irrespective of the support mechanism, care must be taken to avoid over-compensating CRCs in relation to traditional EUAs.
 Introducing CRC-specific support will skew the ETS price signal and could potentially counteract efforts made to avoid mitigation deterrence, such as quantitative restrictions imposed on CRCs.
- One way to address this is to ensure that subsidy levels are dynamically set based on traditional EUA prices. For example:
 - Carbon Contracts for Difference (CCfDs) or other compensation mechanisms could be indexed to the traditional EUA price,
 thereby avoiding situations where the CRCs can be sold below the traditional EUA price.
 - A similar logic could be applied to reverse auctions, whereby bids are only considered if the cost structure exceeds the traditional EUA price.
- Another way to address this is to have a governance structure with an intermediary responsible for assessing the risk of mitigation deterrence and adjusting compensation levels to reflect changes in the market.

CONCLUSION

- Index CRC subsidy levels to reflect currently expected or future EUA prices.



How should incentive schemes be funded to avoid mitigation deterrence?

- In addition to directly over-compensating CRCs in the market, another form of mitigation deterrence is by indirectly affecting the flow public funding - re-directing it away from carbon mitigation and toward carbon removal.
- This is described by Naturvårdsverket (2025) on the topic of utilizing ETS-based Innovation Fund revenue for CRC purchasing.
 - Today, 4.5% of revenue from the EU ETS is directed to the shared Innovation and Modernisation Funds, of which 2.5 percentage points are allocated to the Innovation Fund. The remaining 95.5% is allocated to Member States, with the recommendation that at least half should be allocated to climate and energy measures.
 - To avoid reducing carbon mitigation funding, any funds allocated to public CRC financing should come from ETS income not allocated to carbon mitigation – meaning, not from the existing 2.5% allocated to the Innovation Fund, or the share of Member State funds allocated to carbon mitigation.
- Avoiding mitigation deterrence is as much about cost-efficient climate policy as it is about political and public acceptance.
 Leveraging existing funding pools would reduce the overall fiscal impact but might cause Member State resistance due to reallocation of funds.

CONCLUSION

 Public CRC funding should not come from funding pools that are earmarked for carbon mitigation efforts. Such an approach could reduce the efficiency of climate efforts but also generate political and public backlash.



Should incentive schemes be method-neutral or method-specific?

- As a rule, method-neutral policies meaning, policies that do not offer preferential treatment to any one particular removal method – should result in both fairer and more cost-efficient economic outcomes (at least in the near-term). In the literature, the topic of method-neutrality is discussed at two levels:
 - First, there is broad consensus that, in the event of ETS integration, CDR methods should receive additional CDR-specific support to reduce the near-term price gap between CRCs and traditional EUAs.
 - Second, views differ on whether different CDR methods should be treated differently. The rationale is that certain methods have higher potential or better characteristics, warranting preferential treatment. Typically, this focus lands on scalable and MRV-friendly but costly methods like DACCS and BECCS (Naturvårdsverket, 2025).
- Like any government intervention, method-specific and preferential treatment grounded in highly uncertain predictions of the future has a high risk of skewing price signals in ways that decrease cost efficiency. For that reason, any preferential policy should be grounded in a very clear assessment criteria. Examples of such criteria:
 - Compliance with quality / integrity requirements. Arguably, this should already be reflected in the CRCF and related methodologies and should therefore not warrant further preferential treatment.
 - Better expected scalability or learning curves i.e., the potential of a method is not reflected in the current price.
 - Technology hedging i.e., a desire to invest in a mix of both cheap and expensive methods to ensure that at least some pathways become commercially viable if others fail.

CONCLUSION

- Preferential treatment motivated can be motivated on the basis of higher future potential or technology hedging.





Which additional measures are required to enable targeted EU-level or state aid?

- The literature mainly focuses on two additional measures to enable targeted support for CRC uptake:
 - Setting a separate CDR target: Setting an EU-wide target for CRCs would cement an accountable and transport policy ambition as well as enable further targeted EU-wide and national subsidies in alignment with the Climate, Energy and Environmental Aid Guidelines (CEEAG) principles and EU competition law.
 - Secure sufficient funding pools: Without clear funding pools, the fiscal impact, administrative burden and public acceptance of CRC integration may be forced into question. Edenhofer et al. (2025) highlight the potential to strengthen funding through programs such as the Innovation Fund, Horizon Europe, LIFE Programme as well as extending the Recovery and Resilience Facility beyond 2026 or strengthening the collaboration between the European Innovation Council and European Investment Fund to "address gaps in venture capital and de-risk private investments".

CONCLUSION

- Set a separate CDR target.
- Secure or even earmark funding for durable carbon removals through existing or new EU-wide funding facilities.



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Overview | The timing of when to phase-out restrictions or phase-in new mechanisms will determine the long-term effectiveness of CRC integration

OVERVIEW OF THE TIMING ISSUE

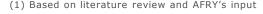
- Integrating CDR into the EU ETS introduces significant uncertainty in the near-term. To ensure quality assurance and public acceptance, time-limited restrictions on the scope of trading will likely be demanded (in line with the CRCF). Restrictions can be phased-out over time, as quality assurance mechanisms become more wellestablished.
- New challenges arise when the ETS cap reaches zero, and when the EU needs to go beyond net-zero to generate EU-wide net-negative emissions – since the current market design does not enable such mechanisms.

MARKET IMPACT

- Phase-out of restrictions can improve CRC supply, leading to higher market liquidity and more stable CRC prices.
- Phase-in of new price mechanisms can extend the functionality and value of the ETS beyond the point when the gross emission cap reaches zero.

SUB-ISSUES

Issue	Key sub-issue ⁽¹⁾
Phase-in	Should there be any temporal limitations on integration?
	How can different phases be conceptualised and what are the key concerns for WtE in each phase?





Should there be any temporal limitations on integration?

- As previously discussed, concerns over mitigation deterrence has led many authors to argue for various qualitative and quantitative restrictions. Furthermore, the CRCF itself establishes certain limitations, for example on the eligibility for non-EU CDR projects.
- Arguably, most of these restrictions could be phased-out over time and with experience as best practices regarding certification, quality assurance and MRV are established and both public and institutional trust grows. This is especially the case if the EU decides to impose particularly strict quantitative limits on CRCs to reduce near-term uncertainty regarding mitigation deterrence.
- On the premise that restrictions could be limited in time (i.e., temporal), one could argue for stronger restrictions in the near-term when understanding of the market dynamics and impact of CRC integration on the EU ETS is relatively low that are phased-out based on achieving certain operating targets or milestones.

CONCLUSION

 Temporal restrictions can be motivated on the basis of limited market understanding and establishment. This opens the door to gradual integration toward an increasingly unrestricted (and therefore cost-efficient) market.





How can different phases be conceptualised and what are the key concerns for WtE in each phase?

- Several studies have suggested a phased approach for the integration of CRCs into the EU ETS, from restricted to increasingly unrestricted markets in line with increasing market experience.
- However, the character of the ETS is also expected to change over time, warranting entirely different mechanisms to enable and manage the role of CRCs in the system. This is typically described in three phases:
 - Phase 1 (pre-2040): Ensure market uptake and supply readiness through restrictions and gov't support, focusing on EU-based and durable removals. This phase requires CRC-specific incentives schemes, but these should be time-limited and eventually result in a market-based system (to the extent possible). Over time, it may also require more active management of price stability, as the cap falls toward zero.
 - **Phase 2** (2040-2050): Manage residual CO_2 to achieve net-zero, phasing out of restrictions, enabling new facilities to participate and opening the market for international involvement. This phase likely requires a revision of the cap adjustment principle and may benefit from intertemporal flexibility (i.e., buying CRCs to be delivered in the future).
 - Phase 3 (post-2050): Manage overshoot to achieve net-negative by clean-up obligations, potentially including temporary removals under a quality-assured system. This phase requires new funding mechanisms that go beyond the traditional "polluter-pays" principle to achieve system-wide net negative (e.g., an extended emitter's responsibility).
- For each phase, the WtE sector needs to consider which policies fit its business model. During Phase 1, ensuring eligibility and financial support for WtE-CCS as well as broad-based market uptake of CRCs is crucial. During Phase 2, loosened restrictions and well-established MRV should enable larger CRC supply to allow CRC prices to stabilise at levels that allow both WtE plants with and without CCS to continue to operate. At this point, it is also critical that residual emitters do not bear an unproportional responsibility for achieving net-negative. This concern extends into Phase 3.

CONCLUSION

- Successively phase-out restrictions while developing market mechanisms to stabilise supply and manage overshoot.



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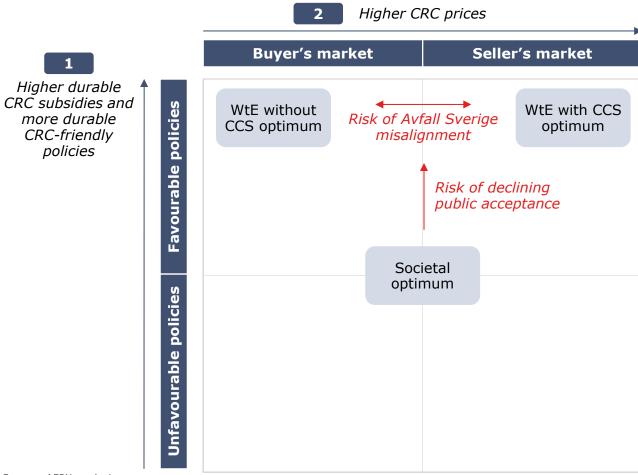
IMPLICATIONS FOR THE WASTE-TO-ENERGY SECTOR

When making market integration choices, the interests of the WtE sector may differ from society as a whole, and even within the WtE sector itself

	Key perspectives	Society as a whole	WtE with CCS installed on-site	WtE without CCS installed on-site
	Avoid mitigation deterrence	Priority		
Societal interest	Minimize administrative burden		Priority	Priority
tal int	Ensure political alignment	Priority		
Socie	Minimize fiscal impact	Priority		
	Maximize cost efficiency	Priority		
	Optimize innovation and learning	Priority	Priority	Priority
est	Increase near-term market uptake		Priority	Priority
interest	Increase price certainty		Priority	Priority
WtE	Ensure high CRC prices		Priority	D →
	Ensure low CRC prices		←	Priority



The WtE sector must balance conflicting views on desired CRC price levels and policy development to find the best-suited ETS integration approach



1

- The WtE sector would benefit from higher state support aimed at increasing durable CRC supply
- However, from a societal perspective, governments seek to balance CDR benefits with risks and costs
 - Key benefits: higher near-term market uptake, price certainty, innovation, and learning curves
 - Key risks: higher mitigation deterrence, incorrect long-term price signals, technology lock-in, and unacceptable administrative burdens or fiscal impact
- Over-extended CRC support could lead to public unacceptability and political backlash

2

- Within the WtE sector, there is a conflicting interest regarding price levels for CRCs
- WtE plants able to install CCS (i.e., CRC sellers) desire high prices, while the opposite applies to those unable to install CCS (i.e., CRC buyers)
- As such, WtE may seek different levels of market regulation / deregulation to impact the CRC supplydemand dynamic
- This could lead to conflicting views within Avfall Sverige



Source: AFRY analysis

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These positions aim to balance benefits for WtE with and without CCS, while also allowing some unfavorable positions that increase public acceptance

Benefi	cial for	Measure	Is the policy favorable for the durable CRC market?	Is the policy positive for CRC buyers?	Is the policy positive for CRC sellers?
S	ers	Set aspirational EU-based CDR target			
elle	An An	Avoid upper supply limits			
CRC sellers	Q	Establish separate funding mechanism for CDR			
Ŗ	CRC	Earmark funds for durable CRCs			
		Allow method-based sub-targets and financing			
		Ensure fair treatment of WtE in CRCF methodologies			
		Treat CDR as distinct credits (not emissions deductions)			
		Use CRCF Regulation as basis for quality assurance			
		Maintain gross emission cap; transition to net cap			
		Allow ETS-based CRCs to trade outside ETS			
		Exclude or limit temporary removals			
		Initially limit to EU-based projects based on CRCF			
		Include biochar based on adherence to CRCF			
		Phase-out integration restrictions over time			
		Extend EU-wide net-negative financing beyond residual emitters			
		Default point of reversal liability in storage operators			
		Avoid financing CRC with mitigation funding pools			
		Index support to price of traditional EUAs			
Source: AF	RY analysis	Policy effect:			

Moderate

positive

Moderate

negative

Significant

negative

Limited or

Significant

positive

Deep-dive on policy position implications (1/5)

		Alignment within WtE sector			
		Alignment wit	tnin wie sector		
	Set aspirational EU-based CDR target	Avoid upper supply limits	Establish separate funding mechanism for CDR	Earmark funds for durable CRCs	
Mitigation deterrence		Unlikely given durable CDR focus			
Administrative burder	ı		Necessary trade-off	Necessary trade-off	
Political alignment		Risk of public unacceptance			
Political alignment Fiscal impact			Necessary trade-off	Necessary trade-off	
Cost efficiency			Better dynamic cost efficiency		
Innovation and learni	ng				
Rear-term market up	take				
Price certainty High CPC prices					
High CRC prices					
Low CRC prices					
Policy effect:	 Beneficial for all 	- There is a societal and	 The increased fiscal and 	 The increased fiscal and 	

- Significant positive
- Moderate positive
- Moderate negative
- Significant negative

Limited or none

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- stakeholders.
- No clear drawbacks or trade-offs between stakeholders.
- political interest to avoid mitigation deterrence but it is unlikely that the lack of an upper supply limit will impact this.
- administrative burden is necessary to enable the timely deployment of CDR.
- Overwhelming benefits for the WtE sector.
- administrative burden is motivated to enable the timely deployment of CDR.
- Would reduce risk of slow deployment.





Deep-dive on policy position implications (2/5)

	Alignment within WtE sector			Beneficial for CRC sellers	
		Allow method-based sub- targets and financing	Ensure fair treatment of WtE in CRCF methodologies	Treat removals as distinct credits (not GHG deductions)	Use CRCF Regulation as basis for quality assurance
	Mitigation deterrence				
I fit	Administrative burden	More analysis needed		Necessary trade-off	
cietal	Political alignment				
Soci	Fiscal impact	More support needed			
•	Cost efficiency	Improves dynamic cost efficiency			
	Innovation and learning				
fit	Near-term market uptake				
WtE 1	Price certainty				
3	High CRC prices				
	Low CRC prices				Necessary trade-off
Poli	cy effect:	 The increased fiscal and 	 Important topic for the 	 The potentially slightly 	 Quality assurance is a
	Significant positive	administrative burden is	WtE sector but limited	higher administrative	necessary trade-off for
	Moderate positive	necessary to enable the timely deployment of	interest in broader society.	burden is motivated by the clear benefits of	WtE plants without CCS, increasing CRC prices.
	Moderate negative	CDR.		increased trading flexibility – increasing	- Clear alignment between
	Significant negative	 Overwhelming benefits for the WtE sector. 		both available CRC volumes and prices.	societal priorities and WtE with CCS.
	Limited or none				

Source: AFRY analysis

Deep-dive on policy position implications (3/5)

		Beneficial for CRC sellers			
		Maintain gross emission cap; transition to net cap	Allow ETS-based CRCs to trade outside ETS	Exclude or limit temporary removals	Initially limit to EU-based projects based on CRCF
Societal fit	Mitigation deterrence		No issue if subsidies are designed to avoid over-compensation		
	Administrative burden		Necessary trade-off		Scope of CRCF
	Political alignment		If CRC contributes to EU's NDC		
	Fiscal impact			More support needed	More support needed
	Cost efficiency			Factoring in externalities	Necessary trade-off
WtE fit	Innovation and learning				
	Near-term market uptake				
	Price certainty				
	High CRC prices				
	Low CRC prices	Necessary trade-off	Necessary trade-off	Necessary trade-off	Phased-out with as MRV improves

Policy effect:

- Significant positive
- Moderate positive
- Moderate negative
- Significant negative
- Limited or none

- Necessary trade-off for WtE plants without CCS, increasing CRC prices but avoiding mitigation deterrence.
- Clear alignment between societal priorities and WtE with CCS.
- Necessary trade-off for WtE plants without CCS, increasing CRC prices.
- Important to address risk of subsidy overcompensation to align with societal priorities.
- Necessary trade-off for WtE plants without CCS, increasing CRC prices but avoiding mitigation deterrence.
- Clear alignment between societal priorities and WtE with CCS.
- Necessary trade-off for WtE plants without CCS, increasing CRC prices but avoiding mitigation deterrence.
- Clear alignment between societal priorities and WtE with CCS.

Source: AFRY analysis



Deep-dive on policy position implications (4/5)

			Beneficial for CRC buyers		Beneficial for society
		Include biochar based on adherence to CRCF	Phase-out integration restrictions over time	Extend net-negative financing beyond residual emitters	Default point of reversal liability in storage operators
WtE fit Societal fit	Mitigation deterrence				
	Administrative burden	More MRV needed	Necessary trade-off		
	Political alignment	Still somewhat unclear			
	Fiscal impact				
	Cost efficiency				
	Innovation and learning				
	Near-term market uptake				
	Price certainty				
	High CRC prices	Necessary trade-off	Necessary trade-off		
	Low CRC prices				
Poli	cy effect: Significant positive	Necessary trade-off for WtE plants with CCS, Todaying CRC prices but	Necessary trade-off for WtE plants with CCS, Traducing CDC prices but	Beneficial for CRC buyers.No clear drawbacks or	 Beneficial for society as a whole.

- Moderate positive
- Moderate negative
- Significant negative
- Limited or none

- reducing CRC prices but improving quality assurance consistency.
- Some misalignment on ongoing political discussion.
- reducing CRC prices but improving cost efficiency.
- Necessary trade-off on increased administrative burden to ensure market liquidity.
- trade-offs between stakeholders.
- No clear drawbacks or trade-offs between stakeholders.





Deep-dive on policy position implications (5/5)

		Beneficial for society			
		Avoid financing CRCs with mitigation funding pools	Index support to price of traditional EUAs		
	Mitigation deterrence				
I fit	Administrative burden		Necessary trade-off		
eta	Political alignment				
Societal	Fiscal impact				
	Cost efficiency				
	Innovation and learning				
fit	Near-term market uptake	Necessary trade-off	Necessary trade-off		
WtE 1	Price certainty				
3	High CRC prices				
	Low CRC prices				

Policy effect:

Significant positive

Moderate positive

Moderate negative

Significant negative

Limited or none

 Necessary trade-off impacting the level of support for both WtE with and without CCS, in order to maintain public and political acceptability. Necessary trade-off impacting the level of support for both WtE with and without CCS, in order to maintain public and political acceptability.

Source: AFRY analysis



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From 24 sub-issues, 13 policy positions are deemed high-priority, 6 deemed low-priority, and 5 deemed to not require a clear position

SUPPORT QUANTITY GOVERNANCE **QUALITY TIMING SYSTEMS** Phase-out quantitative Exclude or limit temporary (6) Initially limit to EU-based Ensure fair treatment of (17) Establish separate funding removals (at least in early waste incineration in CRCF mechanism for CDR projects based on CRCF, integration restrictions market development) and consider excluding methodologies over time to achieve non-ETS WtE plants(2) acceptable prices Treat removals as distinct Support and develop the (7) Avoid upper supply limits (18) Both price- and quantity-Extend the responsibility CRCF Regulation as the and sector- and companycredits (instead of based subsidy schemes to finance EU-wide netbasis for quality assurance level mandates automatic emissions could be beneficial negative beyond residual deductions) emitters 3 Include biochar based on 8 Set aspirational EU-based (19) Index support to price of Allow ETS-based CRCs to traditional EUAs to avoid adherence to CRCF CDR target trade outside ETS, with requirements controls to avoid subsidy mitigation deterrence over-compensation (20) Avoid financing CRC 4) Default point of reversal Allow sub-targets based (15) Both peer-to-peer and intermediated trading liability in permanent on removal method support schemes with CO₂ storage operators (connected to Point 21) could be beneficial mitigation funding pools (10) Maintain gross emission (5) Managing reversal risk (16) Mandate of a potential (21) Allow sub-financing based dependent on governance cap and transition to net intermediary authority on removal method - buffer pools(1) may apply could vary significantly cap over time (connected to Point 9) (11) No clear view on required 22 Earmark funds for durable adjustments for the MSR CRCs through existing or

Source: AFRY analysis | (1) Buffer pools are a form of "over-purchasing" of CRCs that are not accounted in targets to act as insurance if some carbon removals are unintentionally and unexpectedly reversed. | (2) Currently, only Swedish and Danish WtE is covered by the ETS.

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High-priority position
Low-priority position
No position

new EU funding facilities



Summary of proposed Avfall Sverige policy position (1/4)

- Avfall Sverige welcomes integration of CDR into the EU ETS, as this would allow critical infrastructure such as Waste-to-Energy plants to neutralize residual emissions and in some cases contribute to EU-wide decarbonization through the generation of negative emissions. The alternative would be to exclude WtE plants from the EU ETS, or ultimately close WtE plants and risk reducing the sustainability of the waste management system.
- Avfall Sverige believes that quality assurance should be the first priority of an integrated ETS, in order to guarantee public and political acceptance and avoid mitigation deterrence. This could be accomplished by:
 - Excluding or severely limiting the eligibility of temporary and nature-based CDR in the EU ETS (Pos. 1), and focusing on durable CDR methods such as BECCS (including WtE-CCS) and DACCS based on the so-called "like-for-like" principle – where only durable removal methods are allowed to neutralize durable fossil emissions.
 - Supporting and developing the Carbon Removal and Carbon Farming (CRCF) Regulation as the basis for quality assurance (Pos. 2), which sets a clear baseline for ensuring that CDR is quantifiable, additional, durable and sustainable. Removal methods with varying durability,

- such as biochar, should only be considered if robust MRV rules can guarantee sufficient durability (Pos. 3).
- Initially limiting eligible CDR generation to EU-based projects in accordance with CRCF guidelines (Pos. 6).
- Maintaining the gross emission cap to avoid mitigation deterrence (Pos. 10), which would ensure that introduction of CRCs do not dilute the market and indirectly lead to a lowered ambition level for emission reductions.
- Designing and funding CDR-specific support schemes in a manner that avoids mitigation deterrence (Pos. 19-20), for example by indexing CDR subsidy schemes to the EUA price (to avoid over-compensation) as well as avoiding re-directing funds from existing emission reduction financing pools.
- Clearly defining the point of liability for reversal risk (Pos. 4-5). As a default point, liability should reside in permanent storage operators as per the CCS Directive, but further guidelines on liability and reversal risk management should be outlined in the CRCF's Delegated Acts and subsequent methodologies.



Summary of proposed Avfall Sverige policy position (2/4)

- Avfall Sverige believes that the critical role of WtE in sustainably managing society's waste should be duly recognized (Pos. 12) in the Delegated Acts and certification methodologies developed under the CRCF. The sustainability criteria as outlined under the CRCF should not incorrectly devalue waste incineration due to the presence of fossil waste.
- Avfall Sverige believes that a cost-effective integration should aim to minimize restrictions and maximize market-based price discovery. This would ensure faster deployment of CDR with lowered fiscal impact on governments and higher price certainty and stability for market participants. This could be accomplished by:
 - Avoiding upper limits to the allowed number of CRCs (Pos. 7). Such a quantity ceiling could result in unnecessary cost inefficiency. Moreover, the significant price gap between expensive durable CDR and cheaper traditional EUAs effectively works to prevent mitigation deterrence, and can be further enforced through less arbitrary restrictions such as maintaining the gross emission cap (Pos. 10).
 - Avoiding sector- or company-level mandates for CRC purchasing (Pos. 7). Similarly, enforcing end-use

- mandates are unlikely to be effective, since mandates without support schemes are likely to be ineffectual, and the introduction of support schemes are likely to reduce the need for mandates.
- Ensuring that CDR developers within the ETS have the freedom to sell to the highest bidder (Pos. 13-14). For facilities under the ETS that generate CDR, it is essential that CDR is treated as a distinct carbon credit instead of an emission deduction, as this would increase trading flexibility. Moreover, such facilities should be allowed to trade with entities outside the ETS as long as CRCs contribute to the EU's NDC, and support schemes are designed in a way that avoids subsidy over-compensation.
- Avfall Sverige believes that it could be valid to restrict access to the ETS for non-ETS WtE-CCS projects (Pos. 6), since facilities generating such CDR do not bear the carbon cost of the ETS but would benefit from the carbon revenue of selling into it thereby gaining an unfair competitive advantage. The best solution would be to harmonize carbon pricing across the entire EU WtE sector by including all facilities in the ETS. If non-EU CRCs are permitted in the system, a level playing needs to be ensured, e.g., by carbon pricing non-EU WtE facilities through the Carbon Border Adjustment Mechanism (CBAM).





Summary of proposed Avfall Sverige policy position (3/4)

- Avfall Sverige believes that the CDR industry requires targeted support to scale fast enough to provide the necessary supply of CRCs by the late 2030s, when the ETS emission cap is nearing zero and price instability is set to increase. This can be accomplished by:
 - Setting an aspirational CDR target for the EU (Pos. 8), which would signal clear political commitment and policy certainty to CDR project developers and unlock new sources of funding.
 - Establishing separate CDR funding mechanisms (Pos. 17) to ensure fast CDR deployment toward the EU-wide target.
 - Allowing sub-targets and sub-financing based on removal method (Pos. 9, 21). Improved long-term cost efficiency can be achieved by investing in different removal methods with the aim to bring down costs for highpotential methods through innovation and experiencebased learning. Focusing solely on the currently cheapest methods might be too limiting.
 - Earmark funds for durable CRCs through existing or new EU funding facilities (Pos. 22), since without clear funding pools, the fiscal impact, administrative burden and public acceptance of CDR integration is more uncertain.

- Over time, Avfall Sverige believes that it is necessary to phase-out quantitative restrictions and phase-in new market mechanisms, to ensure the long-term stability of the integrated ETS. This can be accomplished by:
 - Transitioning from a gross to a net emission cap (Pos. 10), since a gross cap does not leave room for residual emissions to exist and be compensated by CDR. Without this shift, the ETS would cease to function as the cap reaches zero.
 - Phasing out quantitative restrictions and expanding qualitative scope (Pos. 23). Phase-out secures the best of both worlds. In the near-term, market uncertainties and fear of mitigation deterrence is reduced. Long-term, the ETS can increase eligible CRC supply once MRV is wellestablished to stabilize CRC prices at manageable levels for residual emitters.
 - Extending the responsibility to finance net-negative beyond residual emitters (Pos. 24): At some point, the EU needs to go beyond net-zero to reach EU-wide net-negative emissions. Putting the responsibility of EU-wide net-negative on residual emitters alone (including WtE plants without CCS) would not only be unfair but also most likely make it more difficult to generate net-negative emissions at the desired scale.



Summary of proposed Avfall Sverige policy position (4/4)

- Finally, there are two key market design areas where Avfall Sverige does not have a clear position.
 - Both peer-to-peer and intermediated CDR trading model could be beneficial (Pos. 15). Whether CDR trading is done directly between buyers and sellers (i.e., peer-topeer) or via an intermediary authority, it is crucial that clear roles, responsibilities and accountability is established in the system. Moreover, Avfall Sverige does not have a clear preference for the mandate of an intermediary authority (Pos. 16), if such as authority is considered preferable.
 - Both price-based and quantity-based subsidy schemes could be beneficial (Pos. 18).



Deep-dive of high-priority policy positions (1/7)

Key recommendations

Exclude or limit temporary removals (at least in early market development)

Support and develop the CRCF Regulation as the basis for quality assurance

Rationale

- Temporary removals such as nature-based reforestation or agroforestry pose major quality assurance risk due to challenges related to Monitoring, Reporting and Verification (MRV) as well as lacking additionality and durability of credits. This increases the risk of mitigation deterrence, reversals, and difficulty of enforcing long-term obligations.
- This issue is further enhanced by the weak track record and lack of public trust in historic temporary removals markets (e.g., via the Kyoto Protocol).
- Focusing on durable CDR (e.g., BECCS, DACCS) based on the "like-for-like" principle will significantly simplify quality assurance mechanisms (for example, reduced need for demand and supply controls to manage mitigation deterrence, or CO_2 buffer $\mathrm{pools}^{(1)}$ to manage reversal risk).
- The Carbon Removal and Carbon Farming (CRCF) regulation creates a strong certification baseline across the EU, establishing strict requirements on certified CDR to be quantifiable, additional, sustainable, and durable. While there are still uncertainties regarding the yet-to-be-developed CRCF Delegated Acts and methodologies, CRCF is a good starting point for quality assurance.
- Moreover, CRCF ensures a reasonable level of market openness. It allows coclaiming of CRCs for non-EU corporate entities (so long as the CRC also contributes to the EU's NDC⁽²⁾ and is not covered by an international compliance scheme). In the near-term, it also limits eligible CDR projects to those that are based in the EU (see Point 6 on the next page). Such quantity restrictions may be eased over time.

Impact of WtE

- Higher CRC prices in the nearterm, driven by limits on (typically cheap) temporary removals.
- Higher focus on durable CDR methods such as BECCS (including WtE-CCS), DACCS or some forms of biochar.
- Lower risk of greenwashing claims against CRC buyers, since quality assurance is easier.
- Higher CRC prices in the nearterm, driven by limits on cheaper removals of lower quality.
- Assurance of high flexibility for CRC sellers to sell to third-party corporate entities.
- Lower risk of greenwashing claims against CRC buyers, since CRCF is politically recognized.



Deep-dive of high-priority policy positions (2/7)

Key recommendations

Initially limit to EU-

based projects based on CRCF, and consider

Rationale

- CRCF does not promote non-EU CDR since certified CRCs must (1) contribute to EU's NDC (thereby excluding CRCs that contribute to third-party NDCs or compliance schemes), and (2) contribute to EU climate objectives such as the European Climate Law, which requires balancing of domestic emissions and removals by 2050 (thereby excluding EU from reliance on CRCs delivered in non-EU jurisdictions to achieve the net-zero target).
- While this may limit the supply of CRCs into the ETS in the near-term, it is likely to significantly increase public acceptance, simplify quality assurance, and strengthen the economics of EU-based CDR projects (such as Swedish WtE-CCS). Over time and as more countries adopt certification frameworks similar or identical to CRCF, restrictions could potentially be lifted and supply increased, thereby favoring residual emitters within the EU ETS.

Impact of WtE

- **Higher CRC prices in the nearterm**, driven by limits to international CDR projects of less clear quality.
- Higher focus on development of **EU-based CDR projects** (including Swedish WtE-CCS).
- Lower risk of greenwashing claims against CRC buyers, since quality assurance is easier.

6b on CRCF, and consider excluding non-ETS WtE plants

- Currently, not all EU-based WtE plants are subject to ETS prices. As WtE plants (to some extent) compete internationally to offer waste management services and source waste, this gives non-ETS WtE plants a cost advantage.
- If non-ETS WtE-CCS projects would be allowed to sell their CRCs into the ETS, they would stand to benefit from the revenue potential of carbon pricing without bearing the cost of carbon pricing within the same system. This is arguably an unfair and inconsistent approach to carbon pricing.
- The best solution would be to harmonize carbon pricing across the entire EU WtE sector by including all facilities in the ETS. A possible partial step would be to limit ETS access for non-ETS WtE plants in the meantime. If non-EU CRCs are permitted in the system, a level playing could be ensured by carbon pricing non-EU WtE facilities through e.g., CBAM(1)

More equitable and consistent application of carbon pricing mechanism for the European WtE sector.

Source: AFRY analysis | (1) CBAM = Carbon Border Adjustment Mechanism



Deep-dive of high-priority policy positions (3/7)

Key recommendations

Set aspirational EUbased CDR target

- Allow sub-targets and removal method
 - sub-financing based on

Rationale

Setting a CDR target would signal clear political commitment and policy certainty to CDR project developers. It would enable expanded and targeted subsidies (based on EU state aid rules) to stimulate near-term growth in CRC generation and sales.

- There is currently a significant policy gap in this regard. The CO₂ injection capacity target for permanent storage by 2030 (set through the Net-Zero Industry Act) does not specifically target CDR but rather CCS as a whole. Moreover, there is no specific 2040 target for neither CCS nor CDR specifically. Finally, the carbon sink target of 310 MtCO₂/year in 2030 for the LULUCF sector covers only temporary (nature-based) removals, and not durable (engineered) removals.
- Today, there are significant cost disparities between different CDR methods (e.g., BECCS vs. biochar). From a near-term or "static" cost efficiency view, only the cheapest methods (which meet the set quality standard) should be supported to ensure cost-efficient deployment of CDR.
- However, these cost differences do not necessarily reflect the long-term potential of each method - also known as their long-term or "dynamic" cost efficiency. Improved long-term cost efficiency can be achieved through method-based sub-targets and financing, by bringing down costs for highpotential methods through innovation and experience-based learning.
- Another reason to support specific methods is to diversify the EU's portfolio of methods - given that we do not know beforehand which methods will have the highest long-term potential.

Impact of WtE

 Faster near-term CRC deployment driven by enabled support mechanisms and increased market participation due to increased market certainty.

- Deployment of a broader suite of durable removals resulting in higher risk diversification, higher R&D and innovation, and more experiencebased learning.
- Possibility for targeted support for WtE-CCS projects even if they are more expensive than other eligible removal methods.



Deep-dive of high-priority policy positions (4/7)

Key recommendations

Ensure fair treatment of waste incineration in CRCF methodologies

Rationale

- The CRCF Delegated Acts / methodologies are not yet established leaving some uncertainty on how the sustainability criteria will be interpreted.
- While there is ample support that waste incineration plays a critical role in ensuring sustainable waste management, the WtE sector should proactively make this point to ensure that developed methodologies do not incorrectly frame their operations. One such potential risk could be derived in the Waste Framework Directive's waste hierarchy, which may lead to CRCF methodologies to consider fossil waste incineration as unsustainable practice (based on the argument that fossil waste should preferably be re-used or recycled).
- While this is not considered a likely risk, it should still be considered seriously and proactively.

- Treat removals as distinct credits (instead of automatic emissions deductions)
- Within the ETS, CRCs generated through CDR projects could be accounted for and traded either as a deductions from reportable emissions (thereby resulting in a lower obligation to purchase traditional EUAs), or as a separate credit (CRC, thereby maintaining the same allowance obligation but serving it with a combination of CRCs and traditional EUAs).
- The latter approach is preferable, as it would mean that facilities under the ETS that generate CDR would have higher flexibility in how they use or trade CRCs. Accounting-wise, they could use CRCs themselves, sell them to another ETS facility, or sell them to an entity outside of the ETS – with corresponding adjustments to avoid accounting issues such as double counting.
- This ensures maximum trading flexibility and thus better sales opportunities.

Impact of WtE

 Ensures WtE-CCS eligibility for CRC sales based on reporting methodologies established under the CRCF.

 Increased flexibility for CRC sellers to maximize returns either within or outside of the EU ETS.



Deep-dive of high-priority policy positions (5/7)

Key recommendations

Allow ETS-based CRCs to trade outside ETS, with controls to avoid subsidy over-compensation

Rationale

- As mentioned, allowing facilities under the ETS that generate CDR to sell their CRCs both within and beyond the ETS could lead to higher revenues, thereby impacting the near-term market deployment of CDR. This is important considering the current significant cost gap between traditional EUAs and durable CDR.
- As mentioned, the CRCF itself does not place restrictions on sale to third-party corporate entities, so long as the CRC contributes to the EU's NDC.
- If the CRC is generated with the help of subsidies that are based on ETS prices, there is a risk of subsidy over-compensation if it is sold beyond the ETS. However, such risks should be mitigated through proper subsidy design rather than a categorical restriction on non-ETS sales.

Impact of WtE

 Increased flexibility for CRC sellers to maximize returns either within or outside of the EU ETS.

- Establish separate funding mechanism for CDR
- There is consensus in literature that durable removals require additional support to spur the innovation and experience-based cost reductions necessary to scale supply. There is also considerable support behind the idea that CDR supply needs to be scaled quickly to reach sufficient volumes by 2040 to prevent destabilization of the ETS market, as the emission cap falls closer to zero.
- While there is currently some forms of support (e.g., through the EU Innovation Fund), there are significant funding gaps across all stages of the innovation cycle.

 Faster near-term CRC deployment driven by stronger support mechanisms and increased market participation due to improved project economics and price certainty.



Deep-dive of high-priority policy positions (6/7)

Key recommendations

Rationale

Impact of WtE

Earmark funds for durable CRCs through existing or new EU funding facilities

- Without clear funding pools, the fiscal impact, administrative burden and public acceptance of CDR integration will be more uncertain.
- There is an opportunity to strengthen funding through the Innovation Fund, Horizon Europe, LIFE Programme as well as extending the Recovery and Resilience Facility beyond 2026 or strengthening the collaboration between the European Innovation Council and European Investment Fund to address gaps in venture capital and de-risk private investments.

 Faster near-term CRC deployment driven by stronger support mechanisms and increased market participation due to strengthened political ambition and improved funding certainty.

Phase-out quantitative integration restrictions over time to achieve acceptable prices

- Most of the early restrictions imposed to assure quality could be phased-out over time and with experience – as best practices regarding certification and MRV are established and both public and institutional trust grows. This is especially the case if the EU decides to impose particularly strict quantitative limits on CRCs to reduce near-term uncertainty regarding mitigation deterrence.
- Phase-out secures the best of both worlds. In the near-term, the ETS can manage near-term market uncertainties and fear of mitigation deterrence. In the long-term, it can increase eligible CRC supply once MRV is wellestablished to stabilize CRC prices at manageable levels for residual emitters. This approach allows for an increasingly free market-based (and therefore cost-efficient) system over time.
- Higher CRC prices in the nearterm, driven by limits on cheaper removals of lower quality.
- Higher focus on durable CDR methods such as BECCS (including WtE-CCS), DACCS or some forms of biochar.
- Lower CRC prices over mid- to long-term as the market stabilizes with the inclusion of additional CRC volumes from previously restricted locations, facilities or methods.



Deep-dive of high-priority policy positions (7/7)

Key recommendations

Extend the responsibility to finance EU-wide net-negative beyond residual emitters

Rationale

- Over time, the market mechanism of the ETS will change as the market shifts from a focus on carbon reductions to carbon removals. To achieve an EU-wide net negative system meaning, to generate more CDR than the EU emits there needs to be a financing mechanisms that goes beyond the traditional "polluter-pays" principle. Placing the burden of achieving EU-wide net-negative emissions on a few remaining residual emitters will likely lead to unsustainable penalties unproportional to their historic responsibility.
- Putting the responsibility of EU-wide net-negative on residual emitters (including WtE plants without CCS) would not only be unfair but also most likely make it more difficult to generate net-negative emissions at the desired scale.

Impact of WtE

 Better economics for residual emitters (including WtE without CCS).



Low-priority positions

RECOMMENDATIONS

Deep-dive of low-priority policy positions (1/3)

Key recommendations

Include biochar based on adherence to CRCF requirements

Default point of reversal liability in permanent storage operators

Rationale

- Biochar is a (possibly durable) CDR method that differs from BECCS and DACCS in two important ways: (1) it is generally cheaper, and (2) its durability is more controversial, varying from decades to millennia depending on the methodology. Because of this, there has been considerable discussion on whether biochar should be eligible within an integrated ETS or not.
- Categorical inclusion of biochar would benefit WtE without CCS, as it would likely reduce CRC prices, while the opposite applies for WtE with CCS (which would prefer higher CRC prices). Regardless of who it benefits, the logically consistent way of including biochar would be to base it on each biochar project's ability to meet the durability criteria set out by the CRCF and related methodologies. This ensures a balanced and consistent approach to all durable CDR projects and maintains the legitimacy of the CRCF as a certification framework.
- In the CRCF, liability is addressed with reference to the ETS Directive and CCS Directive, indicating that permanent storage operators are ultimately liable and must surrender EUAs if reversal occurs. This provides a clear default point of liability that strengthens accountability.
- Of course, there is always the risk that such market participants cease to exist (for example, due to a bankruptcy). In such cases, there should be another mechanism to manage liability. The CRCF notes that certification methodologies approved under the CRCF should include appropriate liability mechanisms to address cases of reversal and leaves the details open to interpretation.

Impact of WtE

- Lower CRC prices in the near-term, driven by inclusion of some EU-based biochar CDR projects that meet strict quality criteria.
- Better balance in CRC supply considering other restrictions that currently benefit durable CDR methods such as BECCS (including WtE-CCS) and DACCS.

 Clear point of liability reduces uncertainty and financial risk toward CDR developers (e.g., WtE-CCS).



Low-priority positions

RECOMMENDATIONS

Deep-dive of low-priority policy positions (2/3)

Key recommendations

Avoid upper supply limits and sector- and company-level mandates

Rationale

- Calls for a potential CRC quantity ceiling is mainly driven by fear of mitigation deterrence. However, the choice of a ceiling is in practice arbitrary and based on regulators' limited knowledge of the future. While it may be desirable to limit CDR to residual emissions, the definition of such emissions is not clear and thus hard to set in advance. A ceiling could result in unnecessary cost inefficiency if residual emissions turn out to be higher than expected.
- Moreover, setting a ceiling may be unnecessary to begin with, if eligible removals are restricted to durable and EU-based CDR (in line with the CRCF). The significant price gap between expensive durable CDR and cheaper traditional EUAs effectively works to prevent mitigation deterrence, and can be further enforced through more market-based restrictions such as maintaining the gross emission cap (see Point 10 below)

Impact of WtE

- Reduced risk of cost inefficiency due to arbitrary and ultimately incorrect market restrictions.
- Better conditions for WtE-CCS project development.

Maintain gross emission cap and transition to net cap over time

- A "gross" emission cap limits the tonnes of positive emissions allowed in a cap-and-trade system *irrespective* of the use of CDR, while a "net" cap allows higher positive emissions if those are neutralized with negative emissions.
- An effective way to avoid mitigation deterrence is to maintain the gross cap when CRCs enter the ETS. This means that when one CRC is used in the ETS, it "retires" one traditional EUA – thereby maintaining the reduction path of the gross cap. While this is not in the direct interest of WtE, it is a popular position. Adopting it would increase the legitimacy of Avfall Sverige and weaken calls for other (and potentially more arbitrary) restrictions.
- As the gross cap starts to near zero, it would be reasonable to shift toward a net cap to allow the existence of residual emissions compensated by CDR (which is not possible with a gross cap).

- Higher near-term public acceptance of CDR integration and lower risk of public and political backlash.
- Cost-effective durable CDR supply by freely allowing CRCs to replace traditional EUAs on the basis of cost competitiveness.
- Clear mechanism to manage residual emissions by switching toward a net cap.



Low-priority positions

RECOMMENDATIONS

Deep-dive of low-priority policy positions (3/3)

Key recommendations

Index support to price of traditional EUAs to avoid mitigation deterrence

Rationale

- Irrespective of the support mechanism, care must be taken to avoid over-compensating CRCs in relation to traditional EUAs. Introducing CDR-specific support will skew the ETS price signal and could potentially counteract efforts made to avoid mitigation deterrence, such as qualitative and quantitative restrictions imposed on CRCs.
- While this is not a primary concern for WtE, adopting a position that avoids this will increase the legitimacy of Avfall Sverige and increase public acceptance for CDR-specific support schemes.
- A simple approach would be to index CRC subsidy levels to reflect expected future EUA prices. Another way would be to have an intermediary authority responsible for assessing the risk of mitigation deterrence and adjusting compensation levels to reflect changes in the market.

Impact of WtE

- Higher near-term public acceptance of CDR integration and lower risk of public and political backlash.
- Some (reasonable) restrictions to CDR deployment based on ensuring a cost-effective energy transition.

Avoid financing CRC support schemes with CO₂ mitigation funding pools

- In addition to directly over-compensating CRCs in the market, another form
 of mitigation deterrence is by indirectly affecting the flow public funding redirecting it away from carbon mitigation and toward carbon removal.
- While this is not a primary concern for WtE, adopting a position that avoids this will increase the legitimacy of Avfall Sverige and increase public acceptance for CDR-specific support schemes.
- Public CRC funding should not come from funding pools that are earmarked for carbon mitigation efforts. Such an approach could reduce the efficiency of climate efforts, while also generating political and public backlash.
- Higher near-term public acceptance of CDR integration and lower risk of public and political backlash.
- Some (reasonable) restrictions to CDR deployment based on ensuring a cost-effective energy transition.





Avfall Sverige är kommunernas branschorganisation inom avfallshantering. Det är Avfall Sveriges medlemmar som ser till att avfall tas om hand och återvinns i landets alla kommuner. Vi gör det på samhällets uppdrag: miljösäkert, hållbart och långsiktigt. Vår vision är "Det finns inget avfall". Vi verkar för att förebygga att avfall uppstår, att mer återanvänds och att det avfall som uppstår återvinns och tas om hand på bästa sätt. Kommunen och deras bolag är ambassadör, katalysator och garant för denna omställning.



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