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A policy brief by Sustainable Finance Lab (Sweden)

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 **SUSTAINABLE  
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# 1 Introduction

Scenarios limiting global warming to close to 1.5°C by 2100 included in the IPCC AR6 WGIII report [1] require deep and rapid greenhouse gas (GHG) emission reductions and that net-zero CO<sub>2</sub> emissions are reached globally by mid-century. In addition to emission reductions, scenarios also rely on large volumes of carbon dioxide removals (CDR). CDR is necessary to achieve the two main functions of (i) counterbalancing of hard-to-abate residual emissions, which is a fundamental requirement to attain globally net-zero CO<sub>2</sub> or GHG emissions, and (ii) compensate for historically too large accumulated GHG emissions (“legacy carbon removal”). The latter can be achieved through reaching globally net-negative CO<sub>2</sub> or GHG emissions in the long-term by CDR at rates exceeding the rate of residual emissions as originally proposed by Obersteiner et al. already in 2001 [2]. CDR methods, i.e., anthropogenic activities that remove CO<sub>2</sub> from the atmosphere and store it durably in geological, terrestrial, or ocean reservoirs, or in products, add to the array of GHG mitigation options. In addition to the two main functions already mentioned, they may enable faster lowering of net CO<sub>2</sub> or GHG emissions on the shorter term, and to enhanced cost-effectiveness of achieving GHG mitigation targets from regional to global scales.

Minimum requirements of CDR contributions until 2100 are measured in hundreds GtCO<sub>2</sub> with annual removal rates at the end of the century reaching nearly 50% of current global annual GHG emissions [1]. A portion of the required CDR can be achieved through nature-based solutions, for example afforestation and various kinds of ecosystem restoration. However, to attain the CDR rates likely required later this century, significant contributions from different kinds of so-called technical CDR methods will be required. Current CDR rates from technical CDR methods are approximately 2 MtCO<sub>2</sub>/year [3], The magnitude of required future CDR thus presents a remarkable scaling challenge. This implies technical, environmental, and financing challenges as well as socio-economic opportunities and risks that need to be thoroughly assessed to attain a good understanding of their potential for implementation. Analysis of opportunities and risks of CDR methods are in many ways sensitive to regional context and specific technological configurations [4] [5] [6].

This policy brief focuses on the financing challenge. The focus is on the development in Sweden of one specific technical CDR method, namely bioenergy with carbon capture and storage (BECCS). More specifically the paper aims to analyse how revenues coming from voluntary carbon markets (VCM) can contribute to a faster deployment rate for BECCS in Sweden.

First, the Swedish context for BECCS deployment is described followed by a section that addresses CDR as a potential “moral hazard”. The main part of the paper consists of a section that discusses different policy models for BECCS incentivisation which is followed by a section that discusses opportunities and challenges related to promoting BECCS development by taking advantage of the potential leverage of Voluntary Carbon Markets (VCM).

### Abbreviations used in this policy brief:

AAU	Assigned Amount Unit
BECCS	Bioenergy with carbon capture and storage
CA	Corresponding adjustment
CCS	Carbon capture and storage
CER	Certified Emission Reduction
CDM	Clean Development Mechanism
CDR	Carbon dioxide removal
ERU	Emission Reduction Units
EU ETS	EU Emissions Trading System
GHG	Greenhouse gases
ITMO	Internationally Transferred Mitigation Outcomes
Jl	Joint Implementation
MRV	Monitoring, reporting, and verification
NDC	Nationally Determined Contribution
PPP	Polluter pays principle
VCM	Voluntary carbon markets

## 2 The Swedish context

### *Supply*

The total potential for BECCS in Sweden is substantial, as the country has many large-point sources of biogenic CO<sub>2</sub> emissions, mainly pulp and paper plants and combined heat and power (CHP) plants in the district heating sector burning wood waste from the forest industry and domestic and industrial waste with biogenic fractions. The total rate Swedish biogenic CO<sub>2</sub> emissions from point sources larger than 0.1 Mt amounts to more than 30 MtCO<sub>2</sub> per year [7].

Sweden has some geological formations that may be suitable for CO<sub>2</sub> storage but those would take considerable time to develop into operational storage sites. Therefore, the realization of Swedish BECCS will rely on CO<sub>2</sub> export for storage elsewhere. Norway has developed projects that offer CO<sub>2</sub> storage as a service and Denmark is rapidly emerging as a potential future provider of geological CO<sub>2</sub> storage services. In addition, Iceland is preparing to provide services based on “mineral storage” of CO<sub>2</sub> dissolved in water into basaltic sub-surface layers [8].

### *Demand*

The Swedish Climate Act from 2017 includes a target to reach net-zero GHG emissions no later than 2045 and negative emissions thereafter. GHG emissions shall be reduced by at least 85 per cent by 2045 compared to 1990. This means that, in order to attain net-zero emissions the remaining emissions, approximately 11 million tonnes CO<sub>2</sub>e, have to be offset through so-called “supplementary measures”.

There is no formal Swedish CCS strategy, however a Governmental Inquiry [7] focused on “supplementary measures” and a brief plan for implementation of CCS in Sweden was given. In this context, BECCS is one of three “supplementary measures” that can be used for counterbalancing residual emissions, the other two being forest carbon sinks and some other measures in the land use sector, and international investments through Article 6 (of the Paris Agreement). The Inquiry recommended the creation of a support scheme for CDR from BECCS. It furthermore recommended the preparation of a proposal for a treaty with Norway necessary according to provisions of the London Protocol to enable Swedish export of CO<sub>2</sub> for storage in Norway. In early 2022, the prime ministers of Norway and Sweden announced that work is ongoing and that it is important that the work is finalised.

The Swedish Energy Agency has been assigned to develop the support scheme for BECCS and is currently developing the design of a programme based on reverse auctions. 36 billion SEK have been allocated for the programme for the years 2026-2046. It has been communicated that 1 to 3 reverse auctions are to be held between 2023 and 2026. Supported projects will be able to receive results-based payments per verified tonne of biogenic CO<sub>2</sub> stored for up to 15 years.

### 3 The balance between mitigation by emission sources and CDR

Widespread optimism about the potential of BECCS and other CDR methods later in the century has led to concerns that CDR may distract from, and reduce the effort for, deep near-term mitigation of fossil fuel emissions [9] [10] and lead to over-reliance on CDR methods that may prove not to be scalable [11] possibly locking Society into a high-temperature pathway if CDR fails to deliver at the required levels [9]. Recent publications by McLaren et al. [12] and Geden & Schenuit [13] have proposed the development of separate targets for emission reductions and CDR as a way to manage the risk that there will be less emphasis on fossil fuel mitigation due to the future availability of CDR.

It can be concluded that there is a need for a climate policy that is sufficient to trigger the required reduction in fossil fuel emissions and create incentives for negative emissions that support the large-scale demonstration and development of CDR. This is in line with Bednar et al. [14], who have proposed that a mitigation strategy should build on the following two pillars:

- (i) earlier and more radical reductions in emissions than what most Paris Agreement-compliant mitigation scenarios (most of which already relying on vast CDR contributions) suggest; and
- (ii) near-term development and ramping-up of “Negative Emission Technologies” to clarify their actual potentials and the scaling properties of specific technological options.

While governments have to take responsibility for the timely funding GHG mitigation at scale, carbon markets, including voluntary carbon markets (VCM), have the potential to create early market signals and funding, and support diffusion of CDR technology, thereby supporting development and deployment of CDR [15] [16] [17].

### 4 Incentivising BECCS investment – Financing models

This section outlines different Policy Models with the focus on BECCS in the Swedish context as an introduction to the next section that discusses how revenues coming from VCM can potentially contribute to a faster deployment rate for BECCS in Sweden.

A common way to create incentives for reducing the environmental impact of emissions is the so-called Polluter Pays Principle (PPP). The PPP includes the pricing of CO<sub>2</sub> emissions and other pollutants in the form of a tax or a trading system, such as the European Union Emissions Trading Scheme (EU ETS). However, with negative emissions, PPP is not applicable, since there is no pollution, but instead a common benefit (or a positive externality). Since carbon removal results in a common benefit, it can be argued that it should be taken from the state budget (although for a global common benefit there are no corresponding global “state budgets”).

However, one could argue that those who emit fossil fuel emissions (or other GHGs) should contribute to financing BECCS. Sectors that could be targeted for such obligations are those that account for significant emissions today and residual emissions in the future.

Based on these principles, we have identified five models for creating incentives and funding for BECCS.

## 4.1 State guarantees (Model 1)

With this Model, the state buys BECCS outcomes. This can be done through long-term agreements with BECCS producers, whereby the state guarantees to buy a certain level of carbon removal by BECCS over a certain time. To minimize costs to the state, the contracts can be auctioned off in lots to the lowest bidder. The previously mentioned Swedish public inquiry [7] has proposed a system of Model 1 type in the form of a reversed auctioning system (reversed in the sense that there is one buyer of the credits—the Swedish state—and several potential sellers of negative emissions).

The motivation for this model is that favorable conditions can be created for the first BECCS installations and that experience from these can be used for next generation installations. Reverse auctions can also have potential to provide price discovery [18]. A challenge with this model is that it is expensive for the state.

## 4.2 Quota obligation for selected sectors with GHG emissions (Model 2)

Following the principle that emitters of GHG should contribute to funding negative emissions the state could impose an obligation on emitters to purchase BECCS credits corresponding to a share of their GHG emissions. In theory, such an obligation can be implemented on a one-for-one basis, meaning that 1 ton of emitted GHG requires the purchase of 1 ton of biogenic CO<sub>2</sub> captured and stored. A more commonly used method—typically applied for renewable energy—is to apply a quota obligation starting at some level, say 10%, and thereafter ramp it up at a certain pace. It is not obvious for which sectors and emitters a quota obligation system would be an efficient policy instrument. The transport sector could be targeted, since GHG emissions are high and challenging to reduce.

The advantages with this model, compared to model 1, is that it broadens the financing basis and reduces costs for the state, which could translate into increased public acceptance, although this will also depend on what sectors are targeted. It also adds incentive for reducing fossil fuel use in sectors that are subject to obligations.

A challenge is that as emissions from the transport sector are expected to be reduced, and so will the revenues from the transport-based quota system. Thus, in the longer term, as we get closer to the year 2045 when Sweden should have net-zero emissions, it would be natural to direct a quota obligation towards sectors with residual emissions, such as those from waste, agriculture, and aviation. If this is executed for all residual emissions on a one-to-one basis, Sweden's residual emissions would be balanced by CDR outcomes leading net zero emissions for the whole country. A risk would be that insufficient efforts are invested in reducing emissions. Read more about this *moral hazard* under Model 3 below including ways to address it.

## 4.3 Allowing participants in the EU ETS to use BECCS credits (Model 3)

With the reforming of the EU emissions trading system in 2023 [19], the EU ETS cap will be reduced by 4.3 – 4.4 % per year. If this annual reduction is sustained, the cap will reach zero in Year 2039, meaning that the last emission allowance will be issued in Year 2039. As we get closer to the year with zero emissions, it is likely that there will be residual emissions, for which abatement will be expensive and/or technically difficult. In addition, the application of CCS to emissions from fossil fuels, foreseen to be applied to mitigate process emissions from industries (e.g., the cement industry), will not fully eliminate emissions due to the capture rates being below 100%. Aviation—of which intra-European aviation is included in the EU ETS—may likewise continue to emit GHGs well into the future. If so, an emissions trading system with no further allocation of emission allowances could still be possible if there exist credits that represent CDR and that can be used to offset the residual emissions in the ETS.

This model would broaden the financing basis and could lead to a significant demand for BECCS. Eventually it would bring down costs for participants in the EU ETS since it offers an option to reducing emissions.

A risk with allowing removal credits to be used in the EU ETS is that it could lead to firms buying credits rather than reducing emissions. It is important that emissions are reduced as much as possible before turning to balancing with CDR. The risk could be dealt with by limiting the number of removal credits that can be used for compliance in the EU ETS. Another way to avoid an overuse of credits is to apply an exchange rate, for instance two-to-one, meaning that one ton of emissions need to be compensated by two tons of CDR. This would tilt incentives in favor of emissions abatement compared to balancing with removals.

A connected issue is that balancing on a one-to-one basis only allows for reaching net-zero emissions, not below net-zero. Once again, applying an exchange rate of more than one-to-one allows for net-negative emissions to be reached.

Under current rules, however, imports of credits are not allowed in the EU ETS [20]. As an alternative, the EU could establish a CDR programme which is not linked to the EU ETS. The level of future expected residual emissions in the whole EU economy can work as an indicator of the size of such a programme, assuming that EU is to achieve territorial net-zero. CDR targets could be distributed between member states based on their potentials and financial capacities, like the current “effort sharing regulation”. It would then be up to the member states to implement the needed CDR activities. Flexibility could be provided by allowing member states to trade CDR outcomes so that member states with surplus CDR can sell to member states that need CDR. This would increase the effectiveness. As mentioned previously, it’s important that CDR does not replace efforts to reduce emissions, but are only used to balance emissions that are technically difficult or very costly to eliminate.

#### 4.4 Private entities for voluntary use of carbon credits (Model 4)

Demand for carbon credits on the VCM is created by companies and individuals that voluntarily chose to use carbon credits to contribute to GHG mitigation outside their value chains [21]. VCM already include CDR project activities [22]. CDR methods that have been adopted by voluntary carbon standards include, inter alia, afforestation and reforestation activities, biochar carbon removal, enhanced soil carbon sequestration, BECCS, Direct Air CCS, and enhanced weathering [23].

The potential role of VCM is the focus of the next section.

#### 4.5 Other states as buyers (Model 5)

Article 6 of the Paris Agreement allows for voluntary cooperation between Parties to achieve their national mitigation targets and is expected to become a key instrument for mobilizing removals [23]. Article 6.2 covers cooperative approaches involving the use of internationally transferred mitigation outcomes (ITMOs); Article 6.4 is a multilateral mechanism for mitigation building on the experiences of the Kyoto Protocol’s project-based flexible mechanisms.

The rules of Article 6 may, therefore, be relevant to a situation in which Country A provides financing towards BECCS in Sweden and Country A wants to claim (all or part of) the associated CDR toward its national target. In order to avoid double counting, Article 6 requires that “corresponding adjustments” be made: For the case of Sweden transferring mitigation outcomes internationally to be counted toward another Party’s NDC, Sweden’s government would be required to authorise the international transfer and adjust its emissions balance so that that the mitigation outcomes are not counted towards Sweden’s national mitigation target. The acquiring country A would then be able to count the ITMO towards its NDC by applying a corresponding adjustment to its emissions balance [24] [25].

Transaction volumes on VCM have reached record levels in 2021 and 2022, largely driven by a demand for carbon credits from non-state actors that are increasingly referring to “carbon neutrality” and “net-zero emissions” to portray their climate goals and efforts and demand is predicted to continue growing [26] [27] [28]. Due to the difficulty of reducing all GHG emissions to zero, particularly in the near

term, “offsetting” is an often-used feature in many carbon-neutrality targets. Offsetting refers to the use of carbon credits emanating from mitigation outcomes (emission reductions or carbon removals) achieved outside of an actor’s value chain or relevant system boundaries to counterbalance the climate impact of specific emissions, such as the carbon footprint of an actor, activity or product. Carbon neutrality has traditionally been achieved by fully offsetting the carbon footprint.

## 5 The evolution of “environmental integrity” of international transfers under the Kyoto Protocol

Markets for carbon credits, based on baseline and credit mechanisms, emerged during the initial years of the Kyoto Protocol. The Kyoto Protocol introduced the project-based flexible mechanisms<sup>1</sup> the Clean Development Mechanism (CDM) and Joint Implementation (JI), with their respective carbon credits called CERs and ERUs<sup>2</sup>. Annex I countries were able to use carbon credits issued through the CDM and JI towards their national GHG emission limitation commitments under the Protocol [29]. The Kyoto Protocol included provisions for maintaining environmental integrity of international transfers on compliance markets. The meaning of “environmental integrity” is that an Annex I country’s decision to meet part of its mitigation commitment through international transfer should not lead to globally increased emissions [30]. The demonstration of additionality, i.e. that the mitigation outcome to be credited under a project-based mechanism would not occur without the registration as a CDM or JI activity, was introduced as an important prerequisite for maintaining the environmental integrity of the mechanisms.<sup>3</sup>

While CDM projects were carried out in developing countries that had no emission limitation commitments, JI project activities were carried out in Annex I countries, i.e., in capped environments. Therefore, as a further provision to safeguard environmental integrity for the international transfers under the JI, ERUs were issued by converting Assigned Amount Units (AAUs). The sum of a country’s AAUs represented its allowed GHG budget for a Kyoto commitment period. In other words, when a country issued ERUs it also surrendered AAUs corresponding to an equal amount of CO<sub>2</sub>e. The ERUs could then be sold to another Annex I country which could then use the ERUs towards compliance. Consequently, the issuance and international trade of ERUs allowed the buying country to emit a certain amount more GHG emissions domestically and the transferring country was allowed to emit an equal amount less – in other words it was a zero-sum game. In this way it was provided for that the double counting of the same mitigation outcomes towards both the host and buyer country’s Kyoto targets was avoided [29].

## 6 The evolution of VCM during the Kyoto Protocol era

In parallel with the compliance market under the Kyoto Protocol, the voluntary use of carbon credits developed on the basis of carbon credits from CDM and JI projects and independent carbon crediting programmes (sometimes called “voluntary carbon standards”). With respect to the voluntary use of carbon credits there was no international oversight. The principles developed under the Kyoto Protocol compliance market to safeguard environmental integrity, including additionality and prevention of double counting, were largely adopted also for the voluntary use of carbon credits for offsetting purposes, including for carbon credits issued by independent carbon crediting programmes [31].

1 In addition, the flexible mechanism “International Emissions Trading”

2 Certified Emission Reductions (CER) and Emission Reduction Units (ERU).

3 Quality criteria also cover, inter alia, the use of a conservative baselines, permanence, and protocols for monitoring, reporting, and verification (MRV). Additionality assessment and the determination of emission baselines can be challenging. Several analyses have concluded that substantial shares of credits issued under the CDM and JI may have suffered from poor environmental integrity [43].



It can be helpful to reflect on some of the consequences of the principles that were adopted for VCM. In the Kyoto Protocol context, when a non-state actor in an Annex I country mitigated its own Scope 1 and 2 emissions<sup>4</sup> it would have contributed to the home country's compliance with existing Annex I party commitments. In other words, in such cases the company's mitigation action led to helping the home country reach its commitments but did not lead to increased overall global ambition. However, the practice that had been adopted for voluntary offsetting, namely adopting the carbon credit quality and environmental integrity principles used for international transfers on the compliance market, meant that if the same company opted to use carbon credits to offset emissions, the impact would be an increase in global ambition. This is clear if we consider that in this latter case (i) the offsetting would not be counted towards the mitigation commitment of the offsetting company's home country and (ii) the mitigation outcome underlying the carbon credits were additional and associated with surrender of AAUs if ERUs were used for the offsetting. In other words, the home country of the offsetting company would not have to do less to comply with its Kyoto commitment and at the same time additional mitigation outcome would be achieved elsewhere. This is an important background that may help understanding the current discussion concerning voluntary offsetting in the post-Paris era.

## 7 Voluntary use of carbon credits in the post-Paris era

The Paris Agreement brought a new reality for VCM compared to the pre-2020 period since under the Paris Agreement, all countries have adopted national climate action plans, known as Nationally Determined Contributions (NDCs). This new reality has sparked an international debate about the role of VCM within the architecture of the Paris Agreement which is focused on issues related to claims and includes interrelations with the international framework currently being developed regarding Article 6 of the Paris Agreement [32]. Questions remain on whether double claiming should be avoided based on corresponding adjustments to countries' emission balances when companies use carbon credits towards offsetting claims. A corresponding adjustment means that the host country adjusts its emissions balance so that it does not count a relevant mitigation outcome towards its NDC target, or national mitigation target beyond the NDC target.

Kreibich and Hermwille [31] have analysed the debate and identified a number of different approaches for dealing with the issue of double claiming of the mitigation outcome underlying carbon credits between project host country national mitigation targets and a purchasing entity's use towards a mitigation targets (such as a net-zero target). Three of the identified approaches are relevant for the case of Swedish BECCS where the mitigation outcome would appear within the scope of the national GHG inventory and the scope of the national mitigation target:

1. "NDC support units" that provide a label for projects that contribute to the achievement of a host country's NDC ("contribution claim") but cannot be used for offsetting purposes.<sup>5</sup> It is concluded that such units do not seem to be in demand and that establishing this new product on the market would require significant (and joint) efforts from all market participants. The authors' definition can be extended to include also the achievement of national targets beyond an NDC.
2. Units that are used to support neutrality claims but are not associated with corresponding adjustments by the project host country. The authors argue that such crediting within the

<sup>4</sup> Scope 1 emissions are direct emissions from company-owned and controlled resources. Scope 2 emissions are indirect emissions from the generation of purchased energy, from a utility provider. There are also scope 3 emissions, representing all indirect emissions - not included in scope 2 - that occur in the value chain of the reporting company.

<sup>5</sup> It was pointed out by Raab [45] already in 2012, that in the context of the Kyoto Protocol, carbon credits are not per se "offsets": "It is the use of these CERs that determines whether or not a CDM project is offsetting, not the mechanism itself. If the CER is retired or not used, it is effectively mitigation in developing countries. A CER can then be seen as a "receipt" for an emissions reduction that has taken place and the financial contribution through the CDM as payment for performance."

scope of an NDC without corresponding adjustments faces serious legitimacy concerns and lead to double claiming and imply reputational risks of companies buying those credits.

3. “NDC crediting with corresponding adjustments”, which the authors regard as the only solution that strengthens and protects the legitimacy of using carbon credits for offsetting in the context of carbon neutrality targets while ensuring a high degree of environmental integrity.<sup>6</sup>

Figure 1 illustrates the climate action achieved by following approach 1, 2 and 3, respectively, in relation to the collective global GHG mitigation ambition as embedded in NDCs.

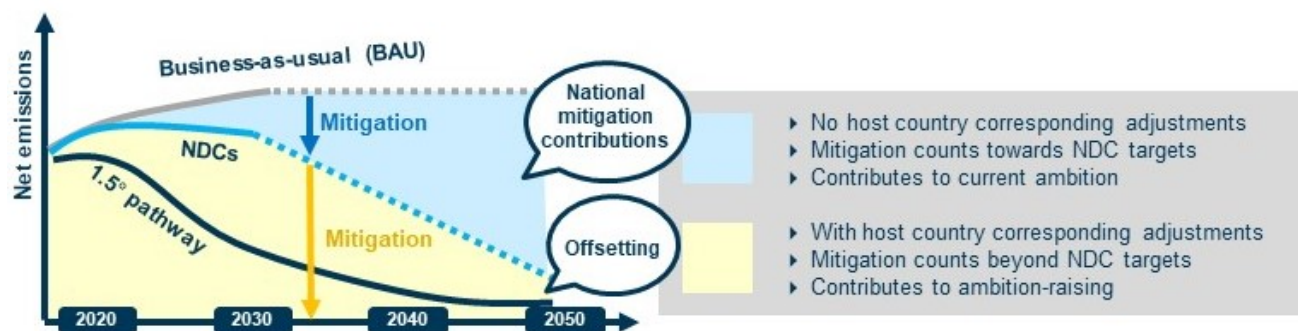


Figure 1. Corresponding adjustments and ambition-raising (Adapted from: Ahonen, Möllersten & Spalding-Fecher (2021)). Approach 1 and 2 would make contributions towards already existing mitigation national targets in the blue area. Approach 3 would make contributions in the yellow area, i.e., ambition raising “cap closure”. In this figure, an underlying assumption when defining “ambition” is that countries will live up to their (unconditional) NDC pledges, i.e., the current global ambition is the collective net GHG reductions pledged in NDCs. Concerning approach 3, it is, furthermore, assumed that carbon credit-buying entities’ home countries do not claim the mitigation outcome towards their NDCs, which is in line with how the voluntary use of carbon credits works (this can be ensured by using mitigation outcomes that have been authorised for “other purposes”).

## 8 Taking the international debate to Sweden

The analysis by Kreibich and Hermwille [31] is useful as a conceptual background to the current Swedish debate concerning the relationship between state-financed auctions for BECCS and emerging voluntary markets for carbon removal credits. A current point of contention is whether and why a certain kind of double claiming should be avoided. More precisely: Should a company that receives results-based payments from the Swedish state for verified tonnes stored biogenic CO<sub>2</sub> be able to also issue and sell carbon removal credits, to be used towards corporate offsetting claims, on the basis of the same verified stored biogenic CO<sub>2</sub>?

Several Swedish companies in the district heating sector who could potentially deploy BECCS have argued, both individually (e.g., [33]) and jointly through Swedenergy [34], that an approach could be operated where BECCS mitigation outcomes could be awarded results-based payments from the Swedish state and be counted towards the Swedish national mitigation target, while the same mitigation outcome would make the basis for issuance of carbon removal credits that could be sold on the VCM to be used by purchasing entities towards offsetting claims (i.e., approach 2).

The problem embedded in this approach is illustrated by the Gold Standard’s [35] analysis concerning potentially creditable project activities that reduce or remove additional GHG emissions, and their potential displacement or postponement of separate mitigation action that would otherwise have occurred to achieve the plan or target of one or more other entities:

<sup>6</sup> It should be noted that any credible use of offsetting by an entity can only be as a complement to ambitious mitigation of the entity’s in-value chain mitigation in order to raise ambition further. Best practise requires that mitigation of in-value chain emissions is in line with a science-based target [21].

*“This could include a host country deferring action that would have been adopted to achieve its Nationally Determined Contribution (NDC) due to the unplanned benefits derived from carbon finance..... In the event that this displacement or deferral occurs, the net atmospheric benefit in terms of greenhouse gas emissions would be lower than that represented by the carbon credit. This would affect the accuracy and credibility of any offsetting claim underpinned by the use of the relevant carbon credits.”*

It is clear that the proposed approach would mean a departure from the practice adopted on VCM since the days of the Kyoto Protocol (as outlined in section 6), namely that credible voluntary offsetting claims should be based on carbon credits that represent mitigation that goes beyond currently existing national mitigation targets, thus, represent mitigation action that would not have taken place without the incentive created through the opportunity to sell carbon credits. The proposed approach could, therefore, be considered to lower the bar regarding what a carbon credit should represent to be eligible for making offsetting claims. This conclusion is in line with Kreibich and Hermwille [31] who argue that allowing offsetting on the basis of mitigation outcomes that have not been correspondingly adjusted risks to “distort our perceptions of global collective action”.

## 8.1 Corresponding adjustments – not a quick fix

For the case of Swedish BECCS, associated mitigation outcomes could, in theory, be authorised in line with the modalities of Article 6.2 and, consequently, correspondingly adjusted, meaning that the mitigation outcomes would not be counted towards Sweden’s national mitigation target. This would enable the issuance of carbon removal credits (ITMOs) that would represent mitigation beyond national mitigation targets (“approach 3”). Such carbon credits would then be aligned with requirements for carbon credits to be used towards credible offsetting claims as proposed by, e.g., WWF<sup>7</sup> [36], Gold Standard [35], the Greenhouse Gas Protocol [37], and the Nordic Code of Best Practice for the Voluntary Use of Carbon Credits [21]. However, EU legislation does not enable Member States to make corresponding adjustments in their GHG accounting [38].

If it were possible for EU Member States to make corresponding adjustments, and Sweden had a process for authorisation in place, then so-called attribution principles [39] could be applied to allocate the mitigation outcomes from BECCS between the government support and revenues from selling carbon credits in accordance with a tailored allocation key. In this case, only the portion of mitigation outcomes allocated to the government for its support would be accounted towards the Swedish national target. The rest of the mitigation outcomes could be used by other actors to compensate for their emissions and reach net-zero emissions, after the necessary adjustment of Sweden’s reporting has been done to ensure that the same mitigation outcome is not counted towards the existing Swedish mitigation target. With an attribution approach, private carbon finance could contribute to mitigation beyond the Swedish national target and thus also provide funding for more of the Swedish BECCS potential.

Yet another potential solution that builds on the use of corresponding adjustments could be blended finance with the full use of corresponding adjustment for all mitigation outcomes of Swedish BECCS projects. Swedish state support could then be used as a lever to mobilise private capital from VCM with the aim to maximise the realisation of the Swedish BECCS potential. The rationale would be to trigger technical learning and cost reduction which would reduce the cost of CDR from BECCS to be used towards compliance with the 2045 net-zero target.

## 8.2 The proposed state support scheme for BECCS

The Swedish Energy Agency, as appointed auctioneer, has issued a memorandum which clarifies that projects that receive state support from the Swedish support system for BECCS are welcome to issue carbon credits to be sold on VCM. There are, however, two caveats: (i) the Agency clarifies that it should be made clear that the use of the carbon credits contribute towards the attainment of the

7 The WWF does not endorse the use of offsetting. In its more recent policy recommendations, the WWF argues that contribution claims are a preferable option.

Swedish net-zero target and that the credits are not suitable for offsetting claims (in other words, the set-up is in line with approach 1 based on “NDC support units”), and (ii) any carbon revenues will be deducted from the government support.

There is a high likelihood that the approach suggested by the Swedish Energy Agency will not be a successful way to generate income from VCM due to the limitations with respect to what claims can be made. It could, at least in theory, save the Swedish state expenses for CDR used towards the Swedish national mitigation target. However, as argued by Kreibich and Hermwille [31], the interest among credit buyers in units that cannot be used for offsetting claims is uncertain and, in addition, incentives for BECCS producers to participate are low.<sup>8</sup>

There are several alternative ways that access to finance for Swedish BECCS from state support and VCM could be structured. In the next section we define 4 models and qualitatively compare their respective potential merits and drawbacks.

### 8.3 Alternative carbon crediting approaches for bringing BECCS credits to VCM:

#### Overview and comparison

Crediting approach	Merits	Drawbacks
<p>Approach A. Mitigation contribution claim credits. Users of carbon credits can claim contribution to the achievement of Sweden’s national target.</p> <p>Corresponding adjustments: No</p>	<p>Not questioned by offsetting sceptics.</p>	<p>Assumed weak interest from carbon credit buyers.</p> <p>Weak contribution to raised global mitigation ambition.</p> <p>Forms for communicating mitigation contribution claims not established.</p>
<p>Approach B. Carbon credits eligible for offsetting claims issued based on mitigation outcomes (MO) also counted towards Sweden’s national target.</p> <p>Corresponding adjustments (CA): No</p>	<p>Enables maximised revenue for Swedish BECCS.</p>	<p>Does not lead to enhanced global ambition (counted as supplementary measures for already committed balancing of Sweden’s residual emissions).</p> <p>Not attractive offer for buyers with preference for carbon credits associated with CA.</p> <p>A devaluation of requirements for legitimate offsetting claims.</p> <p>Price of carbon credits offered to VCM is subsidised with Swedish public funding.</p>

<sup>8</sup> It remains to be seen how this issue develops as offsetting claims are being increasingly questioned and likely restricted by regulation (e.g., ongoing work on the Green claims directive and the Empowering consumers for the green transition directive in the EU) and as guidance regarding contribution claims emerges (e.g., ongoing work on “beyond value chain mitigation” within the Science-Based Targets initiative [44].

Crediting approach	Merits	Drawbacks
<p>Approach C. Blended finance with attribution. An attribution key is used to attribute MO to different climate finance streams (such as grants, state support and carbon revenue).</p> <p>A special case would be 100% carbon revenue from VCM buyer whereby all MO would be eligible for offsetting claims.</p> <p>Corresponding adjustments: Yes, for MO to be eligible for offsetting claims.</p>	<p>Contributes to raising global ambition.</p> <p>Results in credits eligible for offsetting.</p> <p>Attracts VCM funding.</p>	<p>Depending on design, attribution rules can be perceived as unfair.</p> <p>CA currently not possible.</p> <p>A possible (but far from ideal) solution could be that Sweden purchases and cancels ITMOs from countries that can carry out CA. Sweden would not use the purchased ITMOs towards the national target (authorised for other purposes).</p>
<p>Approach D. Blended finance without Swedish state claims.</p> <p>Corresponding adjustments: Yes.</p>	<p>Attractive for buyers and producers of credits. Would maximise outcomes which provides learning for next generation.</p>	<p>Swedish state cannot use as a supplementary measure to reach its net zero target. But in the longer term, the needed credits could be purchased and at a lower cost.</p> <p>CA currently not possible.</p>

## 9 Conclusions and recommendations

Requirements for legitimate offsetting claims that were adopted as good practice for voluntary offsetting of GHG during the time of the Kyoto Protocol imply that carbon credits should represent mitigation *beyond* existing national mitigation targets. These requirements are being challenged by some companies who propose that that it should be allowed to claim mitigation outcomes towards corporate offsetting claims while they are also counted *towards* existing national mitigation targets.

Corresponding adjustments could enable offsetting claims based on carbon removal credits from Swedish BECCS projects that contribute to mitigation beyond existing national mitigation targets and, thus, a raised global ambition. This would enable maintaining the environmental integrity requirements of voluntary offsetting claims have previously been adopted and provides an opportunity to close the gap between the mitigation required to attain the long-term target of the Paris Agreement and the current collective ambition of countries mitigation pledges. This could provide credits for the VCM that can be used for offsetting. It would also provide funding for Swedish BECCS projects (beyond the offsets needed for the Swedish NDC) and contribute to releasing the full potential of BECCS in Sweden.

We therefore conclude that it should be prioritized to explore changes and updates to legislation on the national level in Sweden, and more generally on EU level, in the short and long term to enable corresponding adjustments.

Since it may take considerable time to enable the use of corresponding adjustments, further analysis is recommended to increase understanding of the potential of alternative approaches, such as so-called “contribution claims”, where carbon credit buyers do not use the credits to make offsetting claims.

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## Comment on SFL Policy Brief:

### “Bringing BECCS credits to voluntary carbon markets”

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#### Introduction

In the paper “*Bringing BECCS credits to the voluntary carbon markets*” the authors (Kenneth Möllersten and Lars Zetterberg) provide a valuable perspective on, and analysis of, the different alternatives around management of carbon credits for negative emissions (from BECCS) produced in Sweden. The authors provide an informative background as to why a group of stakeholders is of the opinion that a carbon credit utilized in the Voluntary Carbon Market could be regarded as “double claimed” by the host country and a corporate making a voluntary claim.

The issue of so-called “double claiming” and “co-claiming” is complex. The objective to use the carbon market to close the so called “ambition gap” could create significant adverse effects in relation to the scaling of permanent carbon removals (such as BECCS in Sweden). This situation would be unfortunate and negative in relation to succeeding in reaching the desired and required climate effects.

However, at the same time, the integrity and credibility in climate mitigation activities in general, and in carbon markets specifically, is key. Any schemes and activities must be robust and stand up to scrutiny now and in the future. It is of great importance that corporates allocating funds on a voluntary basis are certain about the instruments’ acceptance and eligibility for different corporate claims.

The conclusion the authors are making in relation to “Approach 3” described in the paper, i.e. recommendation that Corresponding Adjustments (“CA”) should be possible to implement also on a country level within the EU framework, is supported to avoid double counting between nations<sup>1</sup>. However, if applied between nations and corporations, the enablement of CAs will not support the scaling of permanent removals (BECCS in Sweden) to the extent necessary.

The difference between permanent carbon removal credits, such as BECCS, and “traditional carbon credits”<sup>2</sup> in relation to the CA and possibility to use the credits as tool for “closing the ambition gap” is elaborated in this Comment. The question of whether it is appropriate to apply CA at all on carbon credits traded in VCM is not the focus of this Comment.

1 The mechanics would be needed for carbon market trades between countries and also to creates an optionality to be used in the future for credits sold in the VCM (regardless the conclusion in this *Comment*).

2 “Traditional carbon credits” is used in this paper as a simplified term for the type of carbon credits which has historically constituted the majority of transactions in the VCM market (e.g. renewable energy, cockstove projects, deforestation, fossil emission reduction projects etc.)

## Two Different Positions

In the paper three different approaches are described for how a carbon credit could be handled when introduced into the VCM market. The different approaches are well described. However, it would help to briefly describe the two fundamentally different positions underpinning these approaches. The two positions differ in terms of whether a carbon credit purchased by a corporate for voluntary utilization (claim) should require a corresponding adjustment (“CA”) or not in order to avoid double claiming between a host nation and a corporation. The two different positions have direct impact on whether the “legitimate concerns” referred to in Approach 2<sup>3</sup> in the paper are valid and well-grounded or not.

### Position 1 – “Different Accounting Systems”

This position means that the VCM is a completely separate accounting system and should not be linked with the accounting under Paris Agreement (i.e. all nations’ NDCs plus CORSIA and IMO). The situation with double claiming between the accounting systems exists to a very large extent already today. Moreover, this position also emphasizes that the amount of funding from private corporates will be negatively impacted to a significant extent if linkage between nations and VCM were to be applied.

#### A simple example to illustrate existing double claiming:

Company A is a power producer, Company B a manufacturer of building materials utilizing electricity from Company A in its production, and Company C is a real estate company buying building materials from Company B. All companies are domiciled in Country X. Assume that Company A reduces its CO<sub>2</sub> emissions in its power production. This emission reduction will (i) be reported in Country X’ National Inventory Reporting (NIR) and potentially impact its fulfillment of its NDC, (ii) be reported by Corporate A as reduced Scope 1 emissions in its Sustainability Reporting, (iii) be reported by Corporate B as reduced Scope 2 emissions in its Sustainability Reporting, and (iv) be reported by Corporate C as a reduction in Scope 3 emissions in its Sustainability Reporting.

Consequently, an emission reduction by Company A will be double claimed by Country A and all Corporates A, B and C.

A country’s reporting and accounting is solely aggregating territorial emissions, meanwhile corporates focus on all emissions (Scope 1, 2, and 3 – both up- and downstream) regardless of in which territory the emissions have occurred. The accounting systems are different and separate and double counting is inevitable and occurs constantly.

The problem and debate arise when a mitigation activity (or carbon removal activity) is packaged into a carbon credit and sold to a corporate. The advocates of Position 1 question why this activity when packaged into a carbon credit should require a CA to avoid double claiming meanwhile a mitigation activity in a corporate’s own value chain does not require such CA. The CA requirement for only a carbon credit results in a non-consistent treatment.

More importantly, the advocates of this position see a significant risk that the alternative would lead to less voluntary funding being allocated by private corporates into climate projects traded in the VCM and that states will be overwhelmed by the cost of funding all climate mitigation and adaptation measures.

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<sup>3</sup> Refer to page 9 (section 7) in the Paper, “Units that are used to support neutrality claims but are not associated with corresponding adjustments by the project host country. The authors argue that such crediting within the scope of an NDC without corresponding adjustments faces serious legitimacy concerns and lead to double claiming and imply reputational risks of companies buying those credits.”

## Position 2 – “Close Ambition Gap with VCM”

The meaning of this position is described in the paper. In short, the main reason for requiring a corresponding adjustment when an activity is packaged into a carbon credit is to (i) close the “ambition gap”<sup>4</sup>, and (ii) legacy reason which includes acceptance to apply the “carbon market rules and principles” from carbon market between countries<sup>5</sup>.

An additional argument raised in the debate is the inherent uncertainties and weaknesses related to carbon markets and existing carbon credits. The uncertainties and weaknesses include risk for adverse behavior if carbon credits are available as a decarbonization tool, the risk for low quality in terms of baseline and leakage, as well as limited permanence. The advocates of this position are claiming that CA is a tool to balance these risks. That the structure advocated under this position will likely disincentivize and reduce the amount of private funding into the VCM market is not the main concern for advocates of this position; they are rather concerned with avoiding any double claiming.

## Summary

Both positions have valid arguments based on each position’s fundamentally different premises (i.e. the different views as to what the purpose / objective should be with the VCM and how climate finance can and should be maximized).

The debate has been ongoing for a long time. There is a high risk that there will not be any mutual agreement reached in the near future, and there is a likelihood that the two opposing positions will remain for some time.

Key determinants will be how claims frameworks (e.g. VCMi, SBTi, ISO) will stipulate whether a carbon credit needs to have a CA or not in order to be eligible for the climate claims made by corporates.<sup>6</sup>

## Carbon Markets and Incentives

### Function of Market

The basic functions of the carbon market, both between countries as well as when used in the VCM, is to match a buyer and a seller at a price where the transaction provides benefits for both sides. Consequently, a trade in a carbon credit is matched between (i) a buyer (country or corporate) which is high-up on the abatement cost curve versus (ii) a seller (host country and project developer) relatively low on the abatement cost curve. In such trade, the fundamental prerequisite for a win-win situation does exist, i.e. the buyer is prepared to pay more than what the host country (seller) requires.

When the fundamental prerequisite exists, the utilization (or ownership) of a mitigation outcome in a traded carbon credit could be split between the buyer and seller despite it being solely funded / paid for by the buyer. The carbon credit is sufficiently inexpensive to enable the possibility for the host country to charge a “mark-up”. Since having a CA approved by a host country will result in a cost<sup>7</sup>, the prerequisite for the transaction described above is necessary to make such CA viable.

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4 “Ambitions gap” refers to the difference between countries’ current climate targets and policies versus the collective global goals to limit temperature rise to 1.5 degrees.

5 Refer to page 8 (section 6) in the Paper.

6 If standard setters for corporate claims would accept Approach 1 or Approach 2 in the paper, it would in essence result in the same outcome. It would only be a matter of terminology or semantics.

7 The cost would include transaction cost related to handling the CA, potential share allocated under 6.4 rules, but also an incentive for the host country to enable other climate actions which would support the fulfilment of its climate goals.

## Carbon Credits in Scope

Historically, carbon markets (both between countries and the carbon credits traded in the VCM) has been focused on trading mitigation outcomes from sellers in less developed countries in the southern hemisphere to buyers in more developed countries in the Northern hemisphere. This has meant that funds have been channeled from the richer countries to the less developed countries (which fulfils a purpose in itself).

The historical focus has also resulted in criticism in relation to the traded carbon credits in the terms of these being (i) based on mitigation projects from host countries with less ambitious NDCs, and (ii) often focussed on avoidance and/ or reduction projects with a relatively high degree of uncertainties<sup>8</sup>.

Moreover, the mitigation activities in scope have generally been low on the abatement cost curve compared to where the buyers (countries and/or corporates) have been positioned.<sup>9</sup>

## Permanent Carbon Removals – a New Type of Credit

The question arises when a new type of carbon credits will be introduced into the carbon market – carbon removals with high durability / permanent storage. This type of carbon credit is still expensive, i.e. they are high-up on the abatement cost curve. Many of the permanent removal methods, including BECCS, are facing cost levels which require co-financing, i.e. utilization of public funding and private funding<sup>10</sup> to scale the capacity to the necessary level.

This new type of carbon credits gives rise to the question whether it is possible at all to require host countries, which often have more mature and broader NDCs, to make CA for credits to be sold in the VCM market. Is the fundamental pre-requisite in place to expect that the buyer and seller (including both suppliers and the host country) would trade at a price which would be beneficial for both a buyer and seller? If a CA would be required the carbon credits would become even more expensive and thereby likely reach a cost level which only a very limited number of corporates would be willing to pay on a voluntary basis. The alternative “Approach 1” in the paper, will also most likely not result in the demand necessary to scale the capacity of BECCS to the size needed (as also concluded by the authors).

## Differentiation between carbon credits?

There is an urgent need to stimulate the growth and development of net negative emissions. These projects and activities are capital intensive and have long lead times to implement. The permanent carbon removals will be a key complementary tool to reach net zero and beyond. It is not viable to assume that the capacity of the carbon removals will be available when abatements have been made and therefore residual emissions must be handled by carbon removals. Therefore, the scaling of the permanent removals needs to start as soon as possible.

Concerned stakeholders in the Swedish BECCS opportunity agree that in order to succeed in scaling permanent removals private funds from voluntary carbon market are needed. To attract private funds, the corporate demand for these types of carbon credits must be secured.

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8 The uncertainties and risk entailed to “traditional carbon credits” are primarily the utilization of counterfactual and uncertain baseline calculations, leakage risks, and lower or uncertain permanence. An example of the, at least perceived uncertainties and quality issues, was raised in a highly debated article in the Guardian in early 2023.

9 Another argument for Position 2 – “Close the Ambition Gap” is that the required CA and the increased cost might contribute positively to the perceived credibility in this type of “traditional carbon credits” since a criticism per se has been cheapness and low-cost carbon credits. The criticism has been that the low cost does not send an appropriate price signal to corporates regarding the real cost of emissions.

10 The requirement for co-funding is especially required when uncertainty and risk in the projects are taken into account.

The prerequisite for permanent removals (in terms of price levels and position on abatement curve) shows that they are not suitable to be used as a tool to “close the ambition gap” by requiring CA. Moreover, other arguments put forward for “Position 2 – Close the Ambition Gap” are not to the same extent valid for permanent carbon removals given the lower risk for adverse behavior by buyers due to the high price level of these credits<sup>11</sup> and also lower risk profile<sup>12</sup>. The main target with permanent removals should instead be to scale the production to ensure that capacity is available when needed. The accounting and claiming for the permanent removals would not differ compared to the existing, and accepted, accounting between countries’ NIRs and corporates sustainability reports compared to abatements in own value chain (refer to example in earlier section). Noteworthy is that even if permanent removals are not a suitable instrument to close the defined ambition gap, the instrument represents per se the highest ambitions in relation to management of residual emissions.

If the “VCM-community” (policy makers, framework-setters, NGOs and other stakeholders) were to conclude that the desirable path is the “Position 2 – Close Ambition Gap”, the primary target with traditional carbon credits could still be a tool for closing the ambition gap.<sup>13</sup> At the same time, permanent carbon removals could be used to target maximum scaling to ensure sufficient capacity is available to manage the residual emissions and to reach net zero. This structure would result in a differentiation in treatment of the traditional carbon credits and the permanent carbon removals in terms of required CA.<sup>14</sup>

In the future it could be anticipated that a large share of permanent carbon removals will be part of compliance schemes (e.g. accepted in ETS-systems) whereby the issue with CA between host nations and corporates for those carbon credits would not be applicable (since they are not traded into the VCM-market). Moreover, if countries define clear and separate targets for emission reductions and the net-negative emissions (both for permanent removals as well as biogenic removals) and the ambition level in NDCs is accelerated, the fundamental need for using carbon credits as a tool to close the ambition gap should be reduced.

## Conclusion

Regardless of which Position one advocates, CAs between nations and corporations is not a viable path for permanent carbon removals in the VCM if capacity is to scale to the level needed. The carbon removal credit is not suited as a tool to close the ambition gap. Moreover, permanent carbon removals do not have the same characteristics as traditional carbon credits. Consequently, the general arguments to treat traded mitigation outcomes more conservatively when packaged in a carbon credit should not be applicable for this type of new carbon removal credits.

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11 The risk that a corporate is purchasing expensive (\$100+) carbon removals as a “quick and cheap fix” and also be accused of greenwashing should be limited. The “traditional carbon credits” are more exposed for such risk only given the lower price point.

12 Risk profile in terms of baseline calculations, leakage risks, and permanence.

13 As previously stated, this position would still create (i) inconsistencies versus emission reductions in own value chain, and (ii) risk for preventing mobilization of private and voluntary funding (as well as slowing down climate mitigation).

14 Over time, the cost for the permanent removals could have been driven down (due to scale and technology development) and / or other available projects and mitigation outcomes have become more expensive and climbed up the abatement cost curve. At such point, the possibility for a reassessment of the differentiation in treatment of permanent removals versus “traditional carbon credits” could in principle be made. However, such reassessment would require that (i) the Position 2 has become the common and agreed view (despite leading to less allocation of corporates’ private funding), and (ii) it is accepted that the reassessment means that the other arguments are not taken into account (lower risk related to e.g. baseline, permanence, and the higher price levels and therefore more appropriate price signal). On the other hand, if the common view is that Position 1 is the most appropriate handling of all types of carbon credits in the VCM market, the differentiation is not valid anymore and a reassessment obsolete.

If advocates from both positions accept this, and a common understanding is reached to handle the permanent removals differently, it should be a key factor to achieve the goals to scale the net-negative emission capacity. However, such position would require clarification to ensure that corporates, on a voluntary basis, are prepared to commit a sizeable amount of their funds. The corporates must know if and how they can utilize these relatively expensive carbon removal tools in their decarbonization pathway.

To create certainty for corporates, national governments, policy makers, and standard setters would need to clearly state that committing to future larger purchase of permanent removals is an accepted, prudent, and necessary climate action. An important step in relation to the Swedish BECCS initiative would therefore be for the government and authorities in Sweden to clearly state this position to (i) remove uncertainty for buyers, and (ii) influence other stakeholders to make clear statements on this issue. If not clarified, the broader base of corporates, which are needed to mobilize sufficient private funds, is unlikely to provide the necessary funding.

Sweden and the other Nordic countries have a great possibility to develop a sizeable production of net negative emissions. It should be developed with the highest degree of transparency to ensure integrity / robustness in the carbon credits traded and avoid any negative implications at a later stage. An open and constructive approach to how permanent removals should be handled when used in the VCM will be required by stakeholders to avoid losing the opportunity to develop an industry in the Nordics which can support net zero pathways for countries and regions even outside the Nordics.

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