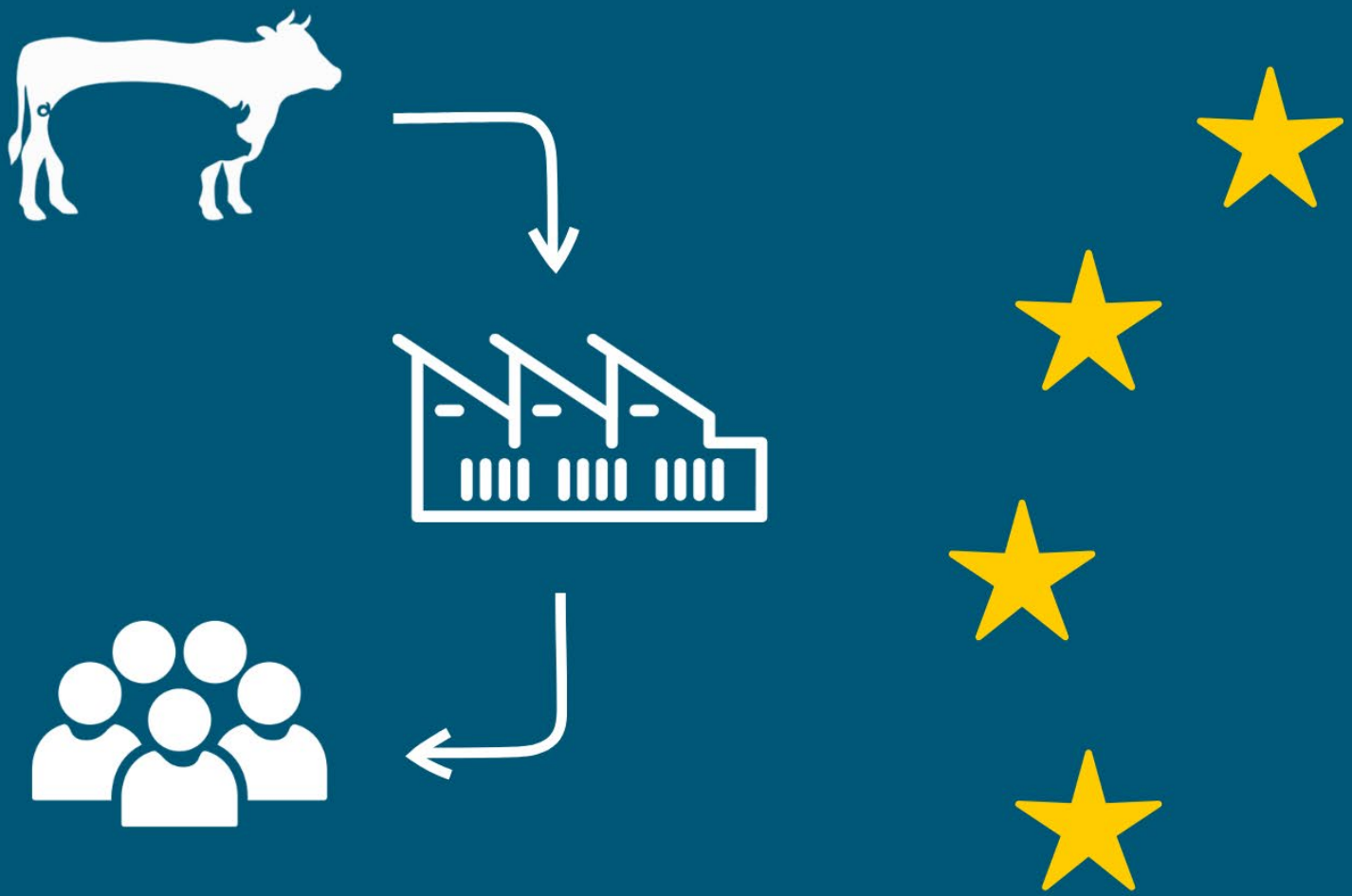
CLIMATE ACTION IN A DOWNSTREAM AGRICULTURAL EMISSIONS TRADING SYSTEM



CONCITO

Climate action in a downstream agricultural emissions trading system

Report

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Executive Summary

Agriculture is the largest sector in the EU that is not covered by an Emissions Trading System (ETS) and thereby not subject to the polluter pays principle. At the same time the sector has hardly experienced reductions in greenhouse gas (GHG) emissions in the last 15 years and will, based on existing measures, only deliver very limited reductions in the future. Currently, various policy interventions, such as an agricultural emissions trading system (AgETS), financing of on-farm credits and/or mandatory climate standards, for regulating agricultural GHG emissions are being considered and discussed among stakeholders across the European Union. Recently, the Strategic Dialogue on the Future of EU Agriculture delivered its final report calling for further work with stakeholders and experts to assess the feasibility and relevance of an AgETS (European Commission, 2024a).

The introduction of a downstream emissions trading system for livestock emissions (downstream AgETS) is one of the discussed options to incentivize climate change mitigation in the agri-food value chain. This has been analyzed in a report commissioned by the European Commission called “Pricing Agricultural Emissions and Rewarding Climate Action in the Agri-food Value Chain” (Bognar et al., 2023), hereafter “Trinomics report”. The Trinomics report also considered four other AgETS options, but these are not analyzed in this report, as the downstream model has been the center of discussion in the aftermath of the publication of the Trinomics report.

A downstream AgETS focuses specifically on livestock emissions and could place the obligation on food processors or further down the agri-food value chain such as retailers. While there are many other purchasers of agricultural products, this report covers meat and dairy processors given the complexity to place the obligation further downstream and limited options to pass on incentives for climate action to farmers.

The design of an emissions trading system involves several key policy choices with the potential to significantly influence the system's effectiveness and efficiency. This report assesses effectiveness aspects of a downstream AgETS such as 1) the possible climate effect from the emissions cap and 2) climate action along the agri-food value chain incentivized through the allowance price of a downstream AgETS.

Scope of greenhouse gas emissions and setting a climate-effective emissions cap

GHG emissions from agriculture (including GHG emissions from crop- and grassland) in the EU account for approximately 11% of the total net-GHG emissions (EEA, 2022). The largest source of these emissions (54%) comes from livestock through enteric fermentation and manure management (EEA, 2023). A downstream AgETS could cap and control these emissions by limiting the number of emission allowances. Other agricultural GHG emissions, such as those from soil fertilization and peatlands, should to the greatest extent possible also be covered by effective climate regulation in the agricultural sector.

Setting an effective emissions cap requires balancing cost-effectiveness, GHG reduction potentials, and fairness in agriculture's contribution to EU climate targets. The emissions cap should be well-assessed and gradually reduced over time to guide mitigation efforts in agriculture. Other design features to ensure an orderly, smooth, and efficient start and management of the system could be introduced in parallel. Lessons from existing emissions trading systems, such as adjusting the emissions cap after reporting and temporarily increasing auctioning at the outset, provide valuable insights when designing an AgETS.

Currently, voluntary credits are being discussed as a mechanism to incentivize on-farm emission mitigation under a downstream AgETS. Voluntary credits should not be directly connected to the AgETS to ensure environmental integrity, simplicity, and learning of the system. Integrating these credits in the future would require careful analysis, including potential adjustments and quantitative or qualitative restrictions to the emissions cap, to ensure the system's efficiency and environmental integrity. Lessons from existing certification schemes for carbon farming, including challenges in measurement and the limitations of their voluntary nature, should be thoroughly assessed before considering the integration of voluntary credits into an AgETS system.

Climate action along the agri-food value chain

Overall, the level of climate action driven by the allowance price in a downstream AgETS will depend on factors such as:

1. The level of the allowance price.
2. The mitigation and transaction cost.
3. The innovation of mitigation technologies/techniques and products.
4. The cost-pass-through to both farmers and consumers and their responsiveness to the allowance price signal.

These drivers of climate action can be categorized into three incentive pathways for climate action. While the pathways are not mutually exclusive and can occur simultaneously, the predominant pathway will depend on design elements such as monitoring, reporting and verification (e.g. the default, audit, and/or voluntary credit approach) and rules for passing on the incentives along the agri-food chain (e.g. on rewarding farmers).

Table 1: Incentive pathways for climate action under a downstream AgETS

Pathway	Description	Mitigation options	Potential climate action
PW1 **On-farm climate action**	**Default approach for food processors** Food processors' obligation to surrender allowances is measured through default emission values of their meat and dairy inputs. There is no direct information on GHG emissions on-farm.	Mitigation on-farm occurs by reducing the GHG-intensity of meat and dairy products. Examples of mitigation options on-farm are increased efficiency, feed additives and manure management.	**Default approach for food processors** The default approach will not incentivize on-farm mitigation, since mitigation efforts will not be reflected in the obligation of the food processor.
	Audit approach for food processors Food processors would be incentivized or required to audit their scope 3 GHG emissions by collecting data from suppliers using more detailed on-farm monitoring, reporting, and verification (MRV) of all GHG emissions from livestock within the value chain.		**Audit approach for food processors** Disclosure of on-farm GHG emission data could make climate friendly production more valuable to food processors as reduction in GHG emissions on-farm will reduce their obligation to surrender allowances. Food processors could incentivize farmers by offering premiums for products with verified lower emissions. Rules could be established to determine the rewards from the food processors to the farmers.
	Voluntary credits approach for farmers Farmers can voluntarily generate credits based on emission reductions on their farms beyond a standardized or activity-specific baseline. Credits can be bought directly or through an intermediary institution to reduce the obligation to surrender allowances for the food processor.		**Voluntary credits approach for farmers** A voluntary credit approach would most likely have a low overall climate effect. A high allowance price/reward is needed to voluntarily set-up monitoring, reporting, and verification as well as carry out mitigation efforts and cover transaction costs. Risks of low participation rates and non-additional credits could potentially affect the climate effect of the system.
PW2 **Consumer climate action**	Food processors will pass on a share of the costs of the allowance price leading to price increases on meat and dairy products, to which consumers react with reductions in demand.	Consumers will reduce consumption of GHG-intensive meat and dairy products, and/or shift to lower emissions products.	Price incentives would drive climate action by influencing consumer behavior. The level of emissions reduction would depend on the degree of cost pass-through of the allowance prices, the price elasticities of demand, and the potential for carbon leakage through trade. Price elasticities suggest that consumers are more responsive to price changes in meat than dairy, with variation across different EU regions. Depending on carbon leakage measures, changes in demand can lead to changes in production.
PW3 **Food processor climate action**	The allowance price incentivizes food processors to reduce their production of meat and dairy, substituting GHG-intensive products with lower emission products and/or investing in abatement mechanisms.	Food processors can reduce food waste, reduce meat and dairy contents in products, and develop meat and dairy alternatives.	Food processors can pursue product innovation and reformulation to lower their obligation to surrender allowances. The mitigation potential will depend on several factors such as consumer behavior, the feasibility of product reformulation/ innovation (e.g. for highly specialized and small- scale food processors), the availability and scalability of low-emission products, and the risk of carbon leakage through imports or shifts in trade patterns.

Recommendations

CONCITO recommends emissions trading as a mitigation tool in agriculture and will engage in further discussions about all potential points of obligation. If a downstream AgETS is established, CONCITO recommends considering five key design principles to effectively reduce livestock GHG emissions:

Clear incentives for mitigation on farm

An AgETS should be designed to ensure that climate action on farm level occurs, since it has a large and cost-effective mitigation potential. Farmers should be incentivized to implement mitigation measures, which must lead to real, additional and verifiable reduction in emissions. The audit approach for food processors should be further explored.

Ensuring good monitoring, reporting, and verification

Monitoring, reporting and verification (MRV) of agricultural emissions is essential for a well-functioning AgETS. Measures should be taken to harmonize and incentivize on-farm MRV of GHG emissions. Special consideration must be given to the design (e.g. audit versus baseline approach), coherence with national GHG inventories, and the use of existing data (e.g. from the common agricultural policy, food safety legislation, animal welfare legislation, and corporate reporting rules) to reduce administrative burdens and ease implementation.

Ensuring market integrity

An AgETS can only be an effective climate instrument if it ensures a functioning allowance market and a strong, fair, and manageable price signal through its emissions cap. Therefore, issues of volatility, liquidity, and the risk of market abuse must be addressed. Voluntary credits for emission reductions and carbon removals should be disconnected from the system to ensure environmental integrity, simplicity, and learnings of the system.

Simplicity and administrative feasibility

The administrative feasibility for the actors along the agri-food value chain should be considered e.g. through threshold values, providing training and support to farmers and other stakeholders to participate in the ETS, increasing the details of the MRV over time, and/or use of existing data.

Redistribution of AgETS revenues

Repurposing revenues from an AgETS towards targeted climate action in the agricultural sector can amplify its overall climate impact. A portion of these revenues could be allocated to support mitigation measures beyond the scope of the downstream AgETS, including carbon removals by farmers and foresters. Additionally, revenues could be used to mitigate the potential distributional effects on consumers as well as to finance innovation and promote climate-friendly consumption.

A final decision on climate regulation of agriculture will require thorough assessments of all GHG emissions from agriculture and exploring other policy options such as an on-farm and/or upstream AgETS. This report focuses on effectiveness aspects of a downstream AgETS, but other elements such as competitiveness, carbon leakage, other environmental objectives, and distributional impacts will also need to be taken into account and addressed as part of the final policy design.

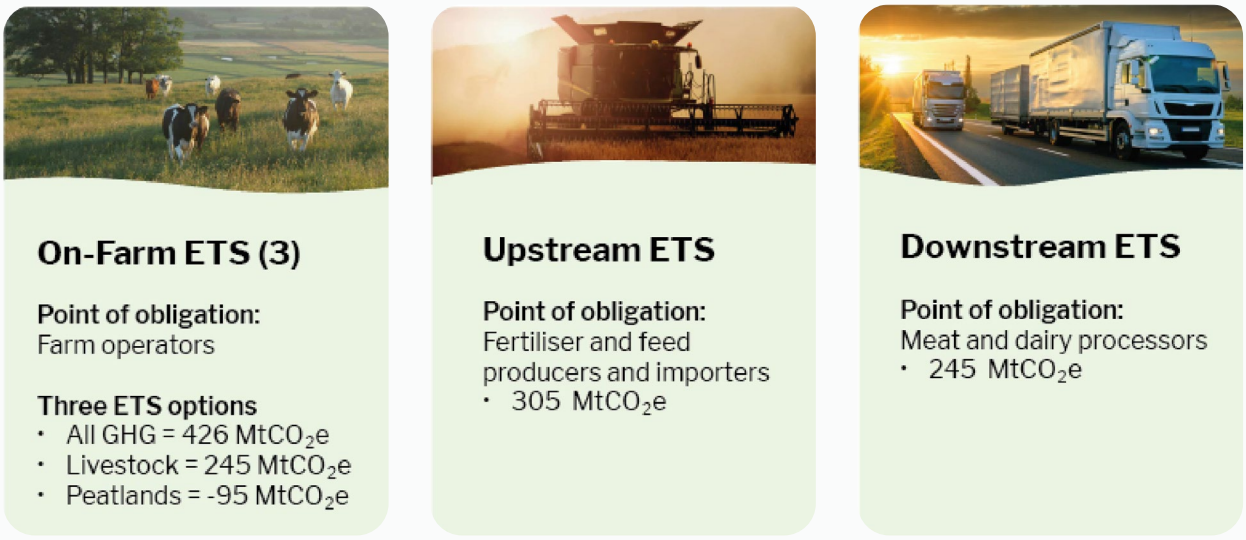
For an effective and efficient implementation of an AgETS, it is also relevant to assess how the CAP and new policies to support more sustainable and healthy diets could effectively contribute to the EU's climate objectives. Any emissions trading in the agricultural sector needs to be underpinned by EU-wide climate and environmental sectoral regulation. Conflicting policy signals - such as pricing GHG emissions while simultaneously subsidizing emissions-intensive agriculture - should be avoided to the greatest extent possible. These elements requires further research to ensure a sustainable and competitive agricultural sector.

2. Introduction

GHG emissions emerging from the agricultural sector in the EU have been relatively steady since 2005, while GHG emissions from other sectors have decreased significantly. Today, non-CO_2 GHG emissions from agriculture[1] account for about 11% of the EU's total greenhouse gas emissions (EEA, 2022). This has prompted the European Court of Auditors and the European Scientific Advisory Board on Climate Change to recommend the European Commission to look into applying carbon pricing to agricultural emissions, as it is applied in other sectors within the Union (European Court of Auditors, 2021; European Scientific Advisory Board on Climate Change, 2024). In response, the European Commission initially explored this in a study on "Pricing agricultural emissions and rewarding climate action in the agri-food value chain", published in November 2023 (Bognar et al., 2023). The report explores five policy options, all of which involve emission trading systems (ETS). The European Commission is now conducting a new project called "Incentives for Climate Change Mitigation across the Agri-food Value Chain" (hereinafter 'the follow-up study'), which investigates policy options for climate change mitigation across the agri-food value chain (including emissions trading and other possible policy options). In parallel, the Strategic Dialogue on the Future of EU Agriculture delivered its final report calling for further work with stakeholders and experts to assess the feasibility and relevance of an agricultural emissions trading system (European Commission, 2024a).

As a market-based mechanism, an emissions trading system is designed to incentivize climate mitigation by imposing a cost on pollutants, thereby encouraging regulated entities to reduce their emissions. The advantage of an ETS compared to command-and-control regulation lies in its ability to ensure emissions reductions through setting an upper and decreasing limit on emissions (the 'emissions cap') and stimulate changes in production practice and foster innovation via price signals. Such price signals provide direct economic incentives to businesses to adopt cleaner production methods, driving innovation and efficiency while meeting environmental goals. An ETS is considered a cost-effective tool because it ensures that the least expensive emission reductions are made first. Companies that reduce their emissions below their obligation can choose to either save their surplus allowances for future use or sell them to other companies that need additional allowances. This system encourages entities with lower abatement costs to cut emissions, while providing flexibility for those facing higher costs by allowing them to purchase allowances for compliance.

Figure 1: The five AgETS options as presented by Trinomics



[1] Non-CO_2 GHG emissions from agriculture are methane (CH_4) and nitrous oxide (N_2O).

Among the five policy options in the Trinomics report, three are on-farm models where the point of obligation is assigned to individual farms. While these options are an example of the application of carbon pricing close to the farmers and have the largest scope of emissions covered among all models, the Trinomics report points to possible administrative costs, lack of ease of implementation, distributional impacts on farms, and stakeholder acceptance as risks associated with on-farm emissions trading systems. However, it must be noted that design features to ease those impacts such as participation thresholds would most likely be included in an on-farm AgETS (like in the current emission trading system for energy, industry, aviation, and maritime).

Besides the three on-farm models, two other models were analyzed by the Trinomics report, see Figure 1. Here, either (1) upstream entities such as fertilizer producers and feed importers/producers or (2) downstream food processors in the meat and dairy industry are appointed as the point of obligation. The follow-up study will most likely also investigate covering retailers by the scope of an emissions trading system, as they occupy the final stage of the agri-food value chain. Whether on-farm mitigation is incentivized under these models is strongly dependent on the extent to which the other actors are passing on incentives to reduce emissions to farms. This underscores the importance of discussing the dynamics of incentive transmission in the context of these different ETS options.

Following the release of the Trinomics report, the downstream model has garnered significant attention in subsequent policy discussions, properly due to its perceived political feasibility. Here, CONCITO identified a partial knowledge gap in how to pass on incentives effectively and efficiently along the agri-food value chain under a downstream system. In response to these developments, this report addresses two key questions related to the climate impact of a downstream AgETS: 1) How can the integrity of the emissions cap be ensured, and 2) How would climate action along the agri-food value chain be incentivized from the price signal of an AgETS.

While this report focuses on analyzing the downstream AgETS model presented by Trinomics, CONCITO is not dismissing other potential points of obligation. Rather, CONCITO will engage in further discussions about all potential points of obligation for carbon pricing in the agri-food value chain in the future.

Climate effects under a downstream AgETS

This report aims to explore the climate effects of a downstream AgETS. Some of the key arguments in favor of a downstream AgETS compared to other ETS models have been its political feasibility, including stakeholder acceptance and farm-level impacts, as well as its potential ease of implementation. The design of an emissions trading system involves several key policy choices with the potential to significantly influence the system's effectiveness and efficiency. This necessitates a thorough analysis of both the design of an effective emissions cap and the mechanisms by which the cap and its resulting allowance price signal can drive climate action throughout the agri-food value chain.

Setting a climate-effective emissions cap

A downstream AgETS would limit GHG emissions embedded in the products by meat and dairy processors by setting a legally binding emissions cap, steering the climate effect of the system. An emissions cap establishes a limit on the total volume of emissions from regulated entities and is gradually reduced over time to guide mitigation efforts towards specific emissions reduction targets.

The emissions cap in a downstream ETS, as presented in the Trinomics report, encompasses approximately 54% of GHG emissions from the agricultural sector, including all emissions from enteric fermentation and manure management (Bognar et al., 2023). Possible thresholds for participation and measurements[2] will also affect the coverage of the emissions and thereby the potential climate effect. If a downstream ETS is adopted, other agricultural GHG emissions, notably nitrous oxide from soil fertilization and emissions from peatlands, should be addressed through other effective climate regulations within the agricultural sector, to the greatest extent possible.

Defining an effective emissions cap will partly depend on the agreed contribution of the agricultural sector to the EU climate targets. The contribution should be ambitious and well-assessed in conjunction with the proposal. A recent CONCITO brief examined the assumptions of the 2040 climate target agricultural modelling and identified a need for scrutinization of certain assumptions (CONCITO, 2024). Design features to ensure the orderly, smooth, and efficient launch and management of the systems, such as measures to mitigate imbalances in the supply of allowances, should be thoroughly assessed. Additionally, measures to prevent extreme fluctuations, through for example a market stability reserve, must also be carefully evaluated.

The setting of the emissions cap in the emissions trading system for buildings, road transport, and additional sectors (ETS2) could serve as a model, incorporating adjustments to the emissions cap following initial reporting and incorporating design features to ensure a smooth and efficient system launch, such as a temporary increase in auctioning. This approach should be adapted to account for the specific challenges unique to the agricultural sector, particularly in areas like monitoring, verification, and reporting.

Any certified on-farm voluntary credits from emissions reductions should be disconnected in the beginning of the system to ensure environmental integrity, simplicity, and learnings of the system. Any considerations of integrating voluntary credits in the long run need careful analysis of the effects on environmental integrity. Assessments of potential adjustments to the emissions cap, along with any quantitative or qualitative restrictions, would be necessary. Introducing certified credits without adjusting the cap could risk undermining the environmental integrity of the system.

[2] Thresholds in an AgETS determine which entities are required to participate and can be applied based on various criteria, such as size and turnover for downstream processors. For example, in the meat processing industry, 83% of turnover is generated by 8% of the companies. Similarly, in the dairy manufacturing sector, 91% of turnover is concentrated in 7% of the companies. This indicates that the large-scale food processors would most likely covering the majority of the within scope GHG emissions.

If the integration of credits from emissions reductions is considered in the long-term framework of an AgETS, then credits require careful analysis, including potential adjustments and quantitative or qualitative restrictions to the emissions cap, to ensure the system's efficiency and environmental integrity. The risks related to measurement challenges, such as the non-additional and temporary nature of credits and the potential for double counting, must be thoroughly addressed.

For example, adjustments could be needed to the calculation of the certified reduction emissions, as certificates are often quantified based on factors such as baselines and direct and indirect greenhouse gas emissions over the entire lifecycle of the activity, whereas the monitoring, reporting, and verification in an emissions trading system normally does not operate with baselines and life cycle calculations.

As a first step, experience and evidence from certification schemes, like those under the framework for certifying permanent carbon removals, carbon farming and carbon storage in products (CRCF) and international voluntary credits, should be systematically gathered. This will help identify gaps, such as where certain schemes may have failed to ensure additionality and robust monitoring, report, and verification. An intermediary institution could be designed to help mitigate some of these challenges by e.g. managing adjustments in the emissions cap and some of the liability risks implied with non-permanence, but it is unlikely to resolve all the potential measurement issues including certified emissions reduction credits. The administrative complexity, costs, and political feasibility of setting up the intermediary institution should also be considered.

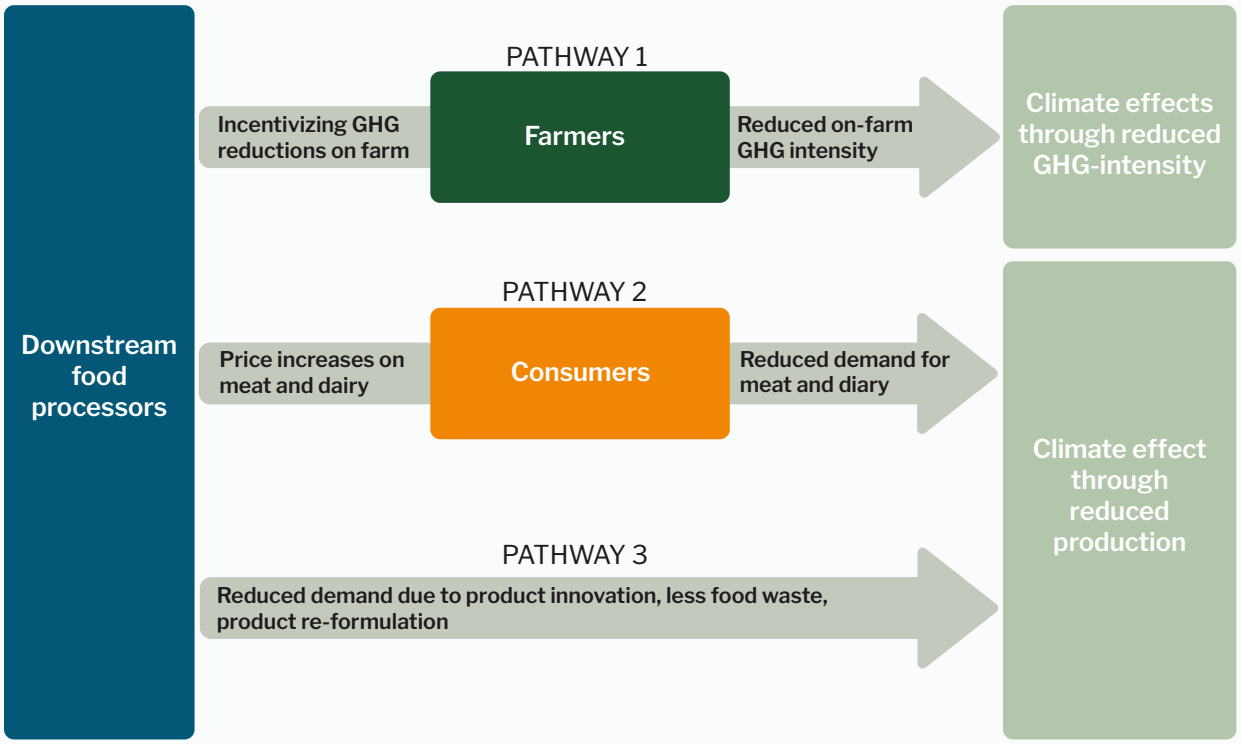
Efficient climate action along the agri-food value chain

As mentioned above, the emissions cap and the emissions scope define how fast and how many emissions are reduced within a downstream AgETS. However, emission reductions are also associated with a cost such as unrealized revenues. These implicit costs of carbon emission reductions are also called marginal abatement costs.

An efficient ETS ensures the least expensive emission reductions are made first, because companies with lower abatement costs reduce their emissions first, and those with higher costs can purchase allowances instead. This system effectively drives down the total cost of achieving a given emissions target by utilizing market forces to allocate reduction efforts efficiently. In the following, we will examine how three different downstream AgETS incentive pathways can enable efficient climate action along the agri-food value chain to the greatest extent possible.

In a downstream AgETS there could be different incentives for climate action, which are described as incentive pathways for climate action in Figure 2. While the pathways are not mutually exclusive and can occur simultaneously, the predominant pathway will depend on design elements such as the approach to monitoring, reporting, and verification - whether through default values, audits, or voluntary credits. Additionally, the rules for passing incentives along the agri-food chain, including how farmers are rewarded, will also play a critical role.

Figure 2: Three incentive pathways for climate action in a downstream AgETS



From a pure efficiency perspective, it is crucial to enable emission reductions across all pathways, as the marginal cost of abatement increases progressively when reductions are concentrated within a single pathway. Allowing the reduction efforts to be distributed across multiple pathways ensures a more cost-efficient approach to lowering GHG emissions covered by the downstream AgETS.

In the next chapters, the report will examine PW1 in more detail under the chapter "On-farm climate action" looking at a default approach, an audit approach and a voluntary credit approach, PW2 will be examined in chapter "Consumer climate action". Finally, PW3 will be reviewed under the chapter on "Food processor climate action".

Pathway 1: On-farm climate action

Pathway 1 is distinct in the sense that it targets on-farm mitigation efforts, which could lead to reduced GHG-intensity of agricultural products. On-farm measures that reduce the GHG-intensity of livestock products include among other measures improved manure management, prolonged dairy cow retention, and addition of feed additives. It is important that an AgETS enables incentives on reductions of on-farm emissions through changes in production practices to unlock cost-effective mitigation potential. Modelling from the European Commission on the 2040 climate target indicates that, given the marginal abatement costs, approximately 50 $MtCO_2$-eq can be abated at costs below 50 EUR/$MtCO_2$-eq by 2040, with 34 $MtCO_2$-eq of that attributed solely to non-CO_2 emissions from livestock (European Commission, 2024b).

PW1 can only be enabled, if on-farm climate actions are incentivized through a detailed monitoring, reporting and verification (MRV) system. Without a detailed MRV system capable of accurately tracking the deployment of mitigation practices and technologies, the system will not be able to verify that on-farm measures have been implemented and resulted in real emissions reductions. Establishing a detailed MRV system is therefore of paramount importance if the full potential of climate action of the system is to be realized.

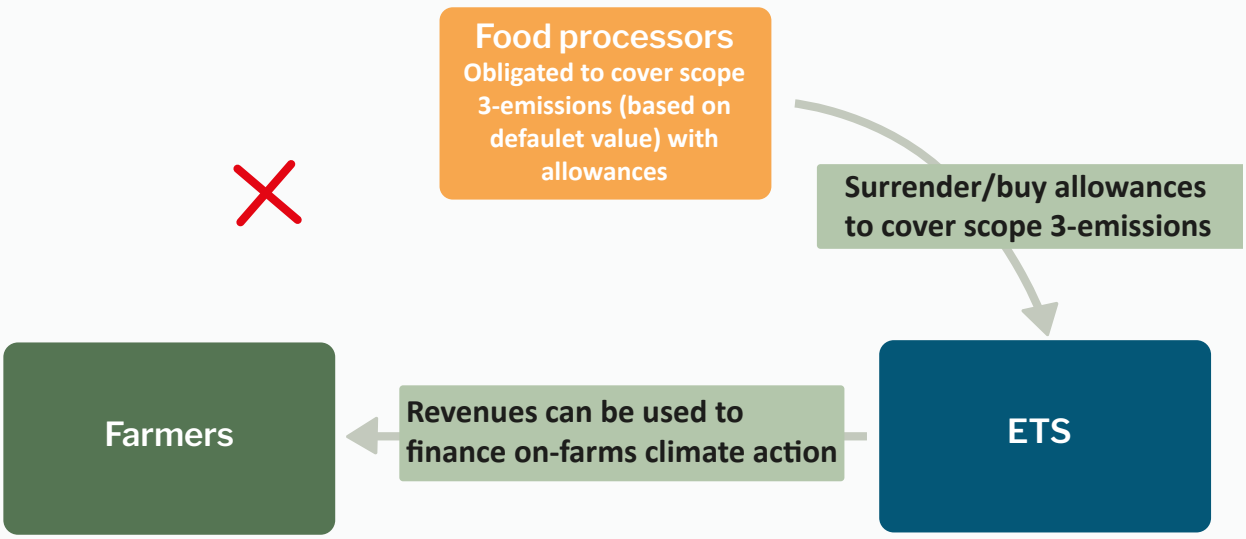
This chapter will examine three different approaches to MRV in a downstream AgETS. First, it explores a **default approach,** and next, it outlines how an **audit-based approach** for food processors and farmers could be implemented. Finally, it discusses a **voluntary credit approach** and its implications for climate action.

Default approach for food processors

Under a default approach food processors' obligation to surrender allowances is measured through default emission values of their meat and dairy inputs (see details in Box 1). There is no direct information on GHG intensity of the meat and dairy products from livestock farms. The default approach will not incentivize on-farm mitigation, since mitigation efforts would not reduce the obligation to surrender allowances. The default approach will only enable PW2 and PW3.

One option to incentivize farmers to reduce emissions on-farm is by utilizing ETS revenues to pay for mitigation. This option is described in the chapter on ETS revenues and is not exclusive to the default approach.

Figure 3: The default MRV approach



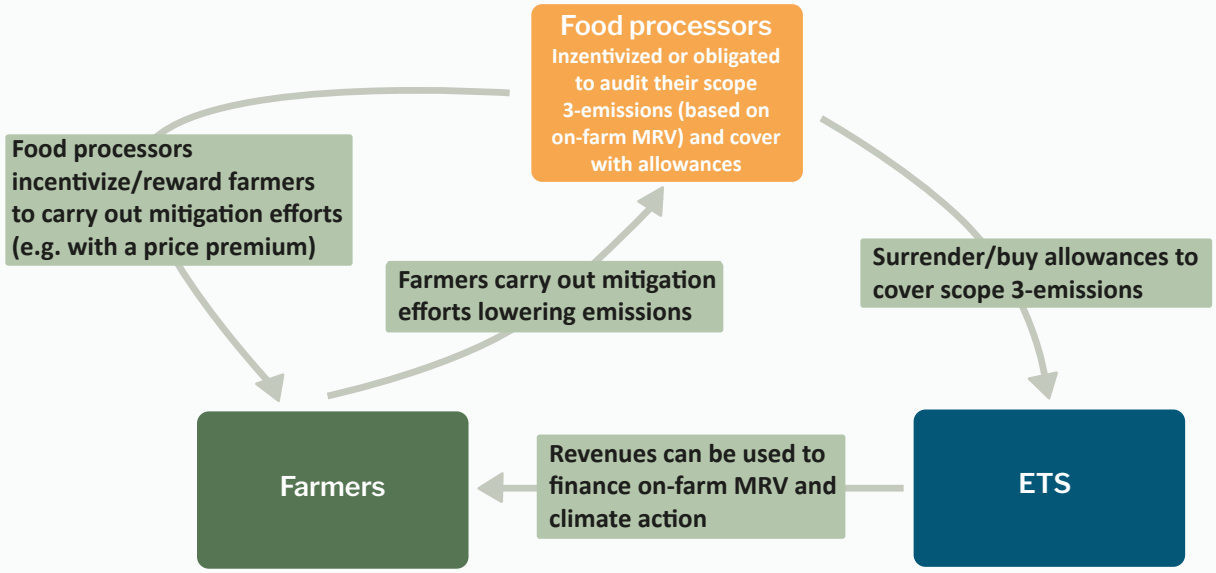
Box 1: Default MRV approach as described in the Trinomics report

In the default approach, emissions are quantified based on default emission values per unit of input (i.e. per kg of beef). This emission factor can incorporate a small set of characteristics (husbandry type, animal age). Food processors are mandated to disclose their purchased quantities and associated emissions. Under a default approach to MRV, there will be no data collection on-farm. Therefore, the potential cost and burden to the reporting entity is expected to be lower compared to the other options.

Audit approach for food processors

Instead of using default values, food processors could be incentivized or obligated over time to audit their scope 3 GHG emissions through collection of supplier emissions using more detailed on-farm MRV on GHG emissions (see more details in Box 4). Disclosure and provision of on-farm data could make climate friendly production more valuable to food processors, as reduction in emissions on-farm (e.g. through on-farm mitigation efforts) will reduce the obligation to surrender allowances.

Figure 4: Audit approach



The introduction of the **audit approach** could be done in several ways. In the beginning of a downstream ETS, the obligation for food processors could be based on conservative default values for their scope 3 GHG emissions (at a fairly high emissions level), making it relatively expensive for downstream processors not to collect the more detailed on-farm MRV. This could encourage food processors to implement and opt-in more detailed on-farm MRV in their emissions reports. This logic has e.g. been used for MRV on non-CO_2 emissions from aviation in the current emissions trading system (European Commission, 2024c). Another way is to make the collection of more detailed on-farm data mandatory for the suppliers over time. Alternatively, the system could refrain from any mandatory MRV and rather make it voluntary for farmers to opt-in. However, the risks of low participation rates (like in the voluntary credit approach) would be relevant if the opt-in is voluntary for farmers.

Food processors could incentivize and reward farmers who can demonstrate documented emissions reductions on their farm. This could be done by incentivizing supplier farms to adopt mitigation efforts, such as manure management techniques, efficient feeding strategies, and/or for feed additives. Given the emphasis on farmers' roles within the agri-food value chain, rules could be established to formalize incentives and rewards (e.g. price premiums) from food processors to farmers. This could help

ensure that farmers benefit financially from reducing the GHG intensity of their products, while also incentivizing processors to support on-farm mitigation. For example, a potential price premium could be related to the allowance price, automatically adjusting the premium in response to fluctuations in the allowance price to maintain consistency with the AgETS.

In terms of climate action, farmers would be incentivized to adopt mitigation activities when the total cost of implementing these measures - along with transaction and MRV expenses - is lower than the allowance price in the AgETS. This ensures that farmers can benefit financially by reducing the GHG intensity of their products, especially if rewards are tied to emissions reductions and linked to the prevailing allowance price. In this case, it will be necessary to ensure that the farmer has access to clear and accurate information about the potential rewards, such as well-defined premiums for mitigation efforts, to reduce any information asymmetry between the food processor and the farmers. Additionally, the complexity of the market is likely to result in some transaction costs, as food processors and farmers would need to navigate fluctuating allowance prices and comply with potential restrictions.

In an audit approach, food processors would be incentivized[3] to encourage mitigation activities on-farm, since reduction in GHG emissions on-farm could reduce their obligation to surrender allowances. However, establishing rules for the rewards (e.g. through price premiums) from the food processor to the farmer could to some extent address farmers' concerns of downstream processors leveraging their position in the agri-food value chain. On the other hand, regulating rewards could introduce some market distortions. Furthermore, such an intervention should take into account other regulations on the farmer's position in the agri-food value chain (e.g. the regulation on unfair trading practices and the CAP (European Commission, 2024d)). An AgETS is fundamentally intended as a climate mitigation tool rather than a market regulation mechanism.

While establishing rewards from a compliance entity to other actors is not a common practice in the current ETS systems, voluntary programs like Arla Foods' sustainability incentive program (see Box 2) already exists within the agri-food value chain. Arla Foods, a multinational dairy company, uses a sustainability incentive model to stimulate on-farm mitigation of GHG emissions and other measures. This illustrates how a food processor could incentivize the farmers in the value chain to adopt mitigating techniques to lower its scope 3 GHG emissions. Many considerations and adjustments will be needed to make this applicable within the design of a downstream AgETS, and the effectiveness of the approach needs to be further assessed.

Box 2: Arla Foods' Sustainability Incentive Model as described in European Commission workshop input papers [4]

In 2020, Arla introduced its Climate Check tool, aimed at helping dairy farmers measure and reduce their GHG emissions. The tool, which includes over 200 questions on topics like feed, energy, and manure management, calculates the carbon footprint of milk production at the farm level. Participation is voluntary for conventional producers but mandatory for organic farmers.

Building on this initiative, Arla launched a point-based Sustainability Incentive model designed to financially support and motivate farmers to meet the company's goal of reducing emissions by 30% by 2030, based on 2015 levels. Farmers earn points across 19 sustainability levers, with the highest points awarded for practices that most significantly lower carbon footprints, such as improving feed efficiency and optimizing land use. Other focus areas include renewable energy adoption and biogas production. Farmers can initially score up to 80 points, with the potential to increase this to 100 as the scheme evolves.

For their efforts, farmers receive 1 euro cent per kilogram of milk for submitting Climate Check data, plus an additional 0.03 euro cent for each point earned. Once the model is fully implemented, farmers could earn up to 4 euro cents per kilogram, with Arla estimating a total of 500 million euros in rewards for sustainable farming practices. In the first year, Arla expects to distribute 270 million euros, with participating farmers achieving an average of 39 points.

[3] Depending on the nature of the on-farm MRV (mandatory or voluntary on-farm data).

[4] The input paper is part of a workshop series on the project called "Incentives for Climate Change Mitigation across the Agri-food Value Chain" commissioned by the European Commission.

The audit approach could entail higher administrative costs for farmers and could reduce the ease of implementation of a downstream ETS. To lower the administrative cost, threshold values and/or alignments with the requirements in the CAP could be considered. Threshold values could be applied for small-scale livestock farms. This is particularly relevant if MRV is made mandatory and less so, if the participation for farmers is voluntary. Threshold values could help reduce administrative costs for smaller entities but also potentially lower the on-farm climate action, because some GHG emissions will not be covered. If rules for rewarding farmers are established, small-scale farmers would not benefit from these rewards. Aligning the Common Agricultural Policy (CAP) with MRV requirements and/or funding could help farmers meet emissions reporting obligations. This support could be provided through both mandatory (conditionality) and voluntary (eco-scheme) approaches, which are not mutually exclusive. A new conditionality for on-farm GHG MRV could be integrated into the CAP, making emissions reporting a standardized practice across the majority of farms. Additional support could be offered through eco-schemes specifically designed to enhance MRV capabilities. These eco-schemes would provide technical assistance and funding to help farmers improve the precision of their emissions tracking and reporting processes. Right now, it is unclear whether the EU-wide benchmarking system in the agri-food sector proposed in the Strategic Dialogue and given as a task for the new Commissioner for Agriculture and Food would entail such an on-farm GHG MRV (European Commission, 2024e).

A harmonized GHG reporting tool for livestock farmers can draw on several existing data sources to streamline its development and reduce costs. The Farm Accountancy Data Network (FADN) collects information on livestock production, which can help indicate farm-level GHG emissions. Additionally, data gathered through the Common Agricultural Policy (CAP), and compliance with environmental measures, can offer a foundation for emissions reporting. Other valuable sources to consider include National Emissions Inventories under the UNFCCC, Animal Health Law, and the Corporate Sustainability Reporting Directive.

Data interoperability is essential for the success of a downstream AgETS. Given the potential diverse sources of data, interoperability ensures that these systems can communicate seamlessly. Further research is needed to map and outline the current data availability and interoperability for livestock emissions in the EU.

Box 3: Audit MRV approach

Implementing an audit approach for a downstream AgETS would necessitate the development of a harmonized reporting tool for GHG emissions for livestock farmers. This tool would include default emissions factors based on units of output as well as default values for the climate effects of on-farm mitigation efforts (e.g. feed additives, manure management techniques etc.). Default emissions factors both for the activities and the technologies could relate to national inventory methodologies.

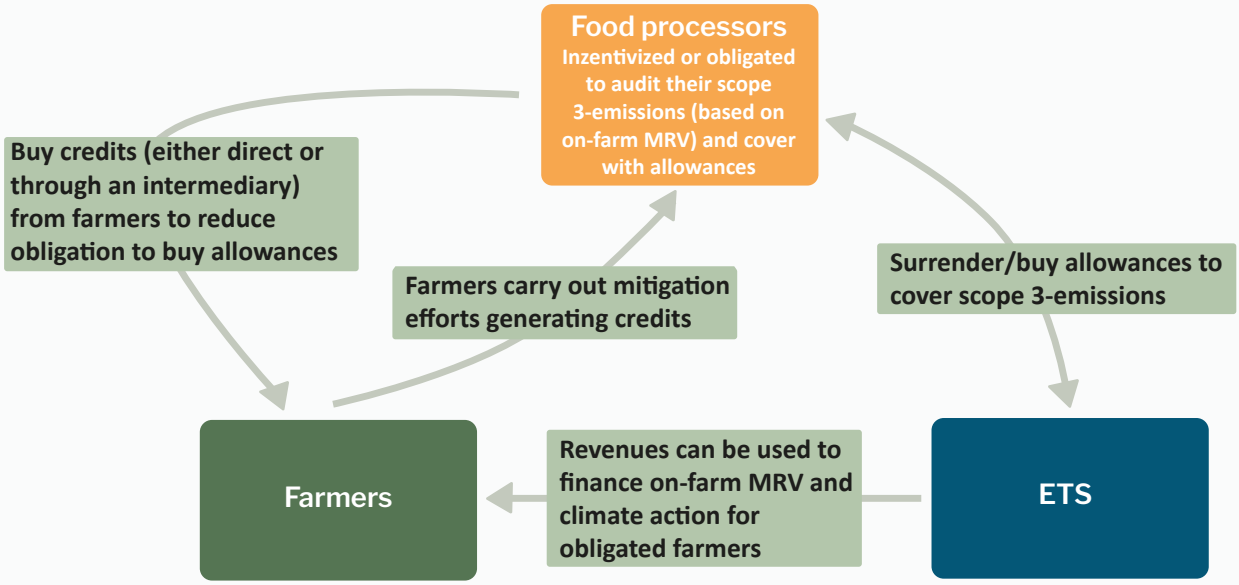
In this system, food processors would assume responsibility for collecting on-farm data, and annual audits would be required to ensure compliance. To guarantee the accuracy and integrity of emissions reporting - and to minimize the risk of fraud - both the food processors' emissions reports and the farmers' data submissions should be verified by an accredited third-party auditor, similar to the verification process in the existing EU ETS. Additionally, the European Commission or Member States could designate public or private entities responsible for appointing, training, and overseeing the auditors, ensuring that the auditing process adheres to high standards of transparency and reliability, akin to the CRCF process.

Voluntary credit approach

Voluntary credits can be seen as a reward system for farmers carrying out mitigation efforts (see details in Figure 3 and Box 4). This approach has the advantage of increasing potential mitigation efforts from on-farm actions by expanding the number of participating farmers engaging in mitigation practices and allowing them to generate additional income under the ETS on a voluntary basis. Several design options are being explored to incentivize certified emission reductions from farmers within a downstream AgETS.

One option is to establish a direct link between obligated actors, such as food processors, and non-obligated actors, like farmers. In this model, food processors could purchase emissions reduction units directly from farmers, allowing them to fulfill part of their compliance obligations while encouraging farmers to implement mitigation practices. Alternatively, an indirect approach could involve a public authority acting as a central buyer of emissions reduction units. In this case, the authority would purchase units from farmers and distribute them to obligated entities. However, there are considerable risks in terms of effectiveness and efficiency in incentivizing farmers to abate emissions through voluntary credits that must be considered - e.g. risk of low participation rate and additionality. The specific risk of allowing an inflow of credits into the downstream ETS system and consequences for the emissions cap is considered in the chapter 'climate effects'.

Figure 5: Voluntary credit approach



Box 4: Voluntary credit MRV approach

Voluntary on-farm credits would likely be certified and verified in accordance with the regulation on establishing a Union certification framework for permanent carbon removals, carbon farming and carbon storage in products (CRCF). Livestock emission reductions are currently ineligible for certification under the CRCF regulation. An assessment will explore the potential for certifying activities that reduce agricultural emissions from livestock management (i.e. enteric fermentation and manure management) and inform the review of the CRCF in 2026. It is assumed that the development of methodologies under the CRCF would be constituting the MRV in this approach.

Risk of low participation rate and low climate action

To incentivize on-farm action and thereby participation in the voluntary credit approach to MRV, farmers would be rewarded with credits that can be sold to downstream processors who can use them to reduce their obligation to surrender allowances (either directly or indirectly through the intermediary institution). A voluntary credit approach would most likely need to have a high reward to voluntarily set-up MRV and carry out mitigation efforts. Thus, in order to opt-in financial benefit for farmers would have to equate:

cost of MRV + cost of mitigation ≤ reward for mitigation (credit)

Additionally, the complexity of the market is likely to result in relatively high transaction costs, as participants would need to secure buyers for CRCF units, navigate fluctuating allowance prices, and comply with potential restrictions. On the plus side, an opt-in approach would avoid obligating farmers to bear administrative costs of more detailed MRV as in the audit approach.

This approach may run into problems regarding low participation rates. Lessons learned from the French carbon certification scheme Label bas carbone show relatively low participation rates among farmers (Minsitère de la transition écologique et de la cohesion des territoires, n.d.), as in 2022 very few carbon credits were generated under Label bas carbone came from agriculture (INFCC, 2023). Most of the agricultural credits generated under the scheme have been from livestock farms by improving herd management (such as reducing the age of the first calving). Little mitigation occurred through investments into improved stables, manure management, and other more expensive mitigation options. This could indicate that the reward for farmers to voluntarily carry out mitigation efforts needs to be quite high, before they choose to opt-in into a certification system. In this light, there is a significant risk that voluntary credits would bring insufficient on-farm mitigation action in terms of the EU's climate targets.

Potential baseline and additionality problems

The design of a downstream AgETS which integrates on-farm voluntary credits from emissions reductions requires careful design to ensure environmental integrity of the system, with particular issues regarding problems of additionality. While the use of standardized baselines[5] for generating credits can be seen as less administratively complex and can reward early movers, it may become problematic when it comes to robustly evidencing emission reductions under downstream ETS. A standardized baseline inherently involves a number of producers operating at lower intensities than the baseline and does not necessarily equate to real-world emission reductions necessary to demonstrate compliance within an emission cap. Furthermore, it should be considered if the approved methodologies under the CRCF, in particular if surrendering an emission reduction credit under the CRCF, can be considered equivalent in terms of climate impact to not surrendering one or more allowances under the AgETS. Robust measures must be implemented to ensure that emissions reductions are truly additional and not simply the result of business-as-usual practices. These measures should verify that reductions occur specifically due to the incentives provided by the credit generation scheme, rather than from actions that would have been taken regardless. Ensuring additionality is critical to maintaining the credibility of the system, as it guarantees that the emission reductions contribute meaningfully to climate goals and are directly linked to the financial incentives offered.

Activity-specific baseline and/or the development of more detailed on-farms MRV (as mentioned in the audit approach) should be carefully analyzed to better ensure real-world GHG emission reductions. In this light, certified on-farm voluntary credits from emissions reductions credits should be disconnected in the beginning of an AgETS system to ensure environmental integrity, simplicity, and learnings of the system.

[5] Standardized baselines should reflect typical performance in similar social, economic, environmental, and technological contexts, considering local conditions. In the context of the CRCF, only carbon farming practices surpassing baseline practice should be certified.

Pathway 2: Consumer climate action

This chapter evaluates the potential climate impact of changes in meat and dairy consumption under Pathway 2 (PW2) of a downstream AgETS. Shifting food demand and promoting healthier diets play a crucial role in reducing GHG emissions from agriculture, while also offering significant health benefits. However, while incentivizing changes in consumption, it is essential to consider both the risk of carbon leakage—where reduced domestic consumption could lead to increased exports to third countries with less stringent emissions standards—and the distributional impact on consumers.

Demand side effects refer to how consumers respond to price signals implemented through an AgETS. A part of the allowance price signal is anticipated to be passed on to consumers as food processors, facing increased costs due to the purchase of allowances, are likely to transfer some of these costs to maintain profitability. This pass-through effect is common when businesses experience higher input costs, and it is expected to result in increased prices for meat and dairy products, which are more emissions intensive.

While food processors may take internal actions to reduce their emissions, such as improving efficiency or reducing waste, these efforts typically only cover a portion of their emissions, leaving them with the need to purchase additional allowances. This will manifest itself in increased prices for meat and dairy products, prompting consumers to react by decreasing their demand for animal products. Depending on carbon leakage measures, the reduction in domestic demand could either lead to a genuine decrease in on-farm production within the EU or result in the outsourcing of production to regions with less stringent climate regulations. Without effective carbon leakage measures, the emissions savings from reduced consumption could be offset to some extent by increased exports.

The extent to which demand for meat and dairy products decreases depends on two key factors:

1. The cost pass-through, which determines how much of the allowance price is transferred to final consumer prices.
2. The price elasticity[6] of consumers towards these products.

Regarding **price elasticities**, existing literature on this topic presents a somewhat mixed picture on the intensity of these demand changes and their consequential climate effects (CONCITO, 2024). It is evident that there are different price elasticities in different Member States due to income, age structure, culture, substitution etc. Overall, the literature seems to indicate that consumers are more responsive to price changes for meat (especially beef) than for dairy products, see Table

Regarding **cost-pass through**, some literature indicates some possible **price dilution** through the agri-food value chain, meaning that not all the cost of a downstream AgETS is reflected in the price of a final consumer product. For example, a CONCITO analysis estimates the impact of a Danish national agriculture tax on farm-level on consumer prices of meat and dairy products. This study analyzes the changes in demand for cheese, milk and beef under two different tax scenarios, namely a carbon price of 50 € and 100 € per ton of CO_2-eq. Even under the higher carbon tax, the changes in consumer prices and thus changes in demand were relatively low. According to the analysis, a 100 € per ton of CO_2-eq tax would increase the expenses on the farm for producing milk for cheese by 14.9%, but the final retail price would only increase by 2.2%. Even though the analysis is using relatively high values for the price elasticity of Danish consumers (see Table 2), the low increases in retail prices would only correspond to a demand shift of respectively -2.6% for milk, -2.4% for cheese, -5.7% for beef even under a 100 € carbon tax. This is due to the internalization of the tax by the different actors along the supply chain.

[6] Price elasticities measure the responsiveness of quantities demanded to change in prices. It is calculated as the percentage change in quantity demanded divided by the percentage change in price. High price elasticities indicate that consumers are more sensitive to price changes, while a lower elasticity suggests less sensitivity. Food items typically exhibit low price elasticities due to their necessity and limited substitutability in daily life.

Table 2: Review of price elasticities for different meat and dairy goods

Area	Beef	Pork	Poultry	Meat accumulated	Milk	Cheese	Source
EU	0.77	0.50	0.52	-	0.42	0.12	Bouyssou et al. (2024
EU	-	-	-	-	0.53	0.60	Bouamra-Mechemache et al. (2008)
EU	1.30[7]	0.80	1.00	-	-	-	Wirsenius et al. (2011)
EU average	-	-	-	0.41	0.42[8]	-	Muhammed et al. (2011)
Europe	0.981	0.936	0.851	-	-	-	Gallet (2012)
Denmark	1.55	-	-	-	1.25	1.07	CONCITO (2023a)
Germany	0.878	0.791	0.771	-	-	-	Roosen et al. (2022)

Similarly, an expert group report regarding the Danish national climate tax on farm-level describes how carbon prices will be internalized along the supply chain. The report estimates that under the 100 € per ton of CO_2-eq tax model, only 56% of the increase in production costs at the farm level is passed on to consumers. This impact varies by product, with 38% of the cost increase being passed on for plant-based products and 62% for beef (Svarer et al., 2024).

It is important to recognize that both the expert group report and the CONCITO analysis were modeled under a Danish on-farm carbon tax. A key difference between a national carbon tax and a downstream ETS, is that under an ETS, the gradual reduction of the emissions cap ensures eventual cuts in GHG emissions. If these reductions do not occur, the price of allowances —and consequently food prices — could rise to a level, even with inelastic demand, where demand reductions are forced to meet the emissions reduction targets. Therefore, price dilution would likely be smaller in a downstream AgETS than indicated in the Danish case. These aspects should be considered in-depth, as there have also been downstream models presented, where the point of obligation is put on food retailers, which represents the final stage of the agri-food value chain positioned closest to the consumer (Canfin, 2023) .

In parallel, there are several other policies which should be considered if the objective is to shift diets and reduce the consumption of unhealthy and GHG-intensive products. Demand side changes are crucial to work on simultaneously to developing policy tools to reduce emissions from production as both are necessary elements of reaching a sustainable food system (Agora, 2024). A coordinated policy mix of complementary policies to shift diets towards a sustainable food consumption should include instruments addressing incentives, information on healthy and sustainable food and regulatory measures (European Commission, 2023a).

To summarize PW2, a downstream AgETS can foster some climate action through consumer changes due to the possible higher price for meat and dairy products. However, this will depend on price elasticities, the allowance price and cost pass-through as well as the potential carbon leakage. Complementary policies are needed to effectively shift diets towards sustainable food consumption in the EU and address distributional impacts on consumers.

[7] Ruminant meat (both beef and sheep meat)

[8] Dairy accumulated (all dairy products)

Pathway 3: Food processor climate action

This chapter will focus on incentives to climate action from the food processor Pathway 3 (PW3). This pathway describes how meat and dairy processors, independently of other actors, can reduce demand for meat and dairy due to product innovation, product reformulation, market strategies, waste reduction, and efficiency improvements. Demand for less GHG-intensive types of food products will also impact on-farm production.

The downstream AgETS presents an opportunity for driving food product innovation. The meat and dairy processors have some reduction potential through innovating their products (e.g. product reformulation) and diversifying product portfolios. This can involve strategies like reducing and substituting meat products in ready-to-eat meals with plant-based alternatives, reducing and substituting animal-based ingredients with plant-based alternatives, and minimizing food waste in production. Further, pricing meat and dairy products could incentivize investments into more research and development of plant-based alternatives and alternative proteins. Life cycle assessments (LCAs) indicate (UNEP, 2023). that plant-based meat products could offer reductions in GHG emissions by 67–89%, when compared to conventional beef, depending on the energy sources and processes used in their production.

Diversifying product portfolios and product reformulation

Diversifying product portfolios and reformulating food products presents a clear opportunity for food processors to reduce their reliance on carbon-intensive ingredients. By decreasing or substituting meat and dairy content with less GHG-intensive options, such as plant-based alternatives, food processors can lower the carbon footprint of their products. This in turn would reduce their demand for allowances under the downstream AgETS. A sufficient allowance price resulting from a robust emissions cap can ensure increased incentives for PW3. However, expanding product lines to include more plant-based or lower-emission options may be less feasible for highly specialized processors, such as those focused exclusively on meat processing, or small-scale processors that may lack the capacity and resources to invest in such innovations.

Food waste

In 2021, 58 million tons (European Commission, 2023a) of food was wasted across the EU. This corresponds to 131/kg per inhabitant and 254 million tons of CO_2-eq or 16% of the total GHG emissions of food systems in the EU[9]. While 54% of wasted food was generated at the household level, 21% was generated at the food processing level, according to Eurostat (European Commission, 2023b). The European Commission has set national food waste reduction targets (European Commission, 2023c) on a processor and manufacturing level of 10% by 2030. defined the main drivers of food waste on a processing level as: product deterioration and spoilage during transportation and storage, by-products of food processing, and consumer perception of safety and quality. Some of these drivers are preventable with investments in better processing infrastructure, while others are because of consumer preference and non-profitability of processing by-products. An AgETS price signal can incentivize investments into preventing food loss more by lowering the need for raw materials.(Raak et al., 2017) defined the main drivers of food waste on a processing level as: product deterioration and spoilage during transportation and storage, by-products of food processing, and consumer perception of safety and quality. Some of these drivers are preventable with investments in better processing infrastructure, while others are because of consumer preference and non-profitability of processing by-products. An AgETS price signal can incentivize investments into preventing food loss more by lowering the need for raw materials.

[9] In its Farm-to-fork strategy the European Commission (2023d) declared to set an ambitious target for food waste reduction in its Waste Framework Directive, with its implementation being due in 2023.

Innovation of meat and dairy alternatives

In addition to reducing food waste and reformulating products, food processors can innovate new food with lower GHG intensity. Meat substitutes can vary from beans and lentils to more processed foods such as tofu or plant-based patties (meat analogues). In recent years, novel cultivated meats have been a focus of food innovation, which can have between 50 - 90% less CO_2-eq emissions (Sinke et al., 2023) than regular beef and dairy products. Similar processes are already happening for dairy product substitutes and reformulation of dairy products - see example in Box 5. By putting a price on GHG emissions from meat and dairy products will give alternative products, with lower emissions, a competitive advantage. Innovations in the alternative meat and dairy industry are also making more lasting shifts away from animal-based diets more feasible.

PW3 presents plentiful options for meat and dairy processors to reduce demand for meat and dairy inputs and thereby reduce their need to buy allowances in a downstream AgETS. The climate effect of demand side changes due to product innovation, product reformulation, market strategies, and waste reduction need further analysis, as the potential will depend on consumer behavior and preferences, food cultures, novel food regulation, carbon leakage to third countries among other things.

Box 5: Product innovation with whey

A cross-sectional example of how meat and dairy processors can utilize innovation, product reformulation, and the reduction of food waste is the **processing of whey.** Whey is a fat free, high protein liquid that is separated during cheese production. Due to its properties, it is nowadays commonly used in reformulated high protein and low-fat products, but only extensive research and development made the usage of whey economically feasible.

Using revenues to enhance climate action

Innovation of meat and dairy alternatives

Through auctioning allowances in a downstream AgETS, the EU will generate additional revenue that can be allocated in various ways. In the EU ETS 1 and 2, revenues have been used for different purposes, including being returned to Member States under certain conditions or directed toward more targeted initiatives like the Innovation Fund, the Modernization Fund, and the Social Climate Fund (European Commission, n.d.), which is funded from EU ETS 2 revenues (European Commission, 2023e). PW3 presents plentiful options for meat and dairy processors to reduce demand for meat and dairy inputs and thereby reduce their need to buy allowances in a downstream AgETS. The climate effect of demand side changes due to product innovation, product reformulation, market strategies, and waste reduction need further analysis, as the potential will depend on consumer behavior and preferences, food cultures, novel food regulation, carbon leakage to third countries among other things.

Repurposing revenues from a downstream AgETS to support climate action in the agricultural sector could enhance the overall climate impact. A portion of these revenues could be directed toward supporting farmers and foresters in implementing mitigation measures or carbon removal efforts. Additionally, these funds could help address the potential distributional impacts on consumers, ensuring that vulnerable groups are protected from price increases. The revenues could also be used to finance innovation and promote climate-friendly consumption patterns, such as encouraging healthier and more sustainable diets. The Strategic Dialogue on the Future of EU Agriculture (European Commission, 2024f). states that the revenues generated by a potential AgETS should solely be earmarked to support less affluent households, investments in the transition of agri-food sector actors, and the nature-based restoration of carbon sinks. It is essential to carefully assess the allocation of the revenues across various categories. In the following section reflections on enhancing climate action for farmers and foresters, distributional impacts on consumers, and healthy diets are presented.

Enhancing climate action

Since a downstream AgETS on food processors would not encompass all agricultural GHG emissions, policymakers should explore using the revenues to incentivize or fund on-farm carbon removal efforts that fall outside the scope of the ETS. Other agricultural GHG emissions outside of the scope of the downstream AgETS, such as those from agriculture soils and peatlands, should to the greatest extent possible be covered by other effective climate regulation in the agricultural sector, if a downstream AgETS for livestock emissions is established. For example, a recent report (EEB, 2024) recommends to include nitrogen emissions from fertilizers under ETS 1 and a reform of the CAP (Common Agricultural Policy) to mitigate peatland emissions.

If MRV activities for farmers are not supported by the Common Agricultural Policy (as discussed under PW1), revenues from the AgETS could be allocated to cover MRV compliance costs. This would alleviate the financial burden on farmers and help transition farmers under an AgETS.

The possibility of linking carbon removals in the land sector via carbon removal credits to a potential AgETS has been presented (Bognar et al., 2023). However, several concerns have been raised regarding carbon farming activities, including issues of impermanence, with the risk of reversals due to factors like land use changes, wind, drought, insect damage, and wildfires, as well as challenges related to additionality, such as uncertainties in establishing trustworthy baselines. Furthermore, MRV processes face limitations in robustness and potentially excessive costs. There is also a significant risk of mitigation deterrence if carbon farming is included directly in an AgETS, as it could encourage polluters to rely on offsets rather than focus on reducing their own emissions. The Strategic Dialogue on the Future of EU Agriculture emphasizes the importance of designing the AgETS in a way that prevents this outcome (European Commission, 2024a).

In this context, it is essential to separate an AgETS from carbon removal credits from the outset of its introduction for agricultural emissions. Instead, incentives for carbon removals can be pursued through revenues generated by the AgETS. For example, these revenues could be allocated to a public or private fund dedicated to LULUCF removals or a nature restoration fund. Using AgETS revenues to promote LULUCF removals would not only create additional climate benefits but also deliver multiple co-benefits for both the environment and the economy. An advantage of this approach is the potential for shifts in land-use practices that enhance carbon sequestration while simultaneously improving ecosystems. Practices such as reforestation, agroforestry, and improved soil management can increase biodiversity by creating habitats and restoring ecological balance. These methods also improve soil health by boosting organic matter and water retention, helping farmers build resilience to droughts and extreme weather events—issues that are becoming increasingly common due to climate change.

Distributional effects and climate-friendly consumption

A downstream AgETS could potentially have regressive effects on lower-income households, as they tend to allocate a larger portion of their income towards food compared to higher-income households (OECD, 2020). The exact effects on consumer budgets and welfare in a downstream AgETS would be affected by the allowance price, the consumer responsiveness (price elasticities), cost pass-through, the import of food products and the level of intake of meat and dairy across income levels.

Depending on the effects on consumer budget and welfare, it would be important to consider mitigating measures to address the distributional impacts of an AgETS, where the revenue could play a role. A Social Climate Fund will be created alongside the emissions trading system for emissions from fuel combustion in buildings, road transport and additional sectors to address some of these impacts (European Commission, n.d.). The new fund will provide Member States with dedicated funding to address the distributional impacts of the system, while also supporting mitigation efforts. This includes funding for structural measures and investments in energy efficiency, building renovations, clean heating and cooling systems, integration of renewable energy, and the development of zero- and low-emission mobility solutions.

Similarly, financing innovation and climate-friendly consumption could be considered. In addition to the possible effects on product innovation described in PW3, AgETS revenues could be used to further innovate new food products with lower GHG intensity. Some research has also suggested that AgETS revenue could also be used to further encourage customers to eat healthier (Dogbe & Gil, 2018). By using the revenues to promote e.g. plant-based and low-GHG consumption, the possible distributional effect of an AgETS could be reduced. At the same time, this would promote healthier diets and improve climate effects, as meat and dairy products would become relatively more expensive.

Concluding remarks

There is a need for the agricultural sector to reduce its GHG emissions and the EU should develop more efficient policies than those that exist today, as neither the CAP, the Industrial and Livestock Rearing Emissions Directive nor the Effort Sharing Regulation have proven sufficiently effective.

This report has assessed the incentive structures and effectiveness of downstream AgETS such as 1) the possible climate effect from the emissions cap and 2) climate action along the agri-food value chain incentivized through the allowance price. On this basis, the report has provided recommendations for key design principles to reduce livestock GHG emissions, if a downstream AgETS is established. To briefly summarize these design principles (detailed in the executive summary), CONCITO recommends:

- **Incentives for on-farm mitigation** to ensure that climate action on-farm occurs, resulting in additional, verifiable reductions.
- **Robust monitoring, reporting, and verification (MRV)** for agricultural emissions to ensure consistency and reduce administrative burdens. The in this report presented audit-approach for food processors should be further explored.
- **Market integrity** through a strong, manageable price signal in the allowance market, separated from voluntary credits.
- **Simplicity and administrative feasibility** to facilitate ease of participation across the agri-food chain.
- **Redistribution of AgETS revenues** to yield additional climate action and address distributional impacts.

The implementation of these principles will be crucial for an efficient and effective reduction of GHG emissions in agriculture.

Further research on other elements such as competitiveness, carbon leakage, other environmental objectives, and distributional impacts will need to be considered and mitigated as part of the final policy design. In particular, the socio-economic conditions of farmers must be carefully analyzed. Farmers across the EU vary significantly in terms of scale, financial capacity, and access to technology, all of which will strongly influence their ability to respond to policy measures. Small-scale or financially vulnerable farmers may face greater challenges in adopting mitigation measures or bearing the cost of the policy measures. Therefore, any new policy packages for the agricultural sector, including climate regulations, should ensure that vulnerable farmers are adequately supported in their transition. This can be achieved through measures such as targeted support for mitigation efforts, upskilling and reskilling initiatives, and well-designed thresholds.

For an effective and efficient implementation of an AgETS, it is also relevant to assess how the Common Agricultural Policy (CAP) and other agricultural policies should effectively contribute to the EU's climate objectives. Any emissions trading in the agricultural sector needs to be underpinned by EU-wide climate and environmental sectoral regulation. Furthermore, policies supporting shifts to sustainable and healthy diets would strengthen climate action in the agricultural sector.

In conclusion, while a downstream AgETS can present a valuable tool for emissions reduction in livestock, its effectiveness will depend on design features and its coherence with the broader mix of policies that accompany the transformation of the agricultural sector.

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