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Integrating Agricultural Emissions into the European Union Emissions Trading System: Legal Design Considerations

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Abstract: In the European Union, greenhouse gas emissions statistics indicate only a slight decreasing trend over the last number of years in emissions from agricultural sources. Unless drastic action is taken in other sectors, the European Union's 2030 and subsequent climate targets are unlikely to be met without greater reductions made in agricultural emissions. The policy instruments aimed at reducing agricultural emissions that are currently in place have proven to be ineffective; therefore, there is a need to look for new approaches towards bringing agricultural emissions down faster and farther. One obvious new approach is to integrate agricultural emissions into the European Union Emissions Trading System, which, so far, has proven very successful in reducing greenhouse gas emissions in the energy and industrial sectors. Hardly any attention has been paid in the scholarly legal literature to the question of integrating agricultural GHG emissions into emission trading systems. This article seeks to fill this gap. This paper presents the concluding findings of a Dutch Research Council-funded research project that aimed to assess whether and under what conditions the European Union Emissions Trading System could play a role in compelling the agricultural sector to reduce its greenhouse gas emissions. We answered this question by looking at lessons learned from existing examples in the world of market-based approaches to integrating agriculture into emission reduction schemes. To do this, we performed an ex-post assessment of three of the very few examples that exist in the world of such schemes in Canada, California, and Australia, followed by an ex-ante assessment of the prospect of including agricultural emissions under the European Union Emissions Trading System based on the practical experiences of those examples. In the ex-ante study, we evaluated how such inclusion could work, either indirectly, through allowing on-farm offset programs to reward increased carbon sequestration, or directly, by requiring farmers and/or other actors in the agricultural sector to surrender allowances for their direct emissions. As lawyers, we focused mainly on the legal considerations of such a proposition. Having conducted both the ex-ante and ex-post assessments, we conclude that introducing stricter legal instruments of one form or another that will reduce agricultural greenhouse gas emissions and increase carbon removal on agricultural land seems necessary for the European Union if it is serious about achieving its commitments under the Paris Agreement and meeting its obligations under its own Climate Law. The project makes a novel contribution to the legal scholarship in concluding that the most viable starting point for such stricter legislation would be to include methane and nitrous oxide emissions from livestock keeping and synthetic fertilizer use, respectively, under the European Union Emissions Trading System. To start with, this could be conducted by obliging meat and dairy processors and synthetic fertilizer producers to surrender allowances for the on-farm emissions associated with their products. This could be complemented by introducing a voluntary, but still highly regulated, carbon credits scheme that could encourage and reward farmers for reducing their own emissions and for transitioning to net-zero, and overall, more climate-resilient and environmentally friendly farming practices. Such credits could be offered for sale on the private carbon market as well as to Member State governments and the European Commission (through, for example, the Common Agricultural Policy, State Aid schemes, or the Innovation Fund).

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Citation: Verschuuren, J.; Fleurke, F.; Leach, M.C. Integrating Agricultural Emissions into the European Union Emissions Trading System: Legal Design Considerations. *Sustainability* **2024**, *16*, 5091. https://doi.org/10.3390/su16125091

Academic Editors: Marc A. Rosen and Mohammad Aslam Khan Khalil

Received: 26 March 2024
Revised: 22 May 2024
Accepted: 8 June 2024
Published: 14 June 2024

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Keywords: emissions trading; carbon sequestration; carbon removals; carbon offsets; agricultural emissions; methane emissions; European Union legislation; EU Green Deal

1. Introduction

Agricultural greenhouse gas (GHG) emissions in the European Union (EU) are primarily non-CO_2 emissions, especially N_2O emissions from soils and CH_4 from enteric fermentation and manure management. Together, these account for 96% of agricultural GHG emissions in total [1]. The reduction in these emissions is primarily targeted by Regulation 2018/842/EU (the Effort Sharing Regulation (ESR)), Regulation 2018/841/EU (the LULUCF Regulation), as well as by the Common Agricultural Policy (CAP) [2–4]. So far, none of these have been successful or effective in reducing agricultural emissions, and one was even deemed a complete failure. A 2023 report by the European Environment Agency (EEA) on agricultural GHG emissions in the EU observed only a slight decreasing trend for emissions and predicted that the national targets for 2030 will not be met without either greater emission reductions in agriculture, or, alternatively, much greater reductions in other sectors [1]. A European Court of Auditors (ECA) report from 2021 showed that although the CAP provided EUR 100 billion to farmers to reduce their emissions between 2014 and 2020, this resulted in a zero percent decrease in agricultural emissions, leading the ECA to conclude that the 'Polluter Pays' principle is simply not being applied to agricultural emissions in the EU [5].

With ambitious overall mitigation targets adopted and codified in the EU Climate Law, as well as a follow-up fitness check of the Polluter Pays principle by the European Commission in response to the 2021 ECA report, attention in the EU is now turning towards its Emissions Trading System (ETS) as a possible option for lowering the EU's agricultural emissions [6,7]. The EU ETS is the EU's most important mitigation instrument that currently covers 36 percent of the EU's GHG emissions, mostly from industry and power generation. According to the EEA's projections, emissions from sectors covered by the ETS are expected to decrease by between 41 and 48 percent by 2030 and by between 55 and 62 percent by 2040 relative to those in 2005 [8]. In this way, the ETS has proven itself to be the most effective regulatory mechanism for reducing emissions that the EU has in its toolbox (thus far).

On several occasions in previous years, the Commission has chosen to not include agricultural GHG emissions in the EU ETS. This was primarily due to the perceived uniqueness of agriculture being an economic sector that is simultaneously both a victim of climate change as well as a contributor to it through its GHG emissions. Because of this perceived uniqueness, the Commission opted instead for the CAP as a more appropriate mechanism than the EU ETS for mitigating agricultural emissions [9]. That position no longer seems tenable, however, given the complete ineffectiveness of the CAP to achieve this goal. It is for this reason that this paper contemplates the return of the EU ETS to the drawing board as a regulatory possibility for reducing agricultural emissions. Doing so raises questions about whether, under what conditions, and how the EU ETS could have a role to play in obliging the agricultural sector to reduce its GHG emissions to a degree that will help it meet its own and international emissions reduction commitments.

Legal scholars, thus far, have paid hardly any attention to evaluating the prospect of integrating agricultural GHG emissions with emissions trading systems, whether in the EU or elsewhere. The very few publications available that discuss legal approaches to reducing agricultural GHG emissions in the EU simply state that the ETS does not apply, and then move on to discuss other law and policy instruments that are currently applied to the agricultural sector, such as the CAP, Effort Sharing and LULUCF regulations [10]. In a 2022 overview of potential law and policy instruments used to address agricultural GHG emissions post 2030, one of the authors proposed the ETS as a viable option, while another discussed in detail why the EU decided to not use the ETS to curb agricultural

GHG emissions and investigates options for it do so in the future [9,11]. The latter study concludes that the ETS is a suitable instrument to reduce agricultural GHG emissions, but also that it could bring the EU's emission reduction, agricultural, and environmental policy goals into closer alignment through cross sectoral synergies and economies that current policy and regulatory frames have been unable to achieve to date. How exactly this could be achieved, though, is still an open question [9].

This paper seeks to fill this gap in the literature, and more specifically, aims to answer this 'how' question. It reports the findings of a research project that contemplated a regulatory framework, whereby agricultural GHG emissions could be included in the EU ETS as well as aligned with the CAP. This was conducted through an ex-post assessment of three of the very few examples that exist in the world of such schemes in Canada, California, and Australia, as well as an ex-ante assessment of the prospect of including agricultural emissions under the EU ETS based on the practical experiences of those examples. In the ex-ante study, we evaluated how such inclusion could work, either indirectly, through allowing on-farm offset programs to reward increased carbon sequestration, or directly, by requiring farmers and/or other actors in the agricultural sector to surrender allowances for their direct emissions. As lawyers, we focused mainly on the legal considerations of such a proposition, but also worked to fit those within the wider economic and social contexts within which the law operates and how they influence the impact of the law [12]. We did not focus on those emissions caused by energy use, nor on the role that farms can play in the generation of renewable energy, nor on mitigating peatland emissions.

2. Methodology

The first phase of our research consisted of a comparative ex-post assessment of three of the very few emissions trading schemes or related pricing mechanisms that currently exist in other jurisdictions that encompass agricultural emissions and/or sequestration. This comparative study was performed in order to discover not only the different legal designs of such schemes, but also the experiences of stakeholders are who are involved in such schemes.

The selection of jurisdictions for ex-post assessment was guided by two selection criteria. Firstly, the jurisdictions had to have a sizeable and diverse agricultural sector at a similar technological level as the EU that offer substantial GHG emissions and large sequestration or reduction potential. Secondly, the jurisdictions had to have been operational for several years (by the 2020 starting date of the project), making use of some kind of pricing and/or rewards mechanism for agricultural GHG emissions that is similar to or at least comparable to the EU ETS.

Based on these criteria, three jurisdictions were selected for further study, namely the province of Alberta in Canada, the state of California in the USA, and Australia. In Australia, a carbon farming mechanism originally had been developed as part of an Australian ETS. Although the Australian ETS was abandoned later, the carbon farming mechanism remained in place at the federal level. In Canada and the USA, emissions trading is regulated at the provincial and state levels, respectively, (although over the course of this research, Canada has also been developing a federal mechanism that is, as yet, untried). While none of these three jurisdictions make use of an ETS similar to that in place in the EU, these three are nevertheless the only ones available for study that have any substantial or relevant experience in using market-based mechanisms to address agricultural GHG emissions. Applying stricter selection criteria would have left zero jurisdictions to draw any comparative conclusions from. China and New Zealand were also considered and will be briefly mentioned below as countries that have seriously considered integrating agricultural emissions in their ETS. However, neither were selected for inclusion in the study because, as of the time of writing, the relevant legal frameworks for doing this have not yet entered into force.

It should be noted here that there are many differences between the EU ETS and the three selected jurisdictions. First and foremost, the EU is a supranational organization that

regulates GHG emissions at the regional level for 27 Member States, whereas the other jurisdictions all operate at different, national, and sub-national levels (at the federal level in Australia and at the state and provincial levels in California and Alberta). The regulatory environments differ as well, mostly because of the harmonization of climate change and agricultural policies across the EU and because of the supranational institutional setting of the EU. Institutions like the European Commission or Court of Justice of the EU do not exist in the selected jurisdictions.

With these differences in mind, the goal of our comparative ex-post assessment was to discover legal design issues and stakeholder experiences in these jurisdictions as a first step only. This step aimed to determine what regulatory concerns need to be addressed when discussing the question of how agricultural emissions could be integrated into the EU ETS. Our focus on how these jurisdictions deployed different regulatory techniques to address similar policy concerns made it possible to generalize issues that need to be tackled in any agricultural GHG emissions pricing system (for example, concerns about additionality, permanence, and monitoring, reporting and verification, etc.), regardless of the structural differences between the jurisdictions. Having said that, though, it is clear that the jurisdictions present obvious limitations for the direct relevance and utility they pose as examples for the EU to follow or learn from. The differences between the jurisdictions and between relevant laws and regulations are big enough that it would be impossible and illogical to simply 'transplant' Canadian, American, or Australian rules to the EU. Instead, it was necessary for us to carefully consider the uniqueness of EU law and policy when translating relevant findings from this comparative assessment to the EU's regulatory environment.

Ex-post analysis began with the analysis of legal documents (legislation, regulations, guiding documents, etc.) in each of the three jurisdictions, together with the relevant scholarly and policy literature, in order to better understand the regulatory techniques that the three have used to integrate agriculture in the pricing system (together with their associated monitoring, reporting, and verification mechanisms as well). This was followed by in-depth semi-structured interviews (both in-person and online) with key informants from governments, agri-business organizations, carbon consultancies, environmental NGOs, and academia, as well as one online stakeholder focus group workshop, organized together with the Simpson Centre for Food and Agricultural Policy at the University of Calgary, Canada. The purpose of these interviews and focus group was to learn more about the experiences of stakeholders who engage with the regulatory frameworks in each of the selected countries.

In the second ex-ante phase of the project, we considered and evaluated how effective any of these differing regulatory designs that comparative research revealed would be if they were ever translated into the EU law and policy context. This required an assessment of the current regulatory instruments in the EU that aim to reduce agricultural GHG emissions and increase sequestration. This allowed us to better understand and acknowledge the potential role of the ETS within the broader policy framework, and also to find potential modes of alignment with other regulatory instruments, particularly the LULUCF Regulation and the CAP. We then presented our findings and opened them up to challenge in a number of stakeholder meetings with European Commission officials at DG Climate Action; in a broad stakeholder meeting in Brussels with representatives from the European Commission and the European Parliament, agri-business organizations, carbon consultancy firms, environmental NGOs, and academia; and in a multidisciplinary academic symposium in Amsterdam with researchers from around Europe [13,14].

3. Results

3.1. Comparative Research

3.1.1. No Pricing of Direct Agricultural GHG Emissions

As explained above, agricultural GHG emissions currently are not directly covered by an ETS or similar mechanism in the jurisdictions we researched [9]. In fact, none of

the countries anywhere in the world that have a working ETS in place have integrated agricultural emissions in it, at least not in the sense of imposing a pricing mechanism under which agricultural producers are obliged to pay for their emissions. China had announced that it would include agricultural GHG emissions in its nationwide ETS, but this plan has since been abandoned [15]. In New Zealand, agricultural GHG emissions are formally included on paper in its ETS, but its original requirement for farmers to surrender allowances equal to their emissions was later suspended [16]. In 2022, it was announced that that any pricing of New Zealand's agricultural GHG emissions, whether under the ETS or under a separate pricing system, would be delayed until 2025 [17].

Despite this, New Zealand, where more than half of all GHG emissions are from agriculture, is the only instance of a country that has seriously considered and promulgated legislation to integrate its agricultural emissions into an ETS. The EU never considered doing this for its ETS because it originally created it as a policy tool for meeting its commitments under the Kyoto Protocol, which did not focus on agricultural emissions. This is not to say that the agricultural sector was intentionally excluded from the EU ETS's original design for any explicit political or scientific rationale, however, only that it was never seen as being an aspect of its Kyoto obligations to begin with [9]. Although one should anticipate and address both the political pushback as well as several technical design issues that integrating agricultural emissions into the EU ETS would produce, we concluded that, in the end, in the face of it, doing so would pose no explicit legal challenge or obstacle to the regulatory design logic of the ETS [9]. Nevertheless, there is no question that if the EU were to actually do so, it would be the first of its kind in the world.

3.1.2. Voluntary Carbon Credits for National and Global Carbon Markets

All three of the jurisdictions that we researched in our comparative study make use of offset systems designed to reward farmers for the carbon removals they achieve through increasing the amount of GHGs they reduce or sequester. All three rely on a similar process, as illustrated in Figure 1. These offset systems are either linked to some kind of ETS for non-agricultural sectors (California), or to a generalized system, where regulated heavy-emitting industries are obliged to achieve improvements according to a legislative baseline (Australia and Alberta). In both types of systems, regulated emitters are able to purchase carbon credits generated by farmers as offsets to help them achieve regulatory compliance with their emissions reduction obligations. In Australia, farmers can sell the credits they produce directly to the government, while in Alberta and California, they are sold to regulated entities through designated registries. California also offers a limited opportunity for farmers to sell their credits on the open ETS market. In all three jurisdictions, though, farmers can opt to sell their credits instead on the voluntary, private carbon market. The private carbon market is a rapidly growing market that a range of business corporations and other private entities, such as airlines, rely upon to buy carbon credits to compensate for their GHG emissions. In the words of one of our interviewees referring to the opportunity that this could pose for carbon farmers, 'for credits from the ag sector, the sky is the limit'. The range of buyers of agricultural offset credits is potentially huge in this voluntary market, and often, the MRV requirements for credits sold in them are less stringent than those in regulated markets, such as for California's ETS credits. In both the voluntary and regulated markets, rules apply to ensure that the removed carbon emissions are additional and real and can be verified; however, there is no universal standard and substantial variation between them. We found that credits for sale on carbon markets that are subject to government regulation and oversight are generally considered more valuable compared to those sold in completely voluntary markets, usually because the latter are thought to be of unreliable quality. In practice, the credits used for regulatory compliance that are subject to stringent government MRV rules can claim higher prices than those on the voluntary markets that are mainly purchased by companies seeking to promote their corporate ESG credentials. As a consequence, the prices for credits sold on voluntary markets are typically lower than those in regulated ones. The EU Commission

has taken note of the potential of the voluntary market for carbon credits being bought and sold in the EU and is interested in stimulating it. However, it is also highly concerned about its volatile and unregulated nature. It is for this reason that in 2022 the European Commission published a legislative proposal for a Certification Framework for Carbon Removals (CFCR) that the EU legislator recently reached an agreement on its final legal text [18].

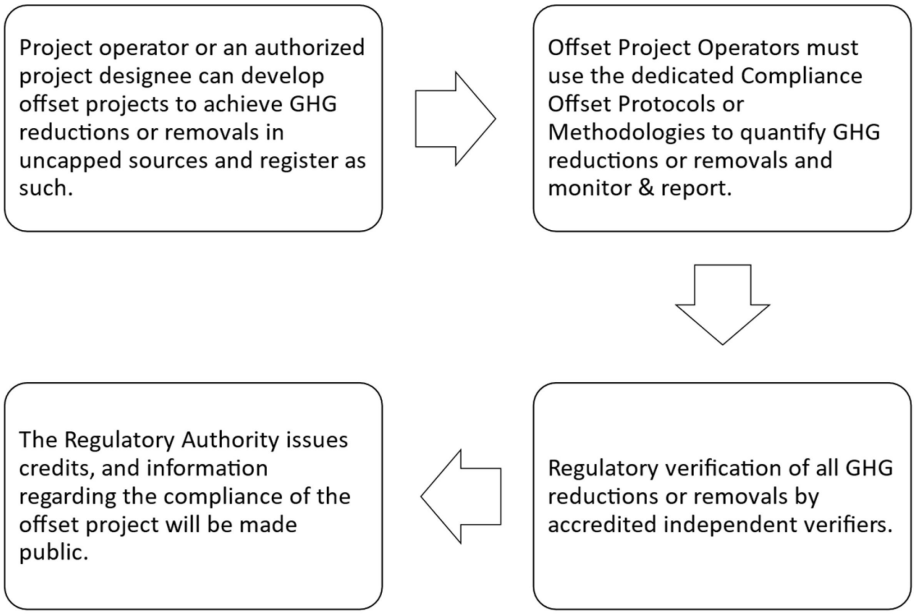


Figure 1. Pattern of the three compliance offset programs/schemes.

3.1.3. Regulated Carbon Markets for Farmers: Additionality, Permanence, and MRV

The key elements in the relevant laws and regulations in all three of the researched countries, as well as in the EU proposal for a CFCR, are 'additionality', 'permanence', and 'monitoring, reporting and verification' (MRV). Any regulatory system that uses carbon offsets or certifies GHG mitigation activities must find ways to ensure that they are 'real,' meaning that they reflect greenhouse gases that are actually reduced or removed from the atmosphere and durably stored. These need to be 'measurable' in the sense that reduced or removed greenhouse gases are quantified via robust monitoring, reporting, and verification rules and procedures. In principle, carbon credits should only be granted to reward activities or projects that lead to actual carbon removals that are permanent and additional to those that would have taken place anyway without incentives (legal or otherwise). In practice, this means that farmers seeking to generate carbon credits will need to implement technologies or new production practices that reduce or sequester emissions beyond a 'business as usual' benchmark. Reductions or removals also need to be long-lasting, meaning that the rules have to ensure that carbon sequestered is not released again later into the atmosphere. This includes, for example, rules around storing carbon in the form of trees and forests that mitigate against the prospect of it being released through wildfires. In this way, 'additionality' is a core requirement wherever emission reductions or removals are achieved through carbon markets, because if any issued carbon credit turns out to be 'non-additional' this means that the GHG emissions they are associated with have not been reduced in reality.

At its core, this deceptively simple concept of 'additionality' is, in practice, one of the most complex aspects of any carbon pricing scheme. It makes it necessary for regulators to strike a balance between ensuring that stringent requirements to guarantee environmental integrity are met, while still maintaining sufficient interest on the part of the carbon credit-generating project owners to participate in the market. The science underlying measuring carbon removals is highly technical and complex, thus the majority of the

rules in the three regulatory systems we studied are devoted to MRV procedures and methods. In order to be certified, all reductions and/or removals need to be measured (and measurable) according to specified methodologies, and then reported and verified by independent bodies. Our research has shown that numerous different approaches can be taken to achieve the environmental integrity of the market scheme and strike this balance. However, each of the three jurisdictions designed their systems around the entire MRV process, including requirements on additionality, baseline scenarios, duration, and liability mechanisms for reversals. The EU CFCR proposal to regulate the voluntary carbon market adds an additional and novel element to this mix, namely, sustainability. Under the CFCR (in Art. 7(1)), any activity or project that seeks recognition as a fungible carbon credit must demonstrate that it will have a neutral impact ('do no harm' principle) or generate co-benefits for a range of sustainability objectives (such as climate change adaptation, the protection of water and marine resources, and the protection and restoration of biodiversity and ecosystems) [18].

All of these rules are generic, but also very specific for various types of activity. In the jurisdictions we researched, several methodologies or protocols had been developed for a number of different agricultural activities that are structured in ways to ensure compliance with the above rules and principles. Some examples include soil carbon sequestration and beef cattle herd management in Australia; conservation cropping, nitrogen fertilizer efficiency, and beef feedlot operations in Alberta; and capturing and destroying methane from manure management systems in California. These specialized methodologies or protocols can either be initiated top-down by the regulator/scheme owner or bottom-up in the case of stakeholders developing their own methodologies that are then approved by the regulatory authority, depending on the jurisdiction in question. California, for instance, applies a more top-down science-based approach that is based on and inspired by methods found in other existing voluntary schemes. This approach usually results in a regulatory framework with fewer methodologies and strict eligibility criteria that do not depend on or guarantee any demand from potential project developers (as is the case with California's Rice Cultivation Protocol for instance). In all three jurisdictions, verification is conducted by registered, independent third parties, but California has the strictest rules for the entire MRV process of the three. The Canadian province of Alberta, in contrast, applies a more bottom-up approach where both prospective project developers and carbon agent/aggregators submit proposals for new protocols to the provincial regulator. This approach tends to generate a regulatory order with more methodologies and covered activities by allowing space for the market to come up with innovative project activities that might not otherwise have been proposed by the regulator. However, while this approach does lead to a wide range of project specific methodologies, they too can struggle to achieve market uptake if they are not drafted in ways that realistically reflect market conditions.

If a moment arrives when regulators decide that a carbon removal activity that is specified in a protocol is now 'business as usual' in the agricultural sector (in the sense that a certain practice or technology that is rewarded with carbon credits has become commonplace, measured by a certain percentage threshold across the sector), then that protocol will be terminated. This happened, for instance, in the case of no-till conservation cropping in Alberta (terminated in 2021) and the destruction of methane from piggeries using engineered biodigesters in Australia (in 2020). The logic for doing so is that once the practices become 'business as usual,' they cease to be 'additional', and therefore rewarding them with fungible carbon credits can no longer be justified.

3.1.4. Stakeholder Experiences with Regulated Carbon Markets for the Agricultural Sector

Despite the bad publicity that bogus carbon offsets have attracted in the press recently (most famously in connection to avoided deforestation), the stakeholders we engaged with were generally positive about the robustness of regulated carbon credit schemes for agriculture, in terms of additionality, permanence, and MRV [19]. They were virtually unanimous in seeing potential for upscaling carbon farming activities, especially with a

view to an anticipated high demand for credible carbon credits in the voluntary markets. However, many also voiced concerns about the considerable constraints and risks involved in converting farms to carbon farming uses, especially when prices for carbon credits are relatively low or when their market share is too small. An illustrative example of this is the offset protocol for rice farming in California. In 2019, this protocol was adopted by the Californian Air Resources Board (CARB) as the first crop-based protocol for generating carbon credits for use in California's cap and trade program. Even though farmers throughout the US could participate and receive carbon credits under this scheme, and even though it was predicted that the rice protocol would generate an additional offset supply of 0.5–3.0 $MtCO_2e$ until 2020, the program was unable to attract carbon farmers and never took off. In comparison, in Canada and Australia, where more farming activities are covered by offset programs under more manageable conditions, farmers have been much more active on the carbon market. These differences show how important it is for regulators in this space to strike manageable balances between assuring credibility and robustness and encouraging farmer participation.

In all three jurisdictions, aggregators or carbon agents acting as middlemen have largely taken up the technical and administrative responsibilities to make the MRV systems work and facilitate the trading of credits. By relieving the farmers from the labor-intensive, time-consuming, and often complicated technical and administrative tasks involved in carbon farming schemes, these carbon consultants play a very important middleman role in making the scheme work and finance themselves by taking a significant percentage of the proceeds as payment for their services (up to one third of the income generated through selling carbon credits in some cases). In all three jurisdictions, the highly complex and technical regulatory requirements of the different protocols present daunting administrative that require farmers to work with carbon consultants in order to manage economies of scale. At the end of the day, for farmers to farm carbon, the economics of their operations have to make sense; any additional income generated per hectare has to be higher than any costs that are incurred when employing carbon removal measures and satisfy all of the reporting and administrative requirements associated with them. In Australia, recent efforts to simplify methodologies (especially through introducing less labor- and cost-intensive measurement methods), coupled with the rising carbon price in the private market appears to have led to a greater uptake of the carbon farming scheme by small family farms. Nevertheless, only the carbon agents have the capacity to work at a large scale, bundling together creditable actions and activities of large numbers of dispersed farms into single credits that are more easily sold to emitters in need of them (simply put, it is easier to sell one credit for 10 tons of CO_2e on the market than selling one hundred credits of 0.10 tons of CO_2e). Carbon agents have an interest in carefully scrutinizing the activities participating farms when doing this bundling work because they will bear liability or financial risks if the bundles are rejected by regulators when one or more farms do not comply fully with protocol requirements.

One limitation that was raised by interviewed stakeholders is how the regulatory protocols for creditable activities almost always focus on specific activities, such as conservation cropping, or soil carbon sequestration, or rotational grazing, rather than 'whole of farm' approaches. This activity-specific focus of the regulatory framework does not allow for farmers to develop integrated approaches to reducing carbon emissions throughout all the operations on their farms. Several interviewees argued that 'whole of farm' regulatory approaches would be more efficient, would allow for a broader and deeper transition to sustainable agriculture, and could also increase the number of carbon credits generated per farm.

Finally, we found that, in the case of Australia and Alberta, that co-benefits connected to emissions reductions or sequestration were often deemed to be important reasons for farmers to participate in the regulatory schemes. Farmers were attracted to activities that remove carbon from the atmosphere not only when they were rewarded with carbon credits, but also when they could be beneficial to their farm operations by making them

more resilient (such as carbon sequestration practices producing healthier soils) and by fostering biodiversity conservation. The prospect of switching to farming carbon can therefore appear more attractive to farmers when such co-benefits are recognized and promoted. The European Commission seems keen on stimulating this kind of focus on sustainability co-benefits, as demonstrated in their proposal for an EU carbon removal certification framework.

3.2. Ex-Ante Assessment

Our project primarily focused on assessing the cases of existing regulatory systems in the world that have somehow integrated agricultural emissions into market-based emissions trading schemes of one sort or another, along with the experiences of stakeholders participating in them. These experiences were mostly limited to questions about opportunities for farmers to receive financial rewards for removing of carbon in their operations. As such, this ex-ante assessment discusses the prospect of integrating reward mechanisms like these into the EU ETS.

3.2.1. Rewarding Farmers for on-Farm Offsets/Carbon Removal under the EU ETS

First and foremost, we found that there is relatively little political appetite for regulatory proposals that include 'carbon offsets' under the EU law, despite the growing international market opportunity with increased attention for the credibility of offsetting [20]. Officials of the European Commission even told us that they preferred not using the word 'offsets' at all, largely because of the many scandals that have surfaced in the past that have given the public the negative impression that projects that offset carbon emissions (such as by tree planting) are unreliable and rarely, in fact, actually remove the amounts of carbon from the atmosphere that they promise. Furthermore, most on-farm techniques and practices of carbon sequestration are largely unable to guarantee the permanence of any carbon they sequester, which presents an immediate challenge for integrating them into the EU ETS. The sequestered carbon in agricultural soils, for example, can be easily released back into the atmosphere whenever farmers opt to change their tillage methods. Our comparative research, however, showed that by embedding legal requirements around permanence in the protocols or methodologies, for example, by demanding that carbon be sequestered for fixed periods like 25 or 100 years, such backsliding can be prevented. Furthermore, the rules can also adopt safe margins that do not reward certain amounts of additional sequestration in order to compensate for unavoidable future losses and reversals that might occur (such as through wildfires).

These are important findings, especially given that they exist in contrast to the wide political support for the alternative regulatory approach of simply directly paying farmers and other landowners compensation for their sequestration efforts. In other words, the political algorithm in its simplest form goes as follows: 'offsetting' is bad, but rewarding farmers for sequestration is good. At the same time, however, the direct payments mechanisms that reward climate-friendly investments on farms under the CAP already have a less-than-illustrious record, with the European Court of Auditors reporting that they have, to date, achieved a net-zero impact on reducing GHG emissions. One of the shortcomings of using the CAP for this compensatory purpose is that the CAP is an income support instrument *au fond* that is not a specially designed for climate change mitigation. As such, when it was adjusted to suit this new purpose, it lacked sufficient focus on the necessary concerns of additionality, permanence, and MRV that all purpose-built climate law instruments necessarily contain [21].

In our view, rather than tailoring the CAP to poorly incentivize farmers to sequester emissions, it would make more sense to incorporate a rewards element in the EU ETS to achieve this instead. The CFCR proposal that is currently on the table is not linked to the EU ETS, but its accompanying documentation suggests that its coherence with the EU ETS should be kept under review [18]. If this coherence is actualized, one could imagine it being possible in the future to trade certain kinds of carbon credit that are produced

through agricultural processes that meet the stringent and specific regulatory criteria for emissions allowances under the EU ETS. A precedent for this can be found in how, under the UNFCCC, it was possible in the past for Clean Development Mechanism credits to be swapped for allowances, although in the case of the EU, there would have to be far more scrutiny and controls in place to guarantee the quality of these credits. Most of the generic criteria that need to be established in the specified protocols for these kinds of credits or allowances (such as additionality, permanence, and MRV discussed above) are all included in the current CFCR proposal, but would have to be detailed by expert groups via delegated decision making by the European Commission in order to make the integration work. In short, from a regulatory perspective, we argue that while this would be a complicated matter to achieve, it would not be impossible, even though it is certainly also true that there would be substantial additional administrative and reporting requirements demanded of participating farmers who would want to sell their allowances on the EU ETS market. Because of this complexity, it would make sense to offer this as a voluntary option to interested farmers only. Carbon offsetting on farms could also be stimulated through by designing complementary benefits into the scheme that could also promote adaptation, food security, and biodiversity [22]. EU regulators could also look for inspiration in the protocols designed and adopted in the countries we researched, especially in Canada and Australia, that contain rules for specified types of activity that would be allowed under a new voluntary certified on-farm credits mechanism for the EU ETS. Although these are not linked to ETS frameworks like the EU ETS, these could nevertheless serve as models and points of departure to be adapted to the European context.

3.2.2. Pricing Agricultural GHG Emissions under the EU ETS

Several of the above considerations would also be relevant should agricultural GHG emissions ever be brought under the EU ETS directly in the sense of not just rewarding farmers for carbon removals, but also pricing GHG emissions associated with and generated by agricultural production. The MRV requirements would likely become the most important consideration for pricing agricultural GHG emissions under the ETS, however. There are many profound differences between MRV mechanisms that are used to verify voluntary carbon credit generation and those that are used for verifying compliance with the EU ETS. First and foremost, pricing agricultural emissions in this sense would not reflect a voluntary practice. Instead, agricultural emitters would have to surrender allowances for the measured emissions of their regulated farming activities. For large livestock farms with high levels of methane emissions in particular, the prospect of having to buy allowances on the European carbon market would be very costly and would be expected to drive up consumer prices of animal-sourced food products like meat, dairy, and eggs. Such an impact, while certainly painful for those seeking to maintain current consumption patterns, would also generate positive incentives for consumers to transition away from current consumption patterns that are overly-concentrated on animal sourced food products. However, minimizing the negative impact of this on consumers would require that it be supported by a wider EU food transition policy [23]. For example, one could imagine the promulgation of some form of border tax adjustment similar to that of the existing CBAM Regulation to counteract the substitution of expensive European meat and dairy products by cheaper imported products [24].

In the interviews as well as in the stakeholder and expert meetings where the prospect of integration with the EU ETS arose, two important regulatory design questions kept surfacing for discussion about which agricultural entities would be the most optimal for inclusion and how the EU ETS would then relate to other emissions mitigation mechanisms like the CAP, LULUCF, and ESR. Each will be addressed in turn here.

A. Which agricultural entities would be the most optimal for inclusion in the EU ETS: individual farms, or upstream or downstream producers?

Whenever an installation is brought under the EU ETS, this brings many consequences for its parent company. As with any newly regulated entity, it would be the parent company

that would be obligated to acquire the necessary number of allowances required to stay in compliance, as well as to comply with the wide range of often complex administrative and technical requirements associated with reporting. Complying with such requirements would likely be very difficult for some agricultural entities, especially small-to-medium-sized family farms, simply due to a lack of capacity. From the perspective of the competent authority, it also seems unlikely that the national emissions authorities in the Member States would be able to monitor and enforce the implementation of EU ETS rules for an extremely large number of farms. At the moment of writing, there are approximately 6.2 million livestock farms in operation in the EU. If one compares this to the 11,000 installations currently covered by the EU ETS, this number alone easily demonstrates how bringing all farms under the EU ETS would be mission impossible for the Commission. Furthermore, since the large majority of EU farms are small in size, doing so would be quite inefficient as well. The EU ETS contemplates problems of scale efficiencies, and in some sectors, only operators above a certain size threshold are included, thus presumably the same could be conducted with farms. In any event, turning (large) farms into regulated entities could be advantageous for the impetus that it would provide to farmers to convert their holdings into more sustainable farming businesses. Another alternative to achieve a similar effect that has been proposed by some experts would be to simplify farm level carbon pricing by basing it on metrics like the amount of fertilizers purchased and the number of livestock held.

In contrast to this idea, there seems to be wider support for a different way of tackling agricultural emissions by targeting not farms themselves, but rather downstream food processors, especially installations in the meat and dairy sectors, such as slaughterhouses and dairies. A total of 43 percent of the respondents of a 2023 survey conducted by Trinomics (n = 91) expressed a strong preference for food processors being the entities that should be targeted for complying with agricultural emission mitigation regulations [7]. In contrast to farms, such installations are typically owned by large multinational corporations that are active throughout the EU and that have business structures that are much more similar to the industries that are already regulated under the EU ETS. If they are regulated by the EU ETS, these corporations would then face having to pay for the on-farm methane emissions associated with the food products that they process and later sell. At this more generic level, away from the individual farm, it would make sense to adopt default emissions data based on easily quantifiable metrics, such as the number and species of livestock processed. While such a default approach would likely not be effective in incentivizing individual farmers to switch to low-emissions practices, such as by using specially modified feed, it would nevertheless produce a price incentive for consumers to switch their food preferences to lower-emitting, non-animal-sourced products. As noted earlier, in order for such an approach to work, though, it would need to be encased within a broader EU food transition policy package.

A further alternative can also be imagined for tackling nitrous oxide emissions resulting from cropping systems in the form of targeting upstream agricultural input suppliers, such as the producers and suppliers of synthetic fertilizers. Industries that produce ammonia already fall under the EU ETS, but not as far as on-farm emissions are concerned (tier-three emissions) [25]. It could be possible to make fertilizer producers also responsible for the emissions associated with the downstream use of their products by farmers. This, of course, would likely make fertilizers and their use more expensive, and thereby indirectly incentivize farmers to alter their production methods to reduce their dependence on fertilizer inputs.

B. What would the relationship be between an EU ETS that includes agriculture and other emissions mitigation instruments such as the CAP, LULUCF, and ESR?

Regulating agricultural GHG emissions under the EU ETS would impact the other instruments that are currently being used to address agricultural GHG emissions in the EU. Currently, agricultural emissions fall under either the ESR or the LULUCF Regulation. Article 2 of the ESR explicitly distinguishes the emissions it covers from those that fall

under the EU ETS by drawing a strict boundary between the two, meaning that, in practice, the emissions of certain economic sectors can either be regulated under the ETS or under the ESR, but not both [2]. Currently, agricultural emissions as a whole fall under the ESR's general Member State targets for emissions reductions, but if a legislative change were to bring certain agricultural GHG emissions under the ETS instead, they would then no longer be considered part of those Member State targets.

In contrast to the ESR, the LULUCF Regulation is constructed around collective targets for the land use sector, which currently exclude almost all livestock emissions. In 2022, the European Commission proposed to include these livestock emissions in a revised version of the regulation, but this plan was later dropped [26,27]. As such, if livestock emissions were ever brought directly under the EU ETS, then it would no longer be necessary to contemplate trying to regulate them under a revised version of the LULUCF Regulation as well. Furthermore, the introduction of a voluntary carbon credit system such as the one described earlier would also not negatively impact the LULUCF Regulation because it could actually help Member States to achieve the regulation's collective goals. Having said that, though, it could also bring with it some risk of double counting that would need to be taken into account.

Finally, the CAP would also be relatively unaffected if agricultural emissions were ever brought under the EU ETS because it is not linked by law to the EU's obligatory climate targets. However, the presence of the CAP direct payments alongside the EU ETS market for allowances could present some risk of double payments as well as of the risk that the economic incentives that the ETS would be hoping to produce might be neutralized the availability of CAP payments. In order to avoid this, it would, therefore, be useful to stop excise provisions in the CAP that fund agricultural carbon removal projects that would also be eligible to benefit from a carbon removal credit mechanism. To assuage such concerns, it is worth mentioning that there was broad support among the stakeholders and experts interviewed for this project for the idea that the money raised through the EU ETS be given to farmers to help them transition to more sustainable farms.

4. Discussion

Integrating agricultural emissions into the ETS would add a new regulatory pathway to reduce GHG emissions from agriculture, in addition to those already available under current instruments, as is illustrated in Figure 2. As stated above, from a regulatory efficiency perspective, it seems advisable to target meat and dairy processors and synthetic fertilizer producers when integrating agricultural GHG emissions into the EU ETS. Generally speaking, these sectors consist of a relatively limited number of larger companies that should have a sufficient capacity to meet their obligations under a complex legal framework like the EU ETS. Furthermore, the measurement requirements for determining their emissions reductions would be less complex and onerous than is the case with on-farm emissions reduction. It is not controversial to say that the bulk of the EU's agricultural GHG emissions take the form of CH_4 emissions from livestock keeping and N_2O emissions from the use of synthetic fertilizers on agricultural soils. Enteric fermentation and manure management together make up almost 80 percent of all the agricultural GHG emissions in the EU (245.4 $MtCO_2e$ from enteric fermentation and 118 $MtCO_2e$ for agricultural nitrous oxide emissions), whereas other agricultural GHG sources contribute a total of only 62.6 $MtCO_2e$, mainly emissions from grassland, cropland, rice cultivation, using carbon containing fertilizers, urea application, and burning crop residues [28]. Thus, from the perspective of GHG sources, the best course of action appears to be to target livestock production and fertilizer production and/or its use as the focuses of EU ETS emissions reduction obligations for agriculture.

There is one disadvantage of this approach, however, which is that it would not stimulate individual livestock farmers themselves to work to reduce their own emissions by balancing emissions and sequestration in the pursuit of a goal to achieve a net zero farm. This would be a concern for the Commission, especially if it is interested in linking the

regulation of agricultural emissions to its policy goals of a transitioning its agricultural sector towards a more sustainable footing. In the discussion above, several options were proposed for how individual farms could be targeted instead of upstream (fertilizers) and downstream (meat and dairy) producers. One option was to focus only on bigger livestock farms. This, however, comes with practical problems of its own, such as where to set the size threshold; or how to avoid larger farms being split into different legal entities in order to remain below the threshold; or how to avoid any increased regulatory complexity that would result from some farms falling under one regulation (such as large farms under the EU ETS) and others under another (such as small farms under the ESR)? One option to ameliorate these concerns would be to look for alignment with the Commission's proposal to amend the EU's Industrial Emissions Directive by extending its current reach that covers large poultry and pig farms to also include cattle as well as smaller pig, poultry, and mixed livestock operations [29]. This kind of proposal could introduce specific rules for the sector that would align with climate and emissions mitigation laws, such as an aggregation requirement to end the widespread practice of dividing one large livestock farm into separate facilities to avoid regulatory penalties; unfortunately, this extension of the Industrial Emissions Directive was rejected during the negotiations on the proposal in 2023 [29]. Furthermore, MRV requirements at the farm level could be greatly simplified by assessing farm GHG emissions with default emission values on a per animal basis instead of relying on more costly and complex chemical sampling procedures. Doing so, however, yet again, neutralizes any incentives for farmers to adopt more climate friendly management practices, such as changes in feed, rotational grazing, or technological adjustments in livestock housing systems. Furthermore, if this were to run parallel to a broader policy goal to reduce the number of methane-producing animals on EU farms altogether, which could very well be a goal of a wider food transition policy, it would seem logical to focus emissions mitigation mechanisms solely on the number of animals instead [23].

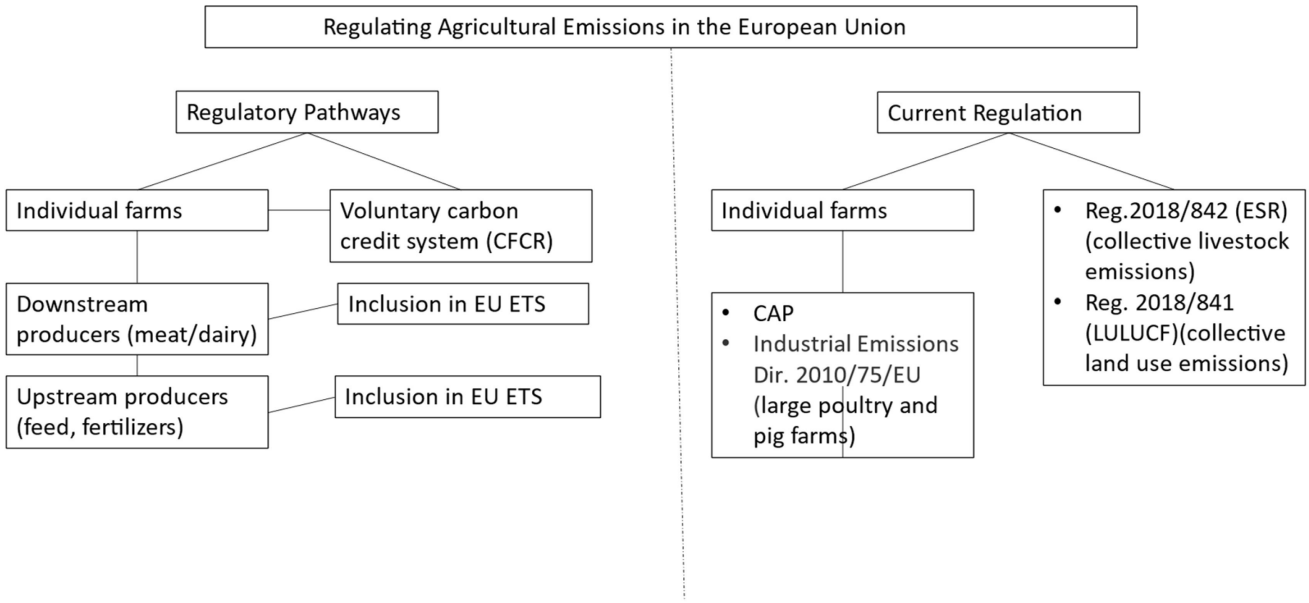


Figure 2. Options for regulating agricultural emissions in the EU.

Another logical conclusion that one could draw from this overview is that it would be simpler, and maybe even better, to develop legal mechanisms that promote the avoidance of emissions in the first place, instead of trying to find methods to sequester emissions in vegetation and soils, many of which now are highly complex, expensive, and/or dubious in achieving permanent sequestration. Indeed, giving too much space to considering emissions removal activities as key to reducing the EU's agricultural emissions levels may have the perverse effect of reducing any sense of urgency around avoiding emissions. From this perspective, it would be important for the Commission to keep the main focus of

agricultural emissions regulation on instruments that are aimed at avoiding emissions, such as directly pricing GHG emissions under the EU ETS. This is not to suggest that carbon removal is not important for emissions mitigation. There is no question that the level of GHGs in the atmosphere is already too high and that they are continuing to rise. It is also clear that sequestering carbon from the atmosphere into soils and vegetation remains an important objective, especially considering the positive co-benefits that doing so would bring for biodiversity, water retention, and climate change adaptation generally. Constructing a stronger policy focus on achieving carbon removal on agricultural lands that relies on more robust financial instruments than the CAP and the LULUCF Regulation to generate incentives for farmers to switch practices would certainly be possible without opening up the possibility that regulated entities under the EU ETS, such as industries and energy producers, will offset their emissions by paying farmers for their sequestration efforts. Regulating the voluntary carbon market, as has been proposed by the European Commission with its Certification Framework for Carbon Removals, can be seen as a first step taken in this direction. The Commission could also set specific rules for certain types of on-farm carbon removal activity, similar to the protocols and methodologies that have been adopted in Canada and Australia. In Australia, the government plays an important role in buttressing the market for carbon farming by actively buying credits from farmers. In this way, farmers can choose to either offer their credits for sale on the private carbon market or to sell them to the government, depending on how they want to manage their risk. Given the failure of the CAP in incentivizing farmers as a sector to substantially remove carbon through voluntary paid rewards mechanisms, it is not difficult to imagine that having the European Commission buy up certified credits, or getting Member States to do so via state aid under a regulated agricultural carbon removal scheme, would be much more effective instead.

We would like to finish this discussion by raising the role of legal scholarship on the topic of reducing agricultural GHG emissions and of achieving a transition towards a more sustainable food system in general. We found that legal scholarship on regulating the agricultural sector with these aims is largely absent. Only a handful of academics are currently working on this topic, despite its enormous importance, the immense challenges inherent to it, as well as the broadly supported call for agriculture and food transition in the EU. Much more research is needed to be able to support the development and establishment of an effective and efficient instrument mix that would achieve a viable transition towards a resilient and environmentally friendly farming and food system in the EU.

5. Conclusions

It seems inevitable that the EU will have to introduce stricter legal instruments to reduce agricultural GHG emissions and to increase carbon removal on agricultural land seems in order to achieve its commitments under the Paris Agreement. This paper summarized the findings of a novel research project that investigated the prospect of integrating agricultural GHG emissions into the EU ETS as the EU's main instrument for reducing GHG emissions. We filled a knowledge gap by exploring whether, under what conditions, and how the EU ETS could be used as a mechanism to oblige the agricultural sector to reduce its GHG emissions. This project partly relied on the ex-post assessment of emissions trading schemes and related pricing mechanisms that currently exist in three other non-European jurisdictions and partly on the ex-ante assessment of the expected effectiveness of different regulatory designs for the EU given its law and policy context. In these two phases of our project, we reached the conclusion that bringing methane and nitrous oxide emissions from livestock keeping and synthetic fertilizer use under the EU ETS would be possible ways to achieve this.

The most viable option would be to oblige meat and dairy processors and synthetic fertilizer producers to surrender allowances for on-farm GHG emissions associated with their products. The disadvantage of this option is that it would not stimulate individual livestock farmers to pursue the goal of achieving a net-zero farm by reducing their emissions

through balancing emissions and sequestration. Given this, we conclude that in addition to directly pricing emissions, a voluntary, but highly regulated, carbon credits scheme could be introduced in parallel that would stimulate farmers to achieve their own emissions removals and transition the agricultural sector as a whole to a net-zero footing, with more climate resilient and environmentally friendly farms. Such credits could be offered for purchase both to the private carbon market as well as to Member State governments and the European Commission via public funding and state aid schemes. In this way, farmers would be rewarded for their emission reduction and carbon removal accomplishments. Given the current political climate in Europe that does not favor compulsory measures aimed at farming, such a voluntary approach seems to be the most viable option. However, more mandatory legal approaches could also be introduced through other regulatory pathways, for example through jointly applying command-and-control type of rules to livestock farms under the Industrial Emissions Directive in addition to the reward mechanism.

Author Contributions: Conceptualization, J.V.; methodology, J.V., F.F. and M.C.L.; validation, J.V., F.F. and M.C.L.; formal analysis, J.V., F.F. and M.C.L.; investigation, J.V., F.F. and M.C.L.; resources, J.V., F.F. and M.C.L.; data curation, J.V., F.F. and M.C.L.; writing—original draft preparation, J.V.; writing—review and editing, J.V., F.F. and M.C.L.; visualization, F.F.; supervision, J.V.; project administration, J.V.; funding acquisition, J.V. All authors have read and agreed to the published version of the manuscript.

Funding: This research was made possible through funding from the Netherlands Research Council NWO under the grant number 406.18.RB.004.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all the subjects involved in this study.

Data Availability Statement: Our anonymized interview reports have been made available through the DANS data station social sciences and humanities, https://dans.knaw.nl/en/social-sciences-and-humanities/, accessed on 7 June 2024.

Conflicts of Interest: The authors declare no conflicts of interest.

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