Farming and biochar in the EU and the road to sustainability: Drawing connections through the Common Agricultural Policy and the regulation of organic and carbon farming

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Farming and biochar in the EU and the road to sustainability: drawing connections through the Common Agricultural Policy and the regulation of organic and carbon farming

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Abstract

Considering the significant impact of agriculture on the environment, there is corresponding potential residing in proper management of agricultural soils and in farming. Agricultural systems are instrumental to achieving climate and environmental goals and for paving the road towards sustainability. However, this requires a transition from business-as-usual agriculture and farming, which must be supported by policy and legislation through systemic and coordinated measures. Other more pointed measures, such as the targeted use of certain technologies, e.g. the proper use of biochar, can also be leveraged. But what is the state of play in the pursuit of sustainability in farming in the EU legislation and policy? How significant are these developments for biochar in the transition towards sustainability? This article considers these issues in relation to three different yet connected policy and legislative fields in the broader agriculture domain: the Common Agricultural Policy, organic farming and the emerging domain of carbon farming.

1 INTRODUCTION

Climate change and biodiversity loss are two of the most significant crises facing our planet.[1] Industrial, intensive and unsustainable agricultural systems put considerable pressure on the Earth and its resources.[2] These agricultural systems generally have productivity as their focus.[3] Such productivity may be achieved through the use of certain farming techniques[4] (for example, monocultures) and the use of external input and increased reliance on mechanisation,[5] all driven

[1] HO Pörtner et al (eds), Climate Change 2022: Impacts, Adaptation and Vulnerability (Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press 2022). E Brondizio et al (eds), Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES Secretariat 2019). L Montanarella, R Scholes, and A Brainich (eds.). The IPBES Assessment Report on Land Degradation and Restoration (IPBES Secretariat 2018).

[2] EEA - European Environment Agency, *Briefing - Rethinking Agriculture* (2022) <https://www.eea.europa.eu/publications/rethinking-agriculture>; EEA - European Environment Agency, *Land and Soil in Europe — Why We Need to Use These Vital and Finite Resources Sustainably* (EEA Signals, 2019) <https://www.eea.europa.eu/publications/eea-signals-2019-land>; European Environment Agency - EEA, *The European Environment: State and Outlook 2020: Knowledge for Transition to a Sustainable Europe* (Publications Office of the European Union 2019).

[3] P Pingali and M Smale, 'Agriculture, Industrialized' in SA Levin (ed), *Encyclopedia of Biodiversity*, vol 1 (2nd ed, Academic Press 2001) 86.

[4] S Salaheen and D Biswas, 'Chapter 2 - Organic Farming Practices: Integrated Culture Versus Monoculture' in D Biswas and SA Micallef (eds), *Safety and Practice for Organic Food* (Academic Press 2019) 24.
R Ghorbani, '18 - Reducing Copper-based Fungicide Use in Organic Crop Production Systems' in J Cooper, U Niggli and C Leifert (eds), *Handbook of Organic Food Safety and Quality* (Woodhead Publishing 2007) 401.

[5] See: United Nations Environment Programme - UNEP, '10 Things You Should Know about Industrial Farming' (2020): <https://www.unenvironment.org/news-and-stories/story/10-things-you-should-know-about-industrial-farming>.

by the goal to increase agricultural yields. While global agricultural yields have increased steadily,[6] there have also been environmental and social costs, which hamper the achievement of climate and environmental goals.[7]

At the same time, despite being among the drivers of environmental degradation, agricultural systems are also increasingly considered instrumental to achieving climate and environmental objectives[8] due to the untapped environmental and climate mitigation potential residing in proper management of agricultural soils[9] and systems.[10] In addition, the targeted and appropriate use of certain technologies can also be enumerated in the arsenal of measures or tools to increase sustainability in the agricultural systems and achieve such climate and environmental goals. In this contribution, the focus is on biochar.

Biochar is a carbonaceous and porous material originating from the thermal treatment of biomass.[11] In other words, it is a charcoal-like material with adsorbent properties produced through heating biomass at relatively high temperatures, generally in oxygen-free, low-oxygen or oxygen-controlled conditions. As biochar can be produced from waste (waste biomass) and is generally co-produced with bio-oils and (syn)gas, it can play a role in the circular economy and production of renewable energy.[12] Biochar is a very stable material: it does not degrade quickly and, therefore, stores carbon for a long time, making it an exciting technology for carbon capture purposes and soil carbon sequestration.[13] Because of these properties,[14] biochar can be used in several applications including in agriculture as fertiliser or liming material. That

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L Horrigan, RS Lawrence and P Walker, 'How Sustainable Agriculture can Address the Environmental and Human Health Harms of Industrial Agriculture' (2002) 110 Environmental Health Perspectives 445, 446.

S Dabbert, AM Haring and R Zanoli, *Organic Farming: Policies and Prospects* (1st edn, Zed Books 2004) 1.

[6] Food and Agriculture Organization - FAO, *Agricultural Production Statistics 2000–2020* (2022).

See also: H Ritchie and M Roser, 'Our World in Data - Crop Yields' (n.d.): <https://ourworldindata.org/crop-yields>.

7 European Environment Agency - EEA, 'Agriculture and Food System' (n.d.) <https://www.eea.europa.eu/en/topics/in-depth/agriculture-and-food. See EU action tab : https://www.eea.europa.eu/en/topics/in-depth/agriculture-and-food?activeTab=e3e6b879-fef4-4a88-9436-5f0064698270>.

[8] This is also recognised in the Commission's positions: European Commission 'A Farm to Fork Strategy for a Fair, Healthy and Environmentally-friendly Food System' (Communication) COM(2020) 381 final, 20 May 2020. European Commission 'EU Soil Strategy for 2030. Reaping the Benefits of Healthy Soils for People, Food, Nature and Climate' (Communication) COM/2021/699 final, 17 November 2021.

[9] PR Shukla et al (eds), Climate Change and Land: an IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems (Cambridge University Press 2019).

[10] For example, beyond the management of soils, we could mention the livestock sector as a sector with substantial emissions and causing environmental issues, where action could be taken. On these issues, from a legal perspective, see: J Verschuuren, 'Achieving Agricultural Greenhouse Gas Emission Reductions in the EU Post-2030: What Options do we Have?' (2022) 31 Review of European, Comparative & International Environmental Law 246.

[11] J Lehmann and S Joseph, 'Biochar for Environmental Management: An Introduction', *Biochar for Environmental Management* (Routledge 2015).

[12] S Shackley, HP Schmidt and B Glaser, 'Introduction (to "Biochar in European Soils and Agriculture: Science and Practice")' in S S et al (eds), Biochar in European Soils and Agriculture: Science and Practice (Routledge 2016).

[13] YS Ok et al, *Biochar: Production, Characterization, and Applications* (CRC press 2015).

[14] KY Chan and Z Xu, 'Biochar: Nutrient Properties and Their Enhancement' in J Lehmann and S Joseph (eds), Biochar for environmental management: science and technology (Earthscan Publications 2009). As cited in: SP Galinato, JK Yoder and D Granatstein, 'The Economic Value of Biochar in Crop Production and Carbon Sequestration' (2011) 39 Energy Policy 6344.

AK Berek and NV Hue, 'Characterization of Biochars and their Use as an Amendment to Acid Soils' (2016) 181 Soil Science 412.

B Glaser, J Lehmann and W Zech, 'Ameliorating Physical and Chemical Properties of Highly Weathered Soils in the Tropics with Charcoal – A Review' (2002) 35 Biology and Fertility of Soils 219.

said, biochar may also have some drawbacks, such as the introduction of pollutants in soils and sustainability risks associated with the type of biomass used.[15] Ideally, a cascading approach, which prioritises higher-value uses of biomass e.g. food, feed and materials, should be adopted. Examples of the sustainability risks in biochar use therefore include inefficiency risks when the cascading approach[16] is not followed in the biomass value chain. Other risks include biodiversity loss or environmental degradation when raw or virgin biomass from forests is used.[17]

Against this backdrop, this article examines whether existing European Union (EU) policy and legislation adequately regulates the transition to sustainability in agricultural systems and considers the regulation of biochar as a tool in said transition. In particular, this contribution aims to provide an overview of these instruments, highlight potential sustainability issues that might emerge from the lack of provisions and measures, link these areas together to underscore the potential for synergies and issues and, finally, consider their role for the advancement of biochar and the proper use of biochar in agriculture.

As mentioned above, this article will consider three policy and legislative fields to identify their contribution to the transition towards more sustainable agricultural systems (section 2) and their relation and significance for biochar (section 3): the CAP, organic farming and carbon farming. The reason why these instruments were considered for further analysis are, firstly, because the CAP can be regarded as the main EU instrument covering agriculture and farming. Given the CAP's sizeable budget,[18] the lack of financial support for certain agricultural practices and the strength of environmentally oriented provisions can also ultimately interfere with sustainability goals. The second area of focus is the regulation of organic farming in the EU. The scientific community[19] and recent policy-making initiatives[20] have linked this farming method with sustainability. Additionally, organic farming is also an agricultural practice that is

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[15] E.g.: F Verheijen et al, *Biochar Application to Soils: a Critical Scientific Review of Effects on Soil Properties, Processes and Functions. Joint Research Centre* (Institute for Environment and Sustainability, 2009).
AB Hassen Trabelsi et al, 'Municipal Sewage Sludge Energetic Conversion as a Tool for Environmental Sustainability: Production of Innovative Biofuels and Biochar' (2021) 28 Environmental Science and Pollution Research 8, 9777. J Yoon Seo et al, 'Production of Biochar from Crop Residues and its Application for Biofuel Production Processes – An Overview' (2022) 361 Bioresource Technology.
S Brick and S Lyutse, 'Biochar: Assessing the Promise and Risks to Guide US Policy' (2010) Natural Resources Defense Council USA http://www nrdc org/energy/files/biochar_paper pdf, 11.

[16] The cascading approach (also cascading principle) is an approach that aims at extending biomass availability within a given system by focusing on the efficient utilisation of resources and using residues and recycled materials for material use (leading to overall maximisation of added value). The cascading approach is usually studied and applied to wood value chains. European Commission - Directorate-General for Internal Market Industry Entrepreneurship SMEs and others, CASCADES – Study on the Optimised Cascading Use of Wood, (Publications Office of the European Union 2016), 10. See, in particular, the distinction between single-stage and multi-stage cascading use on page 6 and the value pyramid used to classify biomass applications on page 7.

[17] For a more comprehensive consideration of these issues, see: E Cavallin, 'A Legal Journey in the Life of Biochar in the EU: Assessing Opportunities and Challenges Through a Value Chain Approach' (Doctoral Degree in Law, Hasselt University 2024).
For a deeper discussion on the cascading approach (though not focused on biochar), see also: E Cavallin, ' Forestry Waste to Biofuel and Biogas: Law and Policy ' in L de Almeida and J van Zeben (eds), *Law in the EU"s Circular Energy System: Biofuel, Biowaste and Biogas* (Edward Elgar Publishing 2023).

18 European Commission, 'Common Agricultural Policy Funds' (n.d.): <https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/cap-funds_en#:~:text=CAP%20in%20the%20EU%20budget,-The%20EU's%20multiannual&text=The%20EAGF%20(the%20%E2%80%9Cfirst%20pillar,dedicated%20to%20supporting%20agricultural%20markets.>.

[19] See for instance: F Caporali, 'History and Development of Agroecology and Theory of Agroecosystems' in M Monteduro et al (eds), *Law and Agroecology: A Transdisciplinary Dialogue* (Springer 2015), 4.

[20] See the focus on sustainable farming practices and organic farming in the European Commission's Farm to Fork Strategy (n 8).

comprehensively included in policy and regulated by law in the EU.[21] Thus, it particularly lends itself to legal and policy reflections.

Finally, the third domain covered is carbon farming, where the term indicates land-based practices that avoid or reduce GHG emissions or sequester carbon.[22] The reasons for including this subject matter are related to carbon farming's environmental and climate sustainability potential. Carbon farming recognises that specific ecosystems, soils and vegetation are a source and sink for atmospheric carbon, and improving the carbon sequestration and storage potential in (agricultural) soils and ecosystems leads to climate change mitigation, reversing soil degradation and improving food security.[23] Additionally, carbon removals from carbon farming are regulated at the EU level, meaning that there is a potential for synergies with existing agriculture legislation and policy.

As for biochar, the reasons for selecting biochar for further analysis are the following. While having some drawbacks, biochar can increase sustainability in farming due to its nature and properties, holding promise for climate change mitigation and environmental quality. A second reason is the intersection between biochar and the three selected EU domains, which have a certain relevance for biochar use in agriculture: the CAP foresees interesting instruments that could be significant for biochar use, the EU Regulations on organic farming expressly include biochar in the list of allowed agricultural inputs and finally, biochar application or, more broadly, agricultural activities that include biochar could be considered a carbon farming practice.[24] These aspects lead to the question of how these legal instruments can contribute to the use of biochar in sustainable agriculture in consideration of this substantial transition needed.

Biochar has already been the object of legal scholarly contributions. Still, these are limited in number and have focused either on providing an overview of biochar-relevant legislation or specific elements relevant to the biochar value chain, such as the potential waste barrier.[25] A more focused consideration of EU instruments relevant to biochar *use* in agriculture is still missing.

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[21] For a comprehensive view of the corpus of laws concerning organic agriculture, see: European Commission, 'Legislation for the Organics Sector' (n.d.): <https://agriculture.ec.europa.eu/farming/organic-farming/legislation_en>.
See also: T Gomiero, D Pimentel and MG Paoletti, 'Is there a Need for a More Sustainable Agriculture?' (2011) 30 Critical Reviews in Plant Sciences 16.

[22] MC Evans et al, 'Carbon farming via Assisted Natural Regeneration as a Cost-effective Mechanism for Restoring Biodiversity in Agricultural Landscapes' (2015) 50 Environmental Science & Policy 114.

[23] See for instance: WR Horwath and Y Kuzyakov, 'The Potential for Soils to Mitigate Climate Change Through Carbon Sequestration' in WR. Horwath and Y Kuzyakov (eds), *Climate Change Impacts on Soil Processes and Ecosystem Properties*, vol 35 (Elsevier 2018).

[24] I Nogués et al, 'Biochar Soil Amendment as Carbon farming Practice in a Mediterranean Environment' (2023) 33 Geoderma Regional.
Government of Western Australia - Department of Primary Industries and Regional Development, 'Carbon farming: Applying Biochar to Increase Soil Carbon' (n.d.): <https://www.agric.wa.gov.au/soil-carbon/carbon-farming-applying-biochar-increase-soil-carbon>.

[25] See: T Van Laer et al, 'Legal Constraints and Opportunities for Biochar: A Case Analysis of EU Law' (2015) 7 GCB Bioenergy 14.
J Hammond et al, 'The Legality of Biochar Use: Regulatory Requirements and Risk Assessment' in Simon Shackley and others (eds), *Biochar in European Soils and Agriculture* (Routledge 2016).
J Vereš, J Koloničnýa and T Ochodeka, 'Biochar Status under International Law and Regulatory Issues for the Practical Application' (2014) 37 Chemical Engineering Transactions 799.
L Štrubelj, 'Waste, Fertilising Product, or Something Else? EU Regulation of Biochar' (2022) 34 Journal of Environmental Law 529.
C van den Bergh, 'Biochar and Waste Law: A Comparative Analysis' (2009) 18 European Energy and Environmental Law Review 243.

Accordingly, the content and structure of this article are as follows: Section 2 addresses the issue of sustainability in farming policy and law in selected EU instruments. After considering and briefly exploring the concept of sustainability in agriculture (section 2.1), sections 2.2, 2.3 and 2.4 provide an overview of the policy and legal status quo and will reflect on sustainability matters and concerns and potential for synergies of the Common Agricultural Policy (CAP), organic farming and carbon farming initiatives. Section 2 concludes with a table summarising the main issues and open questions identified. Section 3 then addresses biochar in agriculture and farming policy and law in order to discover what the selected EU legal instruments can offer to the use of biochar in sustainable agriculture and organic and carbon farming initiatives for biochar. Section 4 will provide some final reflections and conclusions.

2 SUSTAINABILITY AND SUSTAINABILITY IN AGRICULTURE AND ORGANIC AND CARBON FARMING POLICY AND LAW

This section focuses on the concept of sustainability and sustainability as applied to agriculture and its place in the EU agriculture and farming policy and legislation, more specifically in relation to the CAP, and organic and carbon farming.

2.1 The concept of sustainability

In environmental sciences, sustainability refers to the capability of a system to persist in a self-renewing manner[26] until its full natural lifespan is exhausted.[27] From a scientific perspective, sustainability represents a fundamental part of natural systems.[28] In the policy context, the concept of sustainability possesses an intergenerational human component coupled with environmental and economic elements.[29] Sustainability is often associated with sustainable development, historically defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs".[30] This therefore implies development that is considered economically, environmentally and socially sound.[31]

Sustainability in agricultural systems is associated with the use of agricultural methods that do not compromise the natural foundations of life but, rather, preserve them for future generations. Sustainable agricultural systems can be defined as those that (1) incorporate natural processes (ecological and biological processes)[32] into food production; (2) try to diminish or avoid non-renewable and harmful inputs; (3) use farmers' knowledge and problem-solving skills; and (4) use the collective capacities of people to work together to solve problems related to agriculture and natural resources.[33] This encompasses concerns over environmental and health externalities (e.g., maintenance of healthy soils and clean water), preservation of biodiversity, ecosystem services (e.g., carbon capture, flood protection), concerns over certain subsidies, but also equity of technological change, [34] and development of (small-scale) farms

[26] J Meadowcroft, 'Encyclopaedia Britannica - Sustainability' (n.d.): <https://www.britannica.com/science/sustainability>.
[27] R Costanza, 'Ecosystem Health and Ecological Engineering' (2012) 45 Ecological Engineering 26-27.
[28] See entry "sustainable development" in: DD Kemp, *The Environment Dictionary* (Psychology Press 1998) 389.
[29] Meadowcroft (n 26).
[30] G Harlem Brundtland et al, *Report of the World Commission on Environment and Development: Our Common Future* (1987).
[31] See: entry "sustainable development" in: Kemp (n 28)
[32] For example, nutrient cycling, nitrogen fixation, soil regeneration, predation.
[33] Pretty (n 34) xxiii.
[34] J Pretty, 'Overview to Four Volumes: Sustainable Agriculture and Food' in J Pretty (ed), Sustainable Agriculture and Food (Earthscan Reference Collection, Routledge 2008), xxviii.

and local production.[35] Therefore, the productivity of an agricultural system and, in particular, agricultural yields cannot be achieved at the expense of the natural foundations and a sound socio-economic base but must contribute to their preservation.

2.2 The Common Agricultural Policy: status quo and sustainability concerns

The European Green Deal (EGD) [36] and the Farm to Fork Strategy[37] are two significant Commission's outputs aimed at increasing sustainability in agricultural systems.[38] Both instruments also acknowledge the importance of the CAP in achieving more sustainable food systems.[39] This subsection is, therefore, dedicated to the CAP itself (its structure and main elements) and to its role in promoting sustainability and related concerns.

2.2.1 Structure of the new CAP

The structure of the new Common Agricultural Policy (CAP) is set out in Regulation 2021/2115.[40] In this instrument, the two-pillar structure from the previous CAPs was maintained. The two pillars can be broadly characterised as market support and rural development. The first pillar comprises basic income support, redistributive income support, payment for young farmers and payments under the Eco-Schemes.[41] The conditionality system, prescribing the respect of a set of basic rules to receive EU income support, includes cross-compliance requirements in relation to Statutory Management Requirements (SMR) and standards for Good Agricultural and Environmental Conditions (GAECs) laid down in Annex III. Eco-Schemes represent a novel element for the climate and the environment. A dedicated instrument to climate and environmental issues among others, Eco-Schemes are mandatory for Member States (MS) to introduce and voluntary for farmers to use. Eco-Schemes are a payment for the implementation of agricultural practices focusing on the climate and environmental objectives addressed by the CAP and which go beyond what is required under the conditionality system for the first pillar payments.[42] As for the second pillar, at least 35% of the EAFRD (European Agricultural Fund for Rural Development) contribution to the CAP Strategic Plan must be spent on the environment and climate.

Another noteworthy structural element is the governance model, which intends to increase efficiency and tailor the agricultural policy to national specificities through increased flexibility. This increased flexibility is achieved through increased subsidiarity: on the one hand, there is an EU-wide framework of specific and cross-cutting objectives, monitoring and implementation indicators and a range of measures; on the other, deployment in each MS through a National Strategic Plan implements the common framework at the national level according to national conditions.[43] Every MS is responsible for drawing up a national plan,

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[35] MA Altieri, *Agroecology: The Science of Sustainable Agriculture* (2nd edn, CRC Press 1996) 92.

[36] European Commission, 'The European Green Deal' (Communication) COM(2019) 640 final, 11 December 2019. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN.

[37] European Commission, Farm to Fork Strategy (n 8).

[38] ibid.

[39] European Commission, 'The European Green Deal' (n 36); European Commission, Farm to Fork Strategy (n 8).

[40] Regulation 2021/2115 of the European Parliament and of the Council of 2 December 2021 Establishing Rules on Support for Strategic Plans to be Drawn up by Member States under the Common Agricultural Policy (CAP Strategic Plans) and Financed by the European Agricultural Guarantee Fund (EAGF) and by the European Agricultural Fund for Rural Development (EAFRD) and Repealing Regulations (EU) No 1305/2013 and (EU) No 1307/2013 2021) OJ L435/1.

[41] ibid art 16.

[42] ibid art 31.

[43] ibid Title V.

which needs to follow general and procedural requirements;[44] the plans have to feature specific content[45] and are eventually subjected to approval from the Commission.[46]

2.2.2 Problematic elements and sustainability concerns

A noteworthy aspect to consider is that the foundations of the new CAP predate the EGD. While some changes have occurred in the texts of the CAP after the EGD, its basis essentially remains the one conceived by the previous Commission. Therefore, while some EGD objectives might have been included, the reformative potential of the CAP was limited from the outset.

The first element of potential concern is the increased flexibility of the new CAP. Increased flexibility for MS was vigorously pursued and justified on the grounds of better implementation of the CAP and adaptation to national conditions.[47] However, if this *prima facie* might seem a positive development, increased flexibility comes with its own shortcomings and responsibilities. The main limitations are linked to a potential decrease in ambition and lower environmental impact of the national measures. In fact, a higher level of ambition and more robust criteria and requirements set at the EU level would have provided a more robust basis for the National Strategic Plans. Another example of flexibility that might not be effectively exercised at the MS level regards the case of Eco-Schemes, as, their relevance and effects depend on the budget allocated to them and how these are formulated at the MS level, creating potential issues.[48]

The second element of concern is limited ambition in relation to environmental protection. For example, the conditionality mechanism has been criticised for still being rather weak.[49] Stronger legal requirements (SMRs and GAECs), establishing a higher reference point from an environmental and soil standpoint for the beneficiaries of the payments would have better linked direct payments with environmental and climate goals; a more ambitious system would, at the same time, also have ensured a level playing field for MS.[50] In addition, EU agricultural funds are not always well managed as several issues such as transparency and conflict of interest have been highlighted.[51]

On these issues, see also: C Détang-Dessendre and H Guyomard, *Evolving the Common Agricultural Policy for Tomorrow's Challenges* (Quae 2022).

[44] Regulation 2021/2115 on Support for the CAP Strategic Plans (CAP Strategy Plans Regulation) (n 40) arts 104, 105, and 106.

[45] ibid chap II.

[46] ibid art 118.

[47] See: P De Castro, P Miglietta and Y Vecchio, 'The Common Agricultural Policy 2021–2027: A New History for European Agriculture' (2020) 75 Italian Review of Agricultural Economics 5.

[48] T Nemcová et al, *New CAP Unpacked… and Unfit* (European Environmental Bureau - EEB, BirdLife and NABU 2022): <https://eeb.org/library/new-cap-unpacked-and-unfit-joint-report-on-cap-strategic-plans/>.

[49] ibid. For a critical view of the provisions and measures during the legislative process, see: K Heyl et al, 'The Common Agricultural Policy beyond 2020: A Critical Review in Light of Global Environmental Goals' (2021) 30 Review of European, Comparative & International Environmental Law 95.
See also: Institute for European Environmental Policy - IEEP, *What Green Ambitions of the CAP Reform can still be Salvaged? - Briefing note on the Common Agricultural Policy Trilogue Negotiations* (2021) 5 <https://ieep.eu/uploads/articles/attachments/6b0cc89c-8dd0-4efc-a32c-4a23dd9carbon farming078/Briefing%20note%20on%20the%20Common%20Agricultural%20Policy%20trilogue%20negotiations%20(IEEP%202021).pdf?v=63783304864>.

[50] Institute for European Environmental Policy – IEEP (n 49).
As per evaluations during the legislative procedure for the new CAP: H Guyomard et al, *Study - The Green Deal and the CAP: Policy Implications to Adapt Farming Practices and to Preserve the EU's Natural Resources* (DG for Internal Policies, Policy Department B: Structural and Cohesion Policies - European Parliament, 2020), 101.

[51] European Court of Auditors - ECA, *Conflict of Interest in EU Cohesion and Agricultural Spending - Framework in Place but Gaps in Transparency and Detection measures* (Publications Office of the European Union, 2023) <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=63584>. For discussion of this issue in Eastern European countries see D Sabev et al, *Where does the EU Money Go? An Analysis of the Implementation of CAP*

The above concerns seem to be confirmed by the first analyses of the National Plans. The new green architecture, while somewhat greener than the previous CAPs, did not seem to lead to results that match the EU's ambitions for the climate and the environment as outcomes largely depend on how MS implement the green architecture into their Plans and on the voluntary uptake of farmers of the voluntary schemes.[52] For example, misuse of targets and result indicators have been identified,[53] in addition to a great degree of diversity in the design of the rules in the national implementation concerning the conditionality and, seemingly, extensive use of discretion and derogations.[54] A study undertaken by environmental NGOs indicated that there are many business-as-usual measures and highlighted the existence of harmful subsidies. The Eco-Schemes are also not considered as leading to meaningful effects, as measures are often underfunded.[55] Other studies, such as one from the IEEP and Ecologic Institute, have reported similar considerations, indicating that the CAP Strategic Plans, while having some positive elements, are insufficiently tackling environmental and climate issues.[56]

Finally, recent developments regarding the CAP have further called into question the role of the instrument in the pursuit of sustainability in the agricultural sector.[57] In March 2024, the Commission proposed a Regulation to amend the CAP Regulations, weakening the GAEC standards and introducing simplifications. The proposed measures included:

- A substantial modification of GAEC 8, eliminating the requirement of at least 4% of arable land at farm level dedicated to non-productive areas or features);[58] considering the obligation to MS to cover this as an Eco-Scheme, GAEC 8 is no longer mandatory but voluntary.[59]
- Additional flexibility to (and weakening of) GAEC 7, adding crop diversification to the already present crop rotation to fulfil the requirement.[60]
- Possibility for specific GAEC exemptions with limitations.[61]

Funds in Bulgaria, the Czech Republic, Hungary, Slovakia and Romania (A Report Commissioned by the Greens/EFA Group in the European Parliament, 2021) <https://extranet.greens-efa.eu/public/media/file/1/6769>.

[52] European Court of Auditors - ECA, Common Agricultural Policy Plans - Greener, but not Matching the EU's Ambitions for the Climate and the Environment. Special Report 20/2024. (Publications Office of the European Union 2024).

[53] See: European Environment Agency - EEA, *Transforming Europe's Food System — Assessing the EU Policy Mix* (Publications Office of the European Union, 2023) <https://www.eea.europa.eu/publications/transforming-europes-food-system?utm_source=EEASubscriptions&utm_medium=RSSFeeds&utm_campaign=Generic>.
See, also: M Willard, 'CAP Strategic Plans: Observation Letters under Scrutiny' (2022). <https://www.arc2020.eu/cap-strategic-plans-observation-letters-under-scrutiny/>.

[54] S Becker, R Grajewski and P Rehburg, *Where does the CAP Money go? Design and Priorities of the Draft CAP Strategic Plans 2023–2027* (Thünen Working Paper 191a, 2022) <https://www.thuenen.de/media/publikationen/thuenen-workingpaper/ThuenenWorkingPaper_191a.pdf>.

[55] Nemcová et al, *New CAP Unpacked… and Unfit* (n 48).

[56] See, e.g.: E Midler et al, *Environmental and Climate Assessments of CAP Strategic Plans - Summary of Impact Based on Four Key Member States* (Institute for European Environmental Policy – IEEP, and Ecologic Institute , 2023) <https://ieep.eu/publications/environmental-and-climate-assessments-of-cap-strategic-plans/>.

[57] See considerations from IEEP: H Bradley and K Hart, 'Will CAP Simplification Proposals Address the Real Challenges Faced?' (*IEEP - Institute for European Environmental Policy,* 2024). <https://ieep.eu/news/will-cap-simplification-proposals-address-the-real-challenges-faced/>.

[58] European Commission, 'Proposal for a Regulation of the European Parliament and of the Council Amending Regulations (EU) 2021/2115 and (EU) 2021/2116 as Regards Good Agricultural and Environmental Condition Standards, Schemes for Climate, Environment and Animal welfare, Amendments to CAP Strategic Plans, Review of CAP Strategic Plans and Exemptions from Controls and Penalties'. Art 1, Point (6c).

[59] ibid art 1, Point (3).

[60] ibid art 1, Point (6b).

[61] ibid art 1, Point (2)(a).

- Exemptions from controls and penalties for small farms in relation to conditionality.[62]

The measures, for which no impact assessment was conducted,[63] were swiftly adopted by both institutions in April and May 2024.[64] Interestingly, these measures were part of the Commission's response to the farmer protests occurring in several Member States at the beginning of 2024, lamenting the red tape and the environmental requirements to access direct payments.[65]

2.3 Organic farming: The status quo and questions on its operationalisation and development

EU law, in Regulation 2018/848 on organic production and labelling of organic products, defines what constitutes organic agriculture. The Regulation sets out objectives (article 4), general principles (article 5) and specific principles (article 6) applicable to organic farming.[66] Objectives and principles are then accompanied by more specific rules indicated in the subsequent articles and Annexes and in additional legislation, e.g. Commission Implementing Regulation 2020/464 on rules for the application of Regulation (EU) 2018/848[67] and Commission Implementing Regulation 2021/1165 authorising and listing certain products and substances for use in organic production.[68]

These objectives, principles and more detailed provisions all convey that organic farming should pursue the protection of the environment and climate, the respect for nature's systems and cycles, the maintenance of biodiversity, the preservation of regional ecological balances, the enrichment of soil fertility, the maintenance of water quality and the responsible use of energy and natural resources, besides aiming at producing food employing natural substances and processes.[69]

As such, organic farming plays a role in the sustainability discourse. The new legislation on organics, Regulation 2018/848 and its implementing regulations, has been conceived in this light. The new Regulation 2018/848 is likely to put organic farmers on a better footing and to

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[62] ibid art 2.

[63] European Parliament, 'Legislative Train Schedule - Regulation Amending CAP Strategic Plans Regulation and CAP Horizontal Regulation' (n.d.). <https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-targeted-amendments-of-cap-regulations>.

[64] Regulation (EU) 2024/1468 of the European Parliament and of the Council of 14 May 2024 amending Regulations (EU) 2021/2115 and (EU) 2021/2116 as Regards Good Agricultural and Environmental Condition Standards, Schemes for Climate, Environment and Animal Welfare, Amendment of the CAP Strategic Plans, Review of the CAP Strategic Plans and Exemptions from Controls and Penalties 2024) OJ L, 2024/1468.

[65] European Parliament, 'Legislative Train Schedule - Regulation Amending CAP Strategic Plans Regulation and CAP Horizontal Regulation' (n 63). See also: G Fortuna, 'EU Policy. Commission Touts Subsidy Simplification Measures to Soothe Farmers' Ire' (Euronews, 22 February 2024): <https://www.euronews.com/my-europe/2024/02/22/commission-touts-subsidy-simplification-measures-to-soothe-farmers-ire>.

[66] Regulation 2018/848 of the European Parliament and of the Council of 30 May 2018 on Organic Production and Labelling of Organic Products and Repealing Council Regulation (EC) No 834/2007 2018) OJ L150/1.

[67] Commission Implementing Regulation 2020/464 of 26 March 2020 Laying Down Certain Rules for the Application of Regulation (EU) 2018/848 of The European Parliament and of the Council as Regards the Documents Needed for the Retroactive Recognition of Periods for the Purpose of Conversion, the Production of Organic Products and Information to be Provided by Member States 2020) OJ L98/2.

[68] Commission Implementing Regulation 2021/1165 of 15 July 2021 Authorising Certain Products and Substances for Use in Organic Production and Establishing their Lists 2021) OJ L253/13.

[69] See, also: European Commission, 'Organics at a Glance' (n.d.): <https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/organics-glance_en#:~:text=European%20Union%20regulations%20on%20organic,for%20producers%2C%20distributors%20and%20marketers.>.
These considerations are also valid for the old legislation replaced by the abovementioned Regulation, albeit with some differences.

encourage consumer trust, and thus, to better support the practice of organic farming in its entirety[70] through introducing simplifications,[71] strengthening the control systems,[72] and setting the same standards for all organic products in the EU market.[73] However, since 2018, when the new Regulation was adopted, more organic-relevant policy measures have been announced in the Farm to Fork Strategy[74] and the Biodiversity Strategy.[75] These policy development and potential issues will be considered below.

2.3.1 Organic farming in the EU and policy developments and goals

The Farm to Fork and the Biodiversity Strategy directly addressed organic farming by openly endorsing it and by promising to further support it with the adoption of an Action Plan on organic farming. More importantly, the objective of having at least 25% of the EU agricultural land organically farmed by 2030 was also stated in both strategies.[76] In addition, the Commission announced that it would act on issues such as nutrient loading by promoting the goal of zero pollution from nitrogen and phosphorous flows from fertilisers. While this is not strictly organics-related, it has relevance to reducing harmful or non-renewable inputs and may ultimately push towards conversion to organic agriculture. The Commission aspired to reduce nutrient losses by at least 50%, thus reducing the use of fertilisers by at least 20%.[77]

The Action Plan on Organic Farming aimed to build demand and consumer trust, stimulate conversion around organic farming and pursue reinforcement of the whole organic value chain. The Plan intended to do this through investments and exchange of best practices among other things. Additionally, the Plan set out detailed actions aimed at improving the contribution of organic farming to sustainability by reducing the climate and environmental footprint; increasing biodiversity; looking into pathways to phase out or replace some controversial inputs used in organic farming; developing safe alternatives; and making more efficient use of resources.[78]

Particularly relevant from a synergy point of view are the measures that the Commission intended to pursue to stimulate conversion to organic farming and reinforcement of the organics value chain. In particular, the Commission "committed" to additional work to ensure that MS leverage the possibilities offered by the new CAP to support their organic sector. These measures include technical assistance, exchange of best practices and innovation on organics and the use of the Eco-Schemes, rural development measures and farm advisory services. Additionally, to improve the contribution of organic farming to sustainability, the Commission intended to promote the more efficient and sustainable use of water, increase the use of renewable energy and clean transport and promote the reduction of nutrient release in all types

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[70] European Commission, 'The Future of Organics' (n.d.): <https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/future-organics_en>.

[71] Regulation 2018/848 on Organic Production. See Chapter III. Production rules. See also Chapter V. Certification.

[72] ibid. See Chapter VI. Official controls and other official activities.

[73] ibid. See Chapter VII. Trade with third countries.

[74] European Commission, Farm to Fork Strategy (n 8).

[75] European Commission, 'EU Biodiversity Strategy for 2030. Bringing Nature Back into our Lives' (Communication) COM(2020) 380 final, 20 May 2020.

[76] European Commission, Farm to Fork Strategy (n 8);European Commission, 'EU Biodiversity Strategy for 2030. Bringing Nature Back into our Lives' (n 75).

[77] European Commission, 'EU Biodiversity Strategy for 2030. Bringing Nature Back into our Lives' (n 75). European Commission, Farm to Fork Strategy (n 8).

[78] European Commission, 'Action Plan for the Development of Organic Production' (Communication) COM(2021) 141 final, 25 May 2021.
See, also: European Commission, 'Organic Action Plan' (n.d.). <https://agriculture.ec.europa.eu/farming/organic-farming/organic-action-plan_en#documents>.

of farming. This would also be achieved also through the involvement of MS with their CAP Strategic Plans.[79]

2.3.2 Questions on the support for and development of organic farming through law

While the promised policy actions set out above will likely contribute to the development of organic farming, they remain primarily soft law measures. Accordingly, key commitments and targets must be further embedded in legislation. These commitments include the 25% of organic land by 2030 detailed in the EGD, and firm targets on the reduction of agricultural inputs, already expressed in the various strategies mentioned above. Incorporation of these provisions could happen through the revision and/or adoption of key texts.

Firstly, the proposed Sustainable Use of Pesticides Regulation[80] intended to include a legally binding target to reduce by 50% the use and the risk of chemical pesticides and the use of the most hazardous pesticides by 2030.[81] This piece of legislation could have been a game changer in reconciling agricultural production with sustainability. However, following difficulties during the legislative procedure and rejection by the European Parliament,[82] the Commission announced the intention to withdraw the Proposal[83] in May 2024.[84]

Secondly, embedding relevant targets under the Soil Monitoring Law (SML), currently under interinstitutional discussions,[85] and the contribution of the Nature Restoration Law (NRL)[86] could also help achieve objectives and actions detailed in the Action Plan on Organic Farming, such as the reduction of the agricultural climate and environmental footprint, the enhancement of genetic biodiversity, and the more efficient use of resources. This could be the case, for example, if Sustainable Management Practices were to be defined and identified and binding requirements for the sustainable use of soil were to be included in the SML and through targets for the restoration and restoration obligations for agricultural ecosystems in the NRL (however weakened these may have been in the final agreement[87]). Ambitious requirements in this sense might even act as an additional stimulus toward conversion to organic agriculture.

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[79] European Commission, 'Action Plan for the Development of Organic Production' (n 78).

[80] European Commission, 'Proposal for a Regulation of the European Parliament and of the Council on the Sustainable Use of Plant Protection Products and Amending Regulation (EU) 2021/2115' COM(2022) 305 final (2022).

[81] ibid.

[82] European Parliament, 'No Majority in Parliament for Legislation to Curb Use of Pesticides' (2023): <https://www.europarl.europa.eu/news/en/press-room/20231117IPR12215/no-majority-in-parliament-for-legislation-to-curb-use-of-pesticides>.

[83] European Commission, 'Speech by President von der Leyen at the European Parliament Plenary on the Conclusions of the European Council Meetings' (2024). <https://neighbourhood-enlargement.ec.europa.eu/news/speech-president-von-der-leyen-european-parliament-plenary-conclusions-european-council-meetings-2024-02-06_en>.
European Parliament, 'Legislative Train Schedule - Proposal for a Regulation on the Sustainable Use of Plant Protection Products' (n.d.): <https://www.europarl.europa.eu/legislative-train/spotlight-JD22/file-sustainable-use-of-pesticides-%E2%80%93-revision-of-the-eu-rules#:~:text=The%20proposal%20sets%20legally%20binding,'farm%20to%20fork'%20strategy.>.

[84] Withdrawal of Commission Proposals (2024) OJ C, C/2024/3117.

[85] European Commission, 'Proposal for a Directive of the European Parliament and of the Council on Soil Monitoring and Resilience (Soil Monitoring Law)' COM(2023) 416 final (2023).

[86] Regulation 2024/1991 of the European Parliament and of the Council of 24 June 2024 on Nature Restoration and Amending Regulation 2022/869 2024) OJ L, 2024/1991.

[87] On the weakening of the agreement as compared to the Proposal, see: E Cavallin, 'Nature Restoration and Agriculture and Forestry: At the Opposite Side of the Fighting Ring or Compatible After All? An Analysis of the Proposal and the Final Agreement on the Nature Restoration Law' (2024) 33 European Energy and Environmental Law Review 48.

This could be seen as the next logical step, and the achievement of the target of 25% organic land in the EU by 2030.

Thirdly, on nutrient efficiency, the Commission could act on strengthening the Nitrates Directive,[88] ensuring compliance from MS and limiting derogations under the Directive's system.

Furthermore, while it is true that the CAP offers potential for improvements in the organics sector, it has limited ambition and the opportunities it provides are not leveraged to the degree necessary to significantly change the situation for the better.[89] In short, support for sustainable agricultural practices, including organic farming, is still limited. Therefore, a stronger CAP, perhaps even with the inclusion of some key targets, and new ambitious legislation would go a long way toward making organic farming or more sustainable agriculture the norm rather than the exception.

2.4 Carbon farming: status quo and sustainability concerns

As introduced in Section 1, carbon farming is a farming approach that consists of any land-based practice that avoids or reduces GHG emissions or sequesters carbon. Carbon farming rests on the notion that nature is both a carbon source and sink and (agricultural) soils and ecosystems, if properly managed, can contribute to climate change mitigation with the concurrent benefits of reversing soil degradation and improving food security.

The European Commission's 'Farm to Fork Strategy' also defines carbon farming as a green business model that focuses on the improvement of land management practices by rewarding land managers who take up these farming methods.[90] The benefits of carbon farming practices include the increase of carbon sequestration in the living biomass, the dead organic matter and the soil through the enhancement of carbon capture and/or the reduction of carbon emissions in the atmosphere while still respecting ecological principles ruling the environment and biodiversity.[91] Practically, carbon farming practices could amount to afforestation and reforestation respecting ecological principles, agro-forestry, etc.[92] As mentioned, biochar application to soils could also be considered a carbon farming practice.[93]

Carbon farming has a relatively short history in policy and law. Bottom-up activities were the first to surface, followed by law and policy measures,[94] and the legal and policy panorama is only now changing. Policy developments and potential sustainability and synergy concerns will be addressed in the following sections.

2.4.1 Contextualisation in EU policy and policy and legislative developments

Carbon farming was initially addressed in the Farm to Fork Strategy, where the Commission indicated its intention to introduce a new EU carbon farming initiative. The objective of the initiative is to promote a new business model of carbon sequestration in agriculture and forest

[88] Council Directive 91/676/EEC of 12 December 1991 Concerning the Protection of Waters Against Pollution Caused by Nitrates from Agricultural Sources 1991) OJ L375/1.

[89] See, also: K Heyl et al, 'Achieving the Nutrient Reduction Objective of the Farm to Fork Strategy. An Assessment of CAP Subsidies for Precision Fertilization and Sustainable Agricultural Practices in Germany' (2023) 7 Frontiers in Sustainable Food Systems.

[90] European Commission, Farm to Fork Strategy (n 8); European Commission, 'Sustainable Carbon Cycles' (Communication) COM(2021) 800 final, 15 December 2021

[91] European Commission, 'Sustainable Carbon Cycles' (n 90).

[92] ibid.

[93] Nogués (n 24).

[94] European Commission - DG Climate Action et al, Carbon farming Schemes in Europe - Second Roundtable, Background Document <https://ec.europa.eu/clima/sites/clima/files/events/docs/20200923_agenda.pdf>.

management, contributing to the climate neutrality objective, possibly through the CAP or other public or private initiatives (for example, carbon markets). Farmers and foresters would be provided with a new source of income, and other sectors of the food chain would be assisted in their decarbonisation efforts.[95] Correspondingly, the Commission announced in the new Circular Economy Action Plan (2020)[96] that it intended to investigate the development of a regulatory framework for the certification of carbon removals on the basis of a strong and transparent carbon accounting mechanism in order to monitor and assess the authenticity of carbon removals.[97]

The follow-up included two outputs: a Communication and a legislative proposal. In December 2021, the Commission adopted a Communication on Sustainable Carbon Cycles. The Communication highlighted the importance of the carbon cycle primarily within the context of climate action.[98] It defined three key actions in establishing sustainable and climate-resilient carbon cycles: next to decarbonisation and carbon recycling, we also find carbon removal upscaling (e.g. ecosystem restoration or carbon farming solutions).[99]

However, the Commission recognised that to fulfil their crucial role and to be acknowledged as "a contribution" to the EU climate and environmental targets, carbon removals, including carbon farming, should meet strong requirements, especially on monitoring, reporting, and verification. In addition, criteria should also cover the duration of the storage, the risk of reversal, the uncertainty of measurement and the risk of carbon leakage. Addressing barriers has also been identified as necessary: these include financial burdens, uncertainty or lack of trust, and unavailability, complexity or high costs of monitoring, reporting and verification.[100] With this in mind, the Commission worked on a proposal establishing a Union Certification Framework for Carbon Removals dedicated to carbon farming, among other carbon removal methods.[101]

The proposal, published in 2022, aimed to ensure high-quality carbon removals in the EU and establish a certification framework that would help prevent greenwashing. The proposal, in particular, sought to intervene in the correct application and enforcement of EU-wide quality criteria, thus harmonising market conditions and reliability.[102] The proposal was also meant to complement and be consistent with existing legislation and policies in several sectors: the so-called Land Use, Land Use Change and Forestry Regulation,[103] Emission Trading System revision,[104] Communication on Sustainable Carbon Cycles) and other policy

[95] European Commission, Farm to Fork Strategy (n 8).
[96] European Commission, 'A new Circular Economy Action Plan. For a Cleaner and More Competitive Europe' (Communication) COM(2020) 98 final, 11 March 2020 (2020).
[97] In relation to the certification of carbon farming practices, here is an interesting study conducted by the JRC: HL Tuomisto et al, 'Final Technical Report: Certification of Low Carbon farming Practices' (Publications Office of the European Union, Luxembourg, 2013)
[98] European Commission, 'Sustainable Carbon Cycles' (n 90).
[99] ibid.
[100] ibid.
[101] For more context leading up to the adoption of the Proposal, see: L Jensen, *Briefing - A Union Certification Framework for Carbon Removals* (EPRS - European Parliamentary Research Service, 2023) <https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2023)739312>.
[102] European Commission, 'Proposal for a Regulation of the European Parliament and of the Council establishing a Union Certification Framework for Carbon Removals' COM(2022) 672 final (2022). Explanatory memorandum.
[103] Regulation 2018/841 of the European Parliament and of the Council of 30 May 2018 on the Inclusion of Greenhouse Gas Emissions and Removals from Land Use, Land Use Change and Forestry in the 2030 Climate and Energy Framework, and Amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU 2018) OJ L156/1.
[104] Directive (EU) 2023/959 of the European Parliament and of the Council of 10 May 2023 Amending Directive 2003/87/EC Establishing a System for Greenhouse Gas Emission Allowance Trading within the Union and Decision (EU) 2015/1814 Concerning the Establishment and Operation of a Market Stability Reserve for the Union Greenhouse Gas Emission Trading System 2023) OJ L130/134.

and legislative instruments (NRL, CAP, Renewable Energy Directive,[105] and EU Forest Strategy).[106]

The proposal revolved around the concept of carbon removals as "the storage of atmospheric or biogenic carbon within geological carbon pools, biogenic carbon pools, long-lasting products and materials, and the marine environment, or the reduction of carbon release from a biogenic carbon pool to the atmosphere".[107] Not all removals would be eligible for certification, cue the quality requirements established in articles 4 to 7, including sustainability criteria, and related methodologies (article 8) and the independent verification according to Article 9.[108]

A carbon removal activity, according to the proposed regulation, could take the form of (1) permanent carbon storage, (2) carbon farming, and (3) carbon sequestration in products or materials.[109] In particular, the definition of carbon farming included in the proposal comprised land-management activities that result in the increase of the sink potential of nature and in the reduction of carbon emissions from nature.[110]

Another element of great importance was represented by the quality criteria: quantification, additionality, duration of storage, and sustainability.[111] This format was complemented by the so-called certification methodologies, which would need to be applied by the operators to comply with the abovementioned criteria.[112] The methodologies must be further defined in additional complementing/supplementing legislation and will cover important elements and key details of an activity.[113]

Following amendments by Parliament and Council, a provisional agreement between the EU institutions was finally reached in February 2024.[114] The agreement was later endorsed by Parliament in April 2024[115] and more recently by Council in November 2024. The new Regulation has just been published and will soon enter into force.[116] Notable changes include modifications in the definitions of the activities and a broadening of the scope with the inclusion

[105] Directive 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the Promotion of the Use of Energy from Renewable Sources (Recast) (2018) OJ L328/82.
[106] European Commission, 'Proposal for a Regulation of the European Parliament and of the Council establishing a Union Certification Framework for Carbon Removals' (n 102).
[107] ibid art 2(1)(a).
[108] ibid art 3.
[109] ibid art 2(1)(b).
[110] ibid art 2(1)(h).
[111] ibid arts 4 to 7.
[112] ibid art 8.
[113] ibid art 8.
[114] Interinstitutional Agreement or Provisional Deal on the Proposal for Regulation of the European Parliament and of the Council Establishing a Union Certification Framework for Permanent Carbon Removals, Carbon farming and Carbon Storage in Products. Interinstitutional File: 2022/0394(COD) (2024). Available: https://data.consilium.europa.eu/doc/document/ST-7514-2024-INIT/en/pdf. Retrievable: https://www.consilium.europa.eu/en/press/press-releases/2024/02/20/climate-action-council-and-parliament-agree-to-establish-an-eu-carbon-removals-certification-framework/.
[115] European Parliament, 'Carbon Removals: MEPs Adopt a New EU Certification Scheme' (2024). <https://www.europarl.europa.eu/news/en/press-room/20240408IPR20306/carbon-removals-meps-adopt-a-new-eu-certification-scheme#:~:text=In%20April%202023%2C%20Parliament%20adopted,emissions%20that%20cannot%20be%20eliminated>.
[116] Regulation (EU) 2024/3012 of the European Parliament and of the Council of 27 November 2024 establishing a Union Certification Framework for Permanent Carbon Removals, Carbon Farming and Carbon Storage in Products (2024) OJ L, 2024/3012.

of soil emission reductions,[117] which also determined a change in the title[118] of the Regulation. The definition of carbon farming now reads "any practice or process, carried out over an activity period of at least five years, related to terrestrial or coastal management and resulting in capture and temporary storage of atmospheric and biogenic carbon into biogenic carbon pools or the reduction of soil emissions",[119] where "biogenic carbon pools" comprises living biomass, litter, dead wood, dead organic matter, mineral soils and organic soils.[120] A definition of "soil emission reduction" was also added.[121]

In relation to carbon farming activities, there is now a stated minimum duration of at least five years.[122] Additionally, provisions tackling land speculation,[123] and the requirement to deliver at least biodiversity co-benefits under the sustainability requirements identified in article 7 have also been included.[124] More broadly, there are now more detailed rules on methodologies,[125] liability requirements in case of reversals,[126] and provisions on the use of the carbon removal units.[127] Finally, the institutions also opted to include an obligation for the Commission to set up a Union-wide registry for permanent carbon removals, carbon farming and carbon storage in products (article 12).[128]

2.4.2 Sustainability and synergy concerns

When considering carbon farming and its potential for carbon sequestration and the scope of the Certification Framework for Carbon Removals, there are a few elements worth noting. Firstly, while carbon farming is being considered and regulated for its climate potential for the possibilities of sequestration and removals, it presents some issues in relation to impermanence, certainty and precise quantification of removals. These are necessary aspects for the

[117] Interinstitutional Agreement or Provisional Deal on the Proposal for Regulation of the European Parliament and of the Council Establishing a Union Certification Framework for Permanent Carbon Removals, Carbon farming and Carbon Storage in Products (n 114) art 1(1).
[118] Now "Regulation of the European Parliament and of the Council Establishing a Union Certification Framework for Permanent Carbon Removals, Carbon Farming and Carbon Storage in Products".
[119] Interinstitutional Agreement or Provisional Deal on the Proposal for Regulation of the European Parliament and of the Council Establishing a Union Certification Framework for Permanent Carbon Removals, Carbon Farming and Carbon Storage in Products. Art 2(1)(h).
[120] ibid art 2(1)(c).
[121] ibid art 2(1)(aa).
[122] Interinstitutional Agreement or Provisional Deal on the Proposal for Regulation of the European Parliament and of the Council Establishing a Union Certification Framework for Permanent Carbon Removals, Carbon Farming and Carbon Storage in Products (n 114) art 2(1)(h).
[123] ibid arts 8(2)(a) and 18(1)(f) and rec 16 and 30.
[124] ibid art 7(1)(fa).
[125] ibid art 8.
[126] ibid art 6(2)(b) and 6(2b), and 6(3a).
[127] ibid art 1(1)(ca), art 12(1), and art 18(1c).
[128] ibid art 12.
European Parliament, 'Legislative Train Schedule - Legislative Proposal on a Union Certification Framework for Carbon Removals' (n.d.): <https://www.europarl.europa.eu/legislative-train/theme-a-european-green-deal/file-carbon-removal-certification>.

additionality criterion[129] and for the long-term sequestration.[130] As such, the possible role of carbon farming in environmental sustainability and, more specifically, for biodiversity and soil quality could be, potentially, greater than its contribution to climate change mitigation. Legislation and methodologies need to ensure that these elements are adequately addressed.

At the same time, not all carbon farming activities are sustainable.[131] In light of this, the environmental sustainability component of carbon farming should be enhanced and properly pursued in the legislation and methodologies. This involves aspects such as enhancing biodiversity below and above the ground, increasing soil quality, ameliorating water balance, and adequate monitoring.[132] That said, there have been positive changes in this respect in the legislation as compared to the Commission Proposal.[133] However, as the methodologies have yet to be established and discussions are ongoing, more work is needed.

Given the rather apparent overlaps between the CAP and carbon farming, some additional considerations are in order. While the CAP could and would need to be more ambitious to support environmental and climate goals, some of the GAECs go beyond existing statutory requirements and are indeed relevant for soil carbon sequestration. Eco-Schemes may also offer the potential for synergies (we will see this in relation to biochar in section 3). Equally, some Pillar II provisions on investments could be interesting for carbon sequestration certification and carbon sequestration practices.

Finally, the CAP can offer other tools, e.g. the farm advisory services and the Farm Sustainability Tool for Nutrients (FaST), for the deployment of carbon farming. Such CAP measures can improve knowledge, tools and methods for better assessment and optimisation of carbon removals, especially for small businesses lacking resources, expertise and know-how to implement carbon removal technologies.[134] The FaST tool, in particular, would cover both the nutrient management and the GHG emissions aspects of land management, enabling land managers to access carbon farming schemes/initiatives more easily to assess carbon sequestration potential at the farm level and to optimise strategies and business decisions.[135] This potential overlap has led some to consider that the CAP already contains the key building blocks to effectively address, upscale and leverage carbon farming,[136] putting into question the value and utility of the Certification Framework for Carbon Removals with respect to carbon farming.

The Commission claims that the new framework could complement the CAP support by aiding in the development of voluntary carbon markets that target carbon farming

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[129] The additionality criterion considers whether the activity has generated additional removals if compared to a no-activity or baseline scenario. Activities need to go beyond existing practices and what is demanded by law and must take place due to the incentive effect of the certification. European Commission, 'Proposal for a Regulation of the European Parliament and of the Council establishing a Union Certification Framework for Carbon Removals' (n 119). Recitals 7, 8, 11 and art 5. In the case of carbon farming, it can be challenging to (1) quantify the baseline and the removals, (2) determine if removals would have occurred also in the absence of a carbon removal scheme or (3) to ascertain whether the removals are a result of other legally required measures.

[130] See, e.g.: H McDonald et al, Study - Carbon farming, Making Agriculture Fit for 2030 (Policy Department for Economic, Scientific and Quality of Life Policies - European Parliament, 2021).

[131] A Scheid et al, Carbon farming Co-benefits. Approaches to Enhance and Safeguard Biodiversity (Ecologic Institute and Institute for European Environmental Policy - IEEP, 2023).

[132] See: ibid.

[133] Under the sustainability requirements.

[134] See: European Commission, 'Proposal for a Regulation of the European Parliament and of the Council establishing a Union Certification Framework for Carbon Removals' (n 102).

[135] European Commission, 'Sustainable Carbon Cycles'(n 90).

[136] C Nyssens-James and S Caiati, *Promoting Carbon farming through the CAP* (European Environmental Bureau - EEB, 2023) <https://eeb.org/wp-content/uploads/2023/09/Policy-Brief_Role-of-the-CAP-in-promoting-carbon-farming.pdf>.

practices.[137] Besides this, the CAP framework can contribute to the uptake of certification in terms of the upfront investments needed and through the promotion of the practices at the farm level, while a carbon removal certification can help improve the quantification and inventory of GHG flows, which, in turn, might be relevant for certain CAP support measures.[138]

That being said, there are some concerns regarding the interrelation between the CAP and the Certification Framework for Carbon Removals, due to the potential overlap highlighted above.[139] For example, the new framework would set a requirement of additionality, and it remains to be seen how this would interfere with the CAP requirements, also in the future when – hopefully – the CAP requirements become more robust.[140] Equally critical is avoiding double or multiple payments for the same action, which can be challenging to ascertain in such a diverse environment as the EU, given the differences among MS.[141]

Along the same lines, carbon farming and, more specifically, conservation and build-up of carbon in soils can also be a point of contact between the Certification Framework for Carbon Removals and the NRL[142] and the (Proposal for a) SML,[143] provided that the additionality criterion of the carbon removal is respected (though this would also be difficult to prove and it might eventually restrict the field of operation of the carbon farming certification).

Nevertheless, the Certification Framework for Carbon Removals, despite requiring co-benefits, focuses on one single element of soil quality and health, i.e. soil carbon and carbon sequestration,[144] which, while important, on its own is insufficient to achieve better soil health. This would make a case for adopting the SML, comprehensively tackling soil health and quality.[145]

Similar considerations can be formulated with respect to the NRL. The instrument provides for obligations and measures to improve and restore damaged and carbon-rich ecosystems to good ecological status, including obligations to ensure an increasing trend of organic carbon stock in forest ecosystems and cropland mineral soils in agricultural ecosystems.[146] While the Certification Framework does not immediately play a role in the NRL, interesting synergies might be enacted at the national level depending on the National Restoration Plans and the restoration measures indicated there, clearly always being mindful of the additionality criterion of the removals.

Finally, while carbon removals are important, emissions reductions should be the true focus when pursuing climate change mitigation.[147] Some carbon removal activities have more

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[137] European Commission, 'Proposal for a Regulation of the European Parliament and of the Council establishing a Union Certification Framework for Carbon Removals' (n 102) Explanatory memorandum.

[138] See: ibid.

[139] As mentioned, carbon sequestration and enhancement of carbon in soils can already happen through the CAP through the conditionality and Eco-schemes.

[140] M Willard, 'Can the CAP and Carbon farming Coexist?' (2023): <https://www.arc2020.eu/can-the-cap-and-carbon-farming-coexist/>. On this, see also: E Cavallin, 'Carbon farming and the Commission Proposal for a Regulation on a Certification Framework for Carbon Removals: a Legal Perspective' (2024) 21 Journal for European Environmental & Planning Law 41.

[141] See: McDonald et al (n 130).

[142] European Commission, 'Proposal for a Regulation of the European Parliament and of the Council establishing a Union Certification Framework for Carbon Removals' (n 102) Explanatory memorandum.
Nature Restoration Law (n 86).

[143] Soil Monitoring Law (n 85).

[144] Article 7 of the Certification Framework for Carbon Removals does include sustainability criteria, but the focus of the text remains on carbon sequestration.

[145] See, reflections in: C Nyssens, *Carbon farming for Climate, Nature, and Farmers* (European Environmental Bureau - EEB,, 2021) <https://eeb.org/library/carbon-farming-for-climate-nature-and-farmers/>.

[146] Regulation 2024/1991 of the European Parliament and of the Council of 24 June 2024 on Nature Restoration (Nature Restoration Law) (n 86).

[147] H Lee and J Romero (eds.), Climate Change 2023: Synthesis Report (Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, 2023).

uncertain outcomes. Carbon farming is one of these. Using carbon removal activities to offset emissions is dangerous as it could yield problematic and perverse results where certified activities do not deliver promised outcomes, causing a setback in climate action (though carbon removal through biochar is admittedly less prone to reversal[148]).[149] To address cases of reversal, appropriate liability mechanisms, such as the creation of buffers and up-front insurance mechanisms, could play a crucial role in covering for cases in which carbon is released into the atmosphere during the monitoring period.[150]

TABLE 1 Summary of the discussed concerns and open questions on the CAP, organic farming and carbon farming policy and law

Instrument	**Concerns and (open) questions**
CAP	• Increased flexibility of the new CAP and greater responsibility for MS in leveraging added flexibility; • Limited ambition in relation to environmental protection in the green architecture (e.g. conditionality); • Weaknesses in MS Strategic Plans; • Weakening of GAEC standards and introduction of simplifications through recent amending Regulation.
Regulation of organic farming	• Many non-binding commitments; • Need for hard law commitments; • Halting (or issues in) the adoption of important planned legislation on aspects which could act as a stimulus for conversion to organic production; • Limited synergy with and support through the CAP.
Regulation of carbon farming as a carbon removal activity	• Issues of impermanence, certainty and precise quantification of removals for carbon farming: to be adequately addressed in the legislation and methodologies; • Environmental sustainability of carbon farming practices: to be appropriately guaranteed in the legislation and methodologies; • Potential overlap with CAP measures: potential for double payments and

HO Pörtner et al (eds), Climate Change 2022: Impacts, Adaptation and Vulnerability (n 1).

[148] See, section 3.3 below.

[149] See, e.g.: in HO Pörtner et al (eds), Climate Change 2022: Impacts, Adaptation and Vulnerability – Summary for Policymakers (Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press 2022).

[150] For a scholarly contribution addressing liability in the case of carbon removal technologies, see: NS Ghaleigh and J Macinante, 'Déjà Vu All Over Again: Carbon dioxide Removals (CDR) and Legal Liability' (2023) 35 Journal of Environmental Law 377.

	possible future issues with the additionality mechanism; • Adoption of future legislation (SML) and strong implementation of the NRL for addressing matters other than soil carbon; • Emission reduction vs removals.

3 BIOCHAR IN SUSTAINABLE AGRICULTURE AND ORGANIC AND CARBON FARMING POLICY AND LAW

This section focuses on biochar in agriculture and farming policy and law and considers what the selected EU legal instruments (CAP, and legislation and initiatives on organic and carbon farming) can offer to the use of biochar in the context of sustainable agriculture.

3.1 The new CAP and biochar

The CAP foresees some measures that could be relevant for biochar: the Eco-Schemes, the farm advisory services, and the Farm Sustainability Tool for Nutrients. The Eco-Schemes represent the most interesting environmental element of the current green architecture of the CAP for biochar. In relation to these schemes for the environment, MS must establish a list of practices that are considered beneficial for the climate and environment.[151] These schemes are intended to cover at least two areas of action of the list indicated in article 31.

Particularly interesting for biochar are the following areas of action: climate change mitigation, protection and improvement of water quality, conservation and restoration of habitats of species, prevention of soil degradation, soil restoration, improvement of soil fertility and nutrient management and soil biota.[152] Eco-Schemes related to organic and carbon farming, for example, could have relevance for biochar[153] and interesting interactions and synergies could be established with the Fertilising Product Regulation (FPR)[154] and the organics legislation.

That said, to generate positive environmental and climate impacts, an Eco-scheme would have to be well conceived and formulated and this may not necessarily be the case. For example, a study by WWF, Birdlife International, and the European Environmental Bureau found that the majority of draft Eco-schemes aimed at fertiliser and nutrient management tended to lack limits to avoid over-fertilisation or benchmarks for efficient nutrient use and that many Eco-schemes were underfunded.[155] As such, an Eco-scheme with relevance to biochar use

[151] Regulation 2021/2115 on Support for the CAP Strategic Plans (CAP Strategy Plans Regulation) (n 40) art 31(3).
ibid.
European Commission, 'List of Potential Agricultural Practices that Eco-Schemes could Support' (2021) <https://agriculture.ec.europa.eu/system/files/2021-01/factsheet-agri-practices-under-ecoscheme_en_0.pdf.>.
[152] Regulation 2021/2115 on Support for the CAP Strategic Plans (CAP Strategy Plans Regulation) (n 40) art 31(4).
[153] European Commission, 'List of Potential Agricultural Practices that Eco-Schemes could Support' (n 151).
[154] Regulation 2019/1009 of the European Parliament and of the Council of 5 June 2019 Laying Down Rules on the Making Available on the Market of EU Fertilising Products and Amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 and Repealing Regulation (EC) No 2003/2003 2019) OJ L170/1.
[155] World Wide Fund for Nature - WWF, Birdlife International and European Environmental Bureau - EEB, Will CAP Eco-Schemes be Worth their Name? An Assessment of Draft Eco-Schemes Proposed by Member States (2021) <https://www.birdlife.org/wp-content/uploads/2021/11/CAP-report-eco-schemes-assessment-Nov2021.pdf>.

would also need to be well conceived to be able to deliver certain benefits and to actually cover biochar use.

A second tool relevant for biochar uptake is the potential contribution of farm advisory services.[156] These services provide farmers with advice on land and farm management and development, including conversion to more sustainable practices and techniques.[157] Where lack of knowledge could be a limiting factor in the uptake of a certain technology, these services could be instrumental to implement changes at the farm level and for the uptake of newer and more technological solutions. This is because, in such cases, reliable information and knowledge, willingness and certain behavioural changes from farmers and involved parties are required. [158] For biochar specifically, acceptance does not seem to be an issue when there is knowledge of the technology,[159] but there are challenges in farmer awareness.[160]

Thirdly, an ally in the use of biochar in agriculture could also be the new FaST tool, a digital application that delivers certain information on nutrients and balance of nutrients, the related legal requirements, soil data, and more.[161] It is also interesting to note that the tool might have an impact not only in relation to nutrients but also in terms of GHG emissions and removals and the economic performance of the farm,[162] which might make it interesting for biochar as a possible carbon farming technique and fertiliser and soil improver.

Finally, significant factors related to the effects of biochar on the environment and on soils to consider are the type of biochar applied and the type of soils where biochar would be applied to. This is where synergy with the FPR and waste legislation[163] and additional legislation on soil health and protection would also be beneficial and likely crucial for the proper use of biochar in agriculture.

3.2 Organic farming and biochar

Organic farming is a relevant subject matter for biochar on a couple of counts. The first relates to the potential beneficial effects of biochar on soils. In fact, biochar use can be linked to better nutrient efficiency and higher soil quality with increased carbon content, which can be an important element in organic farming and might generate additional financial opportunities for

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[156] Regulation 2021/2115 on Support for the CAP Strategic Plans (CAP Strategy Plans Regulation) (n 40) art 15(1).

[157] On this, see also: European Commission, 'Farm Advisory System' (n.d.). <https://agriculture.ec.europa.eu/farming/fas_en> accessed 18 August 2024.

[158] See some considerations on this: R Sulaiman, Enabling Advisory Services for Climate-smart Agriculture - Key Elements to Foster Farmers' Adoption of CSA practices (Policy brief) (Food and Agriculture Organization - FAO, 2017): <https://www.fao.org/3/bs940e/bs940e.pdf>.

See also: BM Simpson and CG Burpee, 'Adaptation under the "New Normal" of Climate Change: The Future of Agricultural Extension and Advisory Services' (2014) 203 [Online] MEAS Discussion Paper Series on Good Practices and Best Fit Approaches in Extension and Advisory Service Provision.

[159] L Campion et al, 'The Costs and Benefits of Biochar Production and Use: A Systematic Review' (2023) 408 Journal of Cleaner Production.

SF Verde and D Chiaramonti, *The Biochar System in the EU: the Pieces are Falling into Place, but Key Policy Questions Remain* (European University Institute, 2021).

[160] Campion et al (n 159).

N Dal Ferro et al, 'Stakeholder Perspectives to Prevent Soil Organic Matter Decline in Northeastern Italy' (2020) 12 Sustainability 378.

AE Latawiec et al, 'Willingness to Adopt Biochar in Agriculture: the Producer's Perspective' (2017) 9 Sustainability 655.

[161] Regulation 2021/2115 on Support for the CAP Strategic Plans (CAP Strategy Plans Regulation) (n 40) art 15(4).

[162] European Commission, Study for the Development of a Common Framework for the Quantitative Advice of Crop Nutrient Requirements and Greenhouse Gas Emissions and Removal Assessment at Farm Level - FaST-Navigator (2022) <https://op.europa.eu/fr/publication-detail/-/publication/f85a4def-dbd4-11ec-a534-01aa75ed71a1/language-en>.

[163] In light of the definition of End-of-Waste criteria.

those who sell and use biochar. This is especially true if one considers the potential opportunities embedded in relevant CAP Eco-Schemes and, perhaps, rural development measures on sustainable farming.

Secondly, in the EU, biochar can be used as a fertiliser in organic agriculture, as it has been included in the list of allowed input materials for organic farming in Regulation 2021/1165.[164] The legal basis for Regulation 2021/1165 lies in articles 9(3) and 24 of Regulation 2018/848, where it is indicated that only products and substances authorised under the Regulation may be used in organic production. With regards to fertilising products, especially, the circumstances and conditions for use (in addition to articles 9(3) and 24) are provided for in more detail in Annex II to Regulation 2018/848.[165]

In the transposition of these rules, Regulation 2021/1165 reiterates that only authorised products and substances may be used in organic production as fertilisers and soil conditioners, provided that they are compliant with other relevant EU legislation. This legislation includes the FPR and EU legislation on animal by-products[166] and, where applicable, national provisions based on Union law. These authorised substances and products are listed in Annex II to Regulation 2021/1165.[167] Accordingly, the use of these authorised products may be subject to specifications and restrictions laid down in the relevant EU legislation, and more restrictive conditions may be foreseen for the use in organic production as specified in the Annex.[168]

As already anticipated, biochar is indicated as an authorised material in Annex II, which also sets additional rules for its use in organic agriculture and includes references to the FPR. Such reference to the FPR, in particular, could also "push" the further "certification" of biochar as a CE-marked[169] fertilising product in the organics sector, thus also ensuring the non-waste (End-of-Waste) status of biochar when complying with the requirements set by the FPR, potentially removing one possible and significant bottleneck in the biochar value chain for certain biochars.

More broadly, the fact that biochar has been included in Regulation 2021/1165 and can be used as an organic amendment or fertiliser implies, in turn, that the fate of biochar as a fertiliser also partly depends on the development of organics, a crucial aspect if one considers the growing (albeit, still limitedly) organics sector, also spurred on by policy and legislative developments indicated above.

Nevertheless, the successful uptake of biochar in relation to organic farming does not solely reside in allowing the material under the organics legislation but also depends on the state of the sector itself and other aspects related to the biochar value chain.

3.3 Carbon farming and carbon removal certification and biochar

[164] Commission Implementing Regulation 2021/1165 on Authorising Certain Products and Substances for Use in Organic Production and Establishing their Lists (n 68).

[165] In particular in point 1.9.3 of Part I, points 1.9.1.2(b), 1.9.2.2(d), 1.9.3.2(b) and 1.9.5.2(a) of Part II and points 2.2.2(c) and 2.3.2 and the second indent of the fourth paragraph of point 3.1.5.3 of Part III of Annex II.

[166] Regulation (EC) No 1069/2009 on Health Rules as Regards Animal By-Products and Derived Products (Animal By-Products Regulation).

[167] Commission Implementing Regulation 2021/1165 on Authorising Certain Products and Substances for Use in Organic Production and Establishing their Lists (n 68) art 2.

[168] ibid Annex II.

[169] Where CE stands for the French "*Conformité Européenne*" (in English: European Confirmity): "'CE marking' means a marking by which the manufacturer indicates that the EU fertilising product is in conformity with the applicable requirements set out in Union harmonisation legislation providing for its affixing." Regulation 2019/1009 on EU Fertilising Products (EU Fertilising Products Regulation) (154). Art 2(25).

As illustrated above, biochar application on soil may bring co-benefits, such as increased carbon content in the soil and positive effects on soil biodiversity.[170] This makes biochar application to soil a potential carbon farming practice. However, the carbon removal worth of biochar depends on the type of biochar and its use. In particular, Life-cycle Assessment (LCA) studies have shown that biochar might generate net reductions but also, possibly, net emissions contingent on the feedstock used, the stability of biochar on soils, soil emissions, management practices, substitution effects, and methodological issues.[171]

While, in general, carbon farming may be more prone to reversal (accidental or intentional), biochar application and durability seem to be considerably less so.[172] Once applied to soils, biochar's carbon leakage is associated with its slow decay over time as the carbon will be gradually released following the decay rate.[173] Additionally, with biochar, the Biochar Systems Research Group indicates that "there is little to no risk of sudden and uncontrolled complete reversal".[174]

With all of the above in mind, a precautionary approach is still advised when it comes to biochar soil application. A tailored approach with appropriate soil monitoring might represent the safest way to proceed, however difficult or costly. In particular, it has been observed that the boundaries within which biochar content should be monitored must also include a fixed lower depth below the soil surface in a three-dimensional volume and that only the carbon from biochar that remains within this space during the project duration should be considered removed as biochar loss due to, e.g., leaching and erosion cannot be verified.[175] Due to the significant soil monitoring, reporting and verification needed, carbon farming may represent the best avenue among those available in the Regulation on a Certification Framework for Carbon Removals.

If we consider other avenues provided by the Regulation, we *could* also posit that biochar is close to the concept of a Negative Emission Technology amounting to "permanent carbon storage" because of its long-term carbon removal effect. This seemed to be the direction of some of the amendments that have been proposed to the Proposal for an EU Certification Framework for Carbon Removals in Parliament during the legislative procedure.[176] However, this would require the consideration and weighing of important elements, calling for some "flexibility" in the vector used for the recognition of biochar as carbon removal.

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[170] H Wang et al, 'Effect of Biochar on Rhizosphere Soil Microbial Diversity and Metabolism in Tobacco-Growing Soil' (2022) 3 Ecologies 539.
See, also: S Gul et al, 'Physico-chemical Properties and Microbial Responses in Biochar-Amended Soils: Mechanisms and Future Directions' (2015) 206 Agriculture, Ecosystems & Environment 46.

[171] A Tisserant and F Cherubini, 'Potentials, Limitations, Co-Benefits, and Trade-Offs of Biochar Applications to Soils for Climate Change Mitigation' (2019) 8 Land 12, 179.See, also: NP Gurwick et al, 'A Systematic Review of Biochar Research, with a Focus on its Stability in Situ and its Promise as a Climate Mitigation Strategy' (2013) 8 PloS one 9.

[172] PR Shukla et al, (eds.), Climate Change 2022: Mitigation of Climate Change (Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, 2022), 36.
Biochar's low risk of reversal is also briefly considered in: AL Cowie, 'Biochar as a Fast Track to Net Zero' (2023) 4 Nature Food 203.

[173] A Prado and N Mac Dowell, 'The Cost of Permanent Carbon Dioxide Removal' (2023) 7 Joule 700.

[174] Biochar Systems Research Group, 'On The Durability of Biochar Carbon Storage. A Clarification Statement from Researchers' (2023): <https://biochar.systems/durability-statement/>.

[175] Terra Global Capital et al, 'Evaluation of the Opportunities for Generating Carbon Offsets from Soil Sequestration of Biochar' (2010): < https://www.climateactionreserve.org/wp-content/uploads/2009/03/Soil_Sequestration_Biochar_Issue_Paper.pdf >.

[176] European Parliament, 'Amendments - Draft report Lídia Pereira (PE745.292v02-00) on the Proposal for a Regulation of the European Parliament and of the Council Establishing a Union Certification Framework for Carbon Removals - Proposal for a Regulation'. See amendments no 403, 404, 406,

Firstly, there are different variables when considering biochar and its applications that may affect the carbon capture potential of biochar. This is because, despite its permanence and recalcitrance, biochar is heterogeneous and its behaviour may change depending on the environment where it is applied.[177] That said, new research has noted that biochar may have a higher permanence than initially thought, suggesting biochar's stability over geological time scales.[178] These elements, the positive, the negative and the risks, need to be considered in the context of effective carbon accounting and, more specifically, of methodology-development under the framework of the Certification Framework for Carbon Removals and where uncertainties arise, a precautionary approach would need to be used.

Secondly, the actual *use* of biochar determines its carbon sequestration potential. For example, when biochar is used in products, its carbon sequestration potential depends on the life of the product, as it cannot be guaranteed thereafter if the said product is or might need to be disposed of. If biochar is applied to soil, the carbon sequestration potential depends on the biochar itself and on the environmental conditions of the land where biochar has been applied. Additionally, only a certain amount of biochar can be used on soil, and only that specific amount could act as a carbon removal technology. This is because the fate of the material would likely be certain only at the point of use, meaning that biochar would no longer be at risk of being used in a manner that is incompatible with carbon removal. In other words, for effective carbon removal accounting in relation to biochar, the mere production of biochar should not be equated to assured carbon removal. A more "flexible" approach for biochar may therefore be required.

Carbon farming and carbon storage in products (also foreseen in the proposed legislation, next to permanent carbon storage) would be a rather suitable vector for the inclusion of biochar use in a certification framework as they would allow for tailored solutions (e.g. in relation to monitoring) whether biochar is used on soil (carbon farming) or is used in a product (carbon storage in products). The fact that biochar provides for more certainty and longer-term sequestration than other approaches in terms of carbon removals within the carbon farming realm of possibilities[179] could then be taken into account in the more precise methodologies and approaches.

Considering these options, the categorisation of biochar as a permanent carbon storage activity should be reserved for those situations where the activity has the characteristics of a carbon storage activity more similar or comparable to geologic sequestration. New additions to Recital 9 of the agreement on the Regulation for a Union Certification Framework for Carbon Removals seem to confirm this and call for appropriate monitoring and liability rules in the relevant certification methodologies depending on the specific conditions under which the activities take place.

Thirdly, biochar and carbon removal accounting for biochar cannot be decoupled from its use from a waste law standpoint. In EU waste law, certain requirements (End-of-Waste requirements, indicated in article 6 of the Waste Framework Directive) need to be present for a material to cease to be waste: one of these requirements is that the substance be used for specific purposes.[180] As a result, where biochar may be considered waste, it would need to be used for a specific application for it to be legally regarded as non-waste (among other criteria, which also need to be fulfilled). Biochar from raw biomass and biochar as a by-product would also

[177] See, e.g.: S Li and D Tasnady, 'Biochar for Soil Carbon Sequestration: Current Knowledge, Mechanisms, and Future Perspectives' (2023) 9 C - Journal of Carbon Research 3. 67. Y Yang et al, 'Biochar Stability and Impact on Soil Organic Carbon Mineralization Depend on Biochar Processing, Aging and Soil Clay Content' (2022) 169 Soil Biology and Biochemistry.

[178] H Sanei et al, 'Assessing Biochar's Permanence: An Inertinite Benchmark' (2024) 281 International Journal of Coal Geology 104409.

[179] See: PR Shukla et al, (eds.), Climate Change 2022: Mitigation of Climate Change (n 172).

[180] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and Repealing Certain Directives OJ L 312/3, art 6.

not necessarily escape the waste connotation and the application of the article 6 requirement(s), because any material – biochar, in this case – that is not used might be legally considered as discarded and, thus, regarded as waste and in need of proper waste management. For biochar used on soils as a carbon farming practice, this could be less of an issue on account of the FPR, which removes some obstacles to the use of biochar as an EU fertilising product. For biochar used for other applications, however, the problem remains.

As for more general considerations, while biochar might be a strategic tool in the field of carbon removals, detrimental effects may still occur. Safeguards and restrictions would still need to be in place with regard to its use as a fertiliser and its production. For example, this can be done by adding a link to the FPR, the waste legislation, or the organics legislation in the sustainability requirements in the methodologies related to biochar use in carbon farming as this would incentivise the use of a biochar of a certain quality and of a biochar that is an End-of-Waste or by-product material.[181]

Another example would be to potentially exclude the carbon removal certification for biochar produced from raw materials, or, at the very least, admit only those biochars for which sustainability requirements (for raw materials) have been met, e.g. the cascading approach. Other environmental requirements that could be considered are those related to the respect of broader EU legislation, including industrial emissions and impact assessment, where those apply, which would ensure that biochar production operations are running with a permit and have been analysed from an environmental impact perspective, if required. This could also be done through the methodologies required by the Regulation.

4 CONCLUSIONS

This article aimed to consider three different, yet connected, policy and legislative fields that are instrumental to increase sustainability in agricultural systems and have a potential impact on biochar: the CAP as the main EU instrument covering farming and agricultural policy and law; organic farming as a regulated farming practice directed towards sustainability and, finally, the emerging field of carbon farming at the intersection of climate, environmental and agricultural policy. The aim of this examination is to identify the importance and relevance of these instruments to the transition towards more sustainable systems and their relation and significance for biochar and biochar's role in the said transition.

First, the possibility for connections and synergies between the policy and legislative instruments analysed were noted, and it was considered that such connections are not always there or are not always leveraged. This is especially true in relation to environmental and farming policy. Potential synergies that could be further created and exploited with new legislation, such as the SML, if adopted, and the NRL, were also highlighted here. As far as biochar is concerned, in particular, synergies between these instruments and the Regulation on a Certification Framework for Carbon Removals are very likely to occur and developments on the dossiers need to be followed closely: this will include the implementation of the instruments and the development and finalisation of the methodologies under the Certification Framework for Carbon Removals.

Second, it has been argued above that the CAP could have been more ambitious. This would also help better achieve environmental and climate goals. The CAP has some positive

[181] The End-of-Waste status reflects the status of material that has ceased to be waste on account of a recycling or recovery operation. In EU waste law, there are conditions underpinning the EoW status. These are indicated in art 6 of the Waste Framework Directive. The By-product status indicates the status of a material (substance or object) resulting from a production process the primary aim of which is not the production of that material (i.e. a production residue) and meeting certain conditions. These conditions are indicated in art 5 of the Waste Framework Directive.

elements that would increase the support for more sustainable agriculture. However, overall, it fails to deliver a much-needed and more radical transition. Instead, it settles on business as usual, possibly due to, in particular, the increased flexibility given to MS and the issues with the conditionality mechanism. The way forward is clear: the CAP needs to be revised and aligned with climate and biodiversity goals. This, of course, transcends biochar in the sense that such considerations are broad and relevant for all agriculture-related and environmental matters. However, the above considerations are also pertinent to biochar if biochar is to be used in the context of more sustainable and climate-friendly agriculture. In other words, the issues of a CAP with low ambition seep into and undermine the potential of biochar as an agricultural tool for the transition. That being said, and more practically, we also saw that the new CAP has some elements that could be meaningful for biochar: the Eco-Schemes, the farm advisory services, and the Farm Sustainability Tool for Nutrients (FaST).

As for organic farming, while this issue has been pushed up the policy agenda in the last few years, instruments remain mostly soft law/non-binding initiatives. Such commitments, therefore, need to be embedded in hard law measures. Additionally, support for sustainable agricultural practices is still rather limited. This is especially true as far as the CAP is concerned and could be rectified by, for example, establishing more robust conditionality mechanisms in the CAP, pushing EU farmers to adopt more sustainable practices, which might include organic farming. Just as the CAP discussion above, potential issues with organic farming are less of a "biochar problem" and more of a "sustainability problem". That being said, if sustainability is the goal of biochar production and use, then progress in organic farming is progress in biochar development and use. In this sense, it is interesting to note that, under certain conditions, biochar can be used as a fertilising product in organic farming.

Meanwhile, the domain of carbon farming has also garnered extensive attention in the last few years due to pressures related to climate change. This has resulted in the adoption of aRegulation,while work on certification methodologies continues. Despite this, the following general considerations and reflections relating to biochar can be drawn. The first point relates to the nature of carbon farming. While this is certainly an interesting tool in the pursuit of decarbonisation, a holistic perspective must be adopted in handling the matter in legislation, as carbon farming is not only interesting for carbon removal and sequestration potential but might also be noteworthy, perhaps even more so, for other significant co-benefits it could deliver. Given that carbon farming is not necessarily reliable in delivering certain and quantifiable carbon removals, due importance must be given to other benefits that carbon farming could generate (enhancement of biodiversity, soil quality, etc). Next, there is potential overlap and connection between CAP measures and other instruments and the regulation of carbon farming as a carbon removal activity. This also calls for additional pieces of legislation and their implementation to cover matters other than soil carbon. Further, the importance of focusing on emission reductions was underlined.

The potential for coverage of biochar in this new instrument was also addressed. In particular, it was noted that biochar might be particularly suited to the context of carbon farming and carbon sequestration in products, as these two scenarios would take appropriate stock of the (potential) situation of biochar as a (waste) material and given the impossibility or difficulty to decouple biochar from its use.

All in all, the above illustrates how the road towards sustainability in EU agriculture and farming law is still long and much still needs to be done on several fronts. As highlighted, technologies such as biochar can be part of the journey to increased sustainability in agricultural systems; however, their proper and careful regulation is key. To some extent, the current and developing regulatory framework allows and regulates the use of biochar and will progressively do more in the near future; yet, some important issues still remain.

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