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The impact of soil carbon sequestration on adaptation in Europe's agricultural sector and the potential role of regulatory instruments

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Summary

This paper assesses current and proposed EU climate law and the legal instruments associated to the common agricultural policy to see whether and in how far soil carbon sequestration and associated adaptation is or can be promoted through the use of these current or proposed instruments. The assessment shows that current and proposed policies and instruments are completely inadequate to stimulate large scale adoption of soil carbon projects across Europe. Given the structural flaws that were found, it is highly likely that this is true for all climate smart agricultural practices. That is why an alternative approach needs to be developed. The first element of this new approach is focused on EU climate policy: the inclusion of agriculture in the EU ETS through allowing regulated industries to buy offsets from the agricultural sector, following the examples set by Australia and others. Lessons learned from these experiences abroad will be helpful when drafting new EU rules and regulations aimed at setting up a reliable and robust regulatory offsets system under the EU ETS. The second element of a new approach is aimed at the CAP. The CAP, generally, needs to be much more focused on the specific requirements of climate change mitigation and adaptation. Such stronger focus does not take away the need to open up a new income stream for farmers from offsets under the ETS, as the CAP will never have sufficient funds for the deep and full transition of Europe's agriculture sector that is needed.

1. Introduction

In agriculture, adaptation usually is considered together with mitigation and food security, as these three factors are interlinked, hence the focus on 'climate smart agriculture' (CSA) as an approach to developing the technical, policy, and investment conditions to achieve sustainable agricultural development for food security under climate change.[2] CSA is composed of three pillars: sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change, and reducing or removing greenhouse gas emissions. So far, only a few countries in the world have regulatory instruments in place aimed at stimulating farmers to convert to climate smart practices, although these schemes all have a primary focus on mitigation.[3] Experiences in these countries, such as Australia, show that, in practice, increased resilience is often a side-effect of carbon-offset projects, particularly of those projects aimed at increased carbon sequestration in agricultural soils, as these lead

[1] Professor of International and European Environmental law, Tilburg University, the Netherlands. This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 655565.

[2] FAO, *Climate Smart Agriculture Sourcebook* (Rome: FAO, 2013) at ix.

[3] Jonathan Verschuuren, Towards a Regulatory Design for Reducing Emissions from Agriculture: Lessons from Australia's Carbon Farming Initiative, (2017) 7:1 Climate Law 1, 6.

to more fertile soils and better moisture retention and thus to increased production and better water management. Soil carbon plays an important role in maintaining soil structure, improving soil-water retention, fostering healthy soil microbial communities, and providing fertility for crops.[4] Also, soil-carbon projects are often part of the introduction of wider on-farm regenerative practices that focus on soils, water, and biodiversity.

A comprehensive regulatory framework to incentivize the agricultural sector to convert from conventional practices to become climate smart is still lacking, not just in the EU, but worldwide.[5] The current Common Agricultural Policy (CAP) does focus on climate change related measures, but seems largely inadequate to set a transition into climate smart agriculture into motion.[6] This paper reviews the potential for adaptation of a policy aimed at increased soil carbon in agriculture and discusses the regulatory approaches that the EU can adopt to stimulate Europe's farmers to adopt soil carbon projects. It does so, building upon experiences in Australia. The paper consists of three parts. First, a broad literature study will reveal the current knowledge on the benefits of increased soil carbon sequestration for adaptation (section 2). Second, an empirical study into the experiences with soil carbon projects under Australia's carbon farming legislation will show the regulatory approach that was chosen in that country and the stakeholders' experiences with the Australian legislation (section 3). Australia was chosen for this empirical research because it is one of only a handful countries in the world that have a regulatory framework in place allowing farmers to generate carbon credits through increased soil carbon sequestration. Third, current EU climate and agricultural policies will be reviewed with the aim to find anchor points for a policy that stimulates farmers to increase soil carbon sequestration (section 4). Focus will be both on the Common Agricultural Policy and the EU's climate policy, in particularly the EU ETS and the Effort Sharing Decision. Finally, in section 5, a new regulatory approach will be proposed, based on the Australian experiences and the assessment of the current EU climate and agriculture policies.

2. Benefits of soil carbon sequestration for adaptation

Soils contain large quantities of carbon, mainly made up of decomposing plant materials and microbes. The Earth's soils contain around 2500 Gt of carbon, four times more than vegetation.[7] Through soil degradation, much of natural soil carbon stocks has been lost. It has been estimated that the carbon

[4] Daniel Kane, Carbon Sequestration Potential on Agricultural Lands: a Review of current Science and Available Practices (Breakthrough Strategies & Solutions, Takoma Park, Md 2015); R. Lal, 'Soil Carbon Sequestration to Mitigate Climate Change' (2004) 123 Geoderma 1-22; F. Alliaume, W.A.H. Rossing, M. García, K.E. Giller, and S. Dogliotti, 'Changes in Soil Quality and Plant Available Water Capacity Following Systems Re-design on Commercial Vegetable Farms', (2013) 46 *European Journal of Agronomy* 10.

[5] Jonathan Verschuuren, Stimulating Climate Smart Agriculture within the Boundaries of International Trade Law, (2016) 4 Carbon and Climate Law Review 177.

[6] David Blandford, Katherina Hassapoyannes, The Common Agricultural Policy in 2020: Responding to Climate Change, in: Joseph A. McMahon, Michael N. Cardwell (eds.), Research Handbook on EU Agriculture Law (Edward Elgar 2015), 170-202; G. Grosjean et al., Options to Overcome the Barriers to Pricing European Agricultural Emissions (Working Paper, November 2016 version), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2734677 (accessed 1 June 2017).

[7] Kane, above note 4, at 3.

sink capacity of the world's agricultural and degraded soils is 50 to 60% of the historical carbon loss of 42 to 78 Gt of carbon.[8] With around 40% of the world's surface being used for agriculture, it is suggested that these agricultural lands may be used as an important sink for atmospheric carbon.[9] The carbon sequestration potential through restoration of organic agricultural soils can be as high as 663 Mt CO_2eq per year in 2035, [10] or even 1.2 Gt.[11] Soil erosion control and soil restoration has an estimated carbon sequestration capacity of between 5 and 15% of global emissions.[12] After peaking, a new equilibrium will be reached and the sequestration potential goes down. It should also be noted that the carbon stored in soils can be easily emitted again with deep tillage and significant soil disturbance.[13]

Increasing soil carbon sequestration has a very interesting positive impact on climate change adaptation. Measures aimed at soil carbon sequestration increases the ability of soils to hold moisture and to better withstand wind and water erosion, enriches ecosystem biodiversity, helps cropping systems to better withstand droughts and floods, increases fertility for crops through restoring healthy soil microbial communities, and increases livestock efficiency (sustainable intensification).[14] Other potential positive side-effects of practices aimed at soil carbon sequestration are various environmental benefits, such as avoided use of chemical fertilizers and pesticides and improved biodiversity and wildlife.[15]

Examples of soil carbon sequestration practices relevant for Europe are the application of conventional or organic no-till and conservation tillage systems, the use of periodic green fallows, winter cover crops and crop rotations that utilize semi-perennial crops, rotational grazing, decreased grassland

[8] Emanuele Lugato, Francesca Bampa, Panos Panagos, Luca Montanarella, Arwyn Jones, 'Potential carbon sequestration of European arable soils estimated by modelling a comprehensive set of management practices', (2015) 20 Global Change Biology 3557-3567, at 3557.

[9] Pete Smith, 'Agricultural Greenhouse Gas Mitigation Potential Globally, in Europe and in the UK: What Have We Learnt in the last 20 Years?' (2012) 18 Global Change Biology 35-43.

[10] Rolf Sommer, Deborah Bossio, 'Dynamics and Climate change Mitigation Potential of Soil Organic Carbon Sequestration' (2014) 144 Journal of Environmental Management 83-87, at 85. Note that this publication was criticized for being too negative on this potential, see Luis Lassaletta, Eduardo Aguilera, 'Soil Carbon Sequestration is a Climate Stabilization Wedge: Comments on Sommer and Bossio (2014)' (2015) 153 Journal of Environmental Management 48-49. See also next footnote.

[11] Eva Wollenberg et al., Reducing Emissions from Agriculture to Meet the 2 ^{o}C target, (2016) 22 Global Change Biology 3859, at 3863.

[12] M.G. Rivera-Ferre, F. López-i-Gelats, M. Howden, P. Smith, J.F. Morton, M. Herrero, Re-framing the Climate Change Debate in the Livestock Sector: Mitigation and Adaptation Options, (2016) 7 WIREs Climate Change 869, at 874.

[13] Ibid.

[14] P. Smith et al., 'Agriculture, Forestry and Other Land Use (AFOLU)' in: O. Edenhofer et al. (eds.), Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press 2015), 811, 846 and 847; J.R. Porter et al., 'Food security and food production systems' in: C.B. Field et al. (eds.), Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press 2015), 485, 515 and 518; Kane, above note 4 at 18; Rivera-Ferre et al., above note 12, at 884.

[15] Annette Freibauer, Mark D.A. Rounsevell, Pete Smith, Jan Verhagen, 'Carbon Sequestration in the Agricultural Soils of Europe' (2004) 122 Geoderma 1-23, at 14-15.

management intensity, perennial cropping, nutrient management consisting of compost (crop residue addition) and organic manure, and judicious use of irrigation water.[16]

Given these potentially beneficial impacts of soil carbon sequestration projects on farmland, such projects are considered an important element of policies aimed at stimulating farmers to adopt climate smart practices. Climate smart agricultural practices and technologies are practices and technologies that not only reduce emissions from agriculture, but also increase agro businesses resilience against the impacts of climate change while also allowing for an increase in production.[17] A global increase in production is deemed necessary due to an expected increase in global food demand by at least 40, and perhaps as much as 70 per cent by 2050, caused by the growing world population (from seven billion today to nine billion in 2050) and by dietary changes by a wealthier middle class in countries such as China and India.[18] Such increase in food production will have to be achieved under decreasing opportunities due to climate change. In its 5th Assessment Report, the IPCC finds that for the major crops in tropical and temperate regions (wheat, rice and maize), climate change without adaptation will negatively impact production with local temperature increases of 2 °C or more.[19] In fact, the IPCC finds that climate trends have already negatively affected wheat and maize production for many regions,[20] which has led some to comment that even the Paris Agreement goal of 1,5 °C will be insufficient to stop productivity loss in agriculture.[21] Negative yield impacts for all crops past 3 °C of local warming without adaptation are to be expected, even with benefits of higher CO_2 and rainfall (both positively affecting plant growth).[22] There is high confidence that irrigation demand will increase significantly in many areas (by more than 40% across Europe, USA, and parts of Asia).[23] A wide range of adaptation measures is considered necessary. According to the IPCC, effective adaptation of cropping could be critical in

[16] Kane above note 4 at 11-17; Lal, above note 4 at 11-13, Jinfeng Chang et al., Effect of Climate Change, CO2 Trends, Nitrogen Addition, and Land-Cover and Management Intensity Changes on the Carbon Balance of European Grasslands, (2016) 22 Global Change Biology 338-350.
[17] Ibid. at note 2.
[18] Bruce Campbell, Wendy Mann, Ricardo Meléndez-Ortiz, Charlotte Streck and Timm Tennigkeit, *Agriculture and Climate Change: A Scoping Report* (Washington, DC: Meridian Institute, 2011) at 3; David A.N. Ussiri, Rattan Lal, Carbon Sequestration for Climate Change Mitigation and Adaptation (Springer 2017) at 343. See also in general World Resources Institute, Creating a Sustainable Food Future. A Menu of Solutions to Sustainably Feed More than 9 Billion People by 2050 (Washington: WRI 2013).
[19] Porter et al., above note 14 at 488.
[20] Ibid. at 491. In some high-latitude regions, individual locations also benefit from climate change. It is expected that the majority of locations will experience negative impacts while some locations benefit from climate change. Overall, there will be a steady decline of the world's food production because of climate change. Ibid. at 505. It should be noted, though, that there is 'massive uncertainty about the ultimate impacts of climate change on global agriculture, food prices and land use', Thomas W. Hertel, The Challenges of Sustainably Feeding a Growing Planet, (2015) 7 Food Security 185, at 192.
[21] See, for example, the blogpost by Bruce Campbell, director of the CGIAR Research Program on Climate Change, Agriculture and Food Security, coordinated by the University of Copenhagen: Climate Change: Half a Degree Will Make a World of Difference for the Food We Eat <http://www.huffingtonpost.com/bruce-campbell-phd/climate-change-half-a-deg_b_8756428.html> accessed 1 February 2016.
[22] Porter et al, above note 14 at 505.
[23] Jiménez Cisneros et al., 'Freshwater Resources' in Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press 2014) at 251.

enhancing food security and sustainable livelihoods, especially in developing countries.[24] It is, therefore, not only clear that the adaptation goal, laid down in Article 2(1)(b) of the Paris Agreement is especially relevant for farmers,[25] but also that a deep transformation of agriculture is needed to achieve the adaptation, mitigation,[26] as well as food security needs.[27]

3. Soil carbon projects under Australia's Carbon Farming Initiative Act

3.1 introduction

There are only a few countries in the world that have a specific policy in place aimed at stimulating soil carbon sequestration. The Canadian Province of Alberta, for example, allows carbon cuts generated through projects on farms to be used as offsets by industry under its Emissions Trading Scheme.[28] Since 2012, one of the project types that is allowed is conservation cropping.[29] Conservation cropping under the Alberta scheme primarily focuses on no till soil management and on continuous cropping.[30] Australia has a broad carbon farming policy in place ('Carbon Farming Initiative') which originally had been designed as an offset scheme under an ETS, similarly to Alberta. Before trading commenced, however, the ETS was repealed following a change of government. [31] Since the repeal of the ETS in 2015, the carbon farming scheme became a stand-alone programme under which farmers who generate carbon credits through on-farm projects can sell these credits to the government ('Emissions Reduction Fund').[32] Carbon sequestration in agricultural soils is one of many types of projects that are allowed under the scheme.[33]

3.2 Soil carbon projects: detailed rules

Under the Carbon Credits (Carbon Farming Initiative) Act 2011 (hereafter CFI Act) and associated regulations, farmers have a range of options to increase soil carbon sequestration for lands under pasture, crops or in mixed farming systems, for example: converting from annual cropping to pasture,

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[24] Porter et al., above note 14 at 514.
[25] Paris Agreement, FCCC/CP/2015/L9, art. 2(1)(b).
[26] Sebastian Oberthür, Perspectives on EU Implementation of the Paris Agreement, (2016) 1 Carbon and Climate Law Review 34, at 44.
[27] Jonathan Verschuuren, The Paris Agreement on Climate Change: Agriculture and Food Security, (2016) 7:1 European Journal of Risk Regulation 54, at 56.
[28] Specified Gas Emissions Regulation, Alberta Regulation 139/2007, see <http://aep.alberta.ca/climate-change/guidelines-legislation/specified-gas-emitters-regulation/default.aspx> (last accessed 18 April 2017).
[29] Quantification Protocol for Conservation Cropping (April 2012). For more information, see the Alberta Ministry for Agriculture and Forestry's website, <http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/cl11618> (last accessed on 18 April 2017). This protocol replaced a protocol aimed at tillage management, in place since 2009.
[30] Ibid.
[31] Clean Energy Act 2011, No. 131 (2011). See Elena de Lemos Pinto Aydos, 'Australia's Carbon Pricing Mechanism' in *Carbon Pricing, Growth and the Environment* edited by Larry Kleiser, Ana Yábar Sterling, Pedro Herrera, Janet E. Milne and Hope Ashiabor (Cheltenham: Edward Elgar, 2012) at 261.
[32] Carbon Credits (Carbon Farming Initiative) Act 2011 as amended in 2014. See in more detail Verschuuren, above note 3.
[33] For a current overview, see https://www.environment.gov.au/climate-change/emissions-reduction-fund/methods.

retaining stubble in field, undertaking pasture cropping, managing pasture through implementing pasture irrigation, increasing biomass yields through inputs such as fertiliser, lime and water (sustainable yield), rejuvenating pastures, including through seeding (this also includes reducing nitrous oxide emissions from soils through tillage), managing grazing through changing stocking rates, altering the timing, duration and intensity of grazing. Farmers can select the measures they want to implement, but have to adopt at least one new management activity.

Farmers can select the measures they want to implement, but have to adopt at least one new management activity. The land that is used for soil carbon storage has to be delineated in accordance with mapping rules and must be made up of land that had permanent pasture for five years, or continuous cropping for the five years before the start of the project.[34] The selected land is called 'project area' and has to consist of one or more carbon estimation areas in which specific management activities take place. The farmer can exclude parts of the area from the project ('exclusion areas').

Like all sequestration projects, soil carbon projects can have a hundred year permanence period, or a twenty-five year permanence period.[35] There are extensive rules on carbon maintenance. A *carbon maintenance obligation* is imposed upon the sequestration project proponent to avoid that sequestered carbon, after the credits have been issued, is emitted. This means that nobody is allowed to carry out activities on lands that are used for sequestration that result (or are likely to result) in a reduction below the benchmark sequestration level of the sequestration of carbon in the relevant carbon pool on the area.[36] This has to be registered in the relevant land title register.[37] Only *permitted carbon activities* are allowed on lands that are used for sequestration. If there has been a reduction below the benchmark sequestration level, the owner or occupier of the land has to take all reasonable steps to ensure that the number of tonnes of carbon is brought back to that level.[38] A buffer of an additional 5 per cent abatement has to be kept, so as to offset unexpected loss of sequestered carbon.[39] Farmers are allowed to change management activities, but only to an activity with the same or higher sequestration value.[40]

Soil carbon sequestration achieved through these projects originally had to be physically measured on site, but for some management activities (changing from annual cropping to pasture, retaining stubble in field, and increasing biomass yields (sustainable intensification) through inputs such as fertilizer, lime and water) now can also be determined using default soil carbon enhancement values.[41] For the latter

[34] Carbon Farming Initiative (CFI) Mapping Guidelines 2015, <https://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/publications/cfi-mapping-guidelines-2015>.
[35] S. 86A CFI Act.
[36] S. 97(9) CFI Act.
[37] S. 40 CFI Act.
[38] S. 97(10) CFI Act.
[39] S. 16(2) CFI Act.
[40] S. 85 Carbon Credits (Carbon Farming Initiative—Estimating Sequestration of Carbon in Soil Using Default Values) Methodology Determination 2015.
[41] Following rules laid down in the Carbon Credits (Carbon Farming Initiative) (Sequestering Carbon in Soils in Grazing Systems) Methodology Determination 2014 and the Carbon Credits (Carbon Farming Initiative—Estimating Sequestration of Carbon in Soil Using Default Values) Methodology Determination 2015 respectively. Both are available online, http://www.environment.gov.au/climate-change/emissions-reduction-fund/methods (accessed 20 April 2017).

activities, there are detailed rules on how to quantify the amount of carbon sequestered in each activity based on carbon accounting models that were developed in Australia.[42] The rules basically determine the difference between the baseline carbon stock and baseline emissions and the project carbon stock and emissions in the project area. All GHG emissions are covered, including emissions from livestock grazing in the project area, from synthetic fertilizers and lime applied to the project area and from tillage. For project activities for which the amount of abatement cannot be determined using default values, samples of soil need to be taken by qualified persons, i.e., a technician with qualifications from a nationally accredited course or recognized by a nationally accredited institution, with competencies prescribed in another set of rules.[43] Detailed rules are set on sample collection and on the analysis of the samples. Sampling starts with baseline sampling, followed by sampling at regular intervals, and has to take place at a depth of at least 30 centimetres.

3.3 Experiences with soil carbon projects under the Australian CFI Act

Empirical research into the experiences with the CFI Act in Australia in 2016 showed that soil carbon projects are becoming increasingly popular among farmers.[44] Initially, though, it was mainly a handful of 'first movers' that were active both in developing and promoting soil carbon, both with the government and with the broader farming community, for instance through organisations such as and Soils for Life and Healthy Soils. Projects of these initially engaged farmers include, for instance, the 2015 Bindaree Carbon Project.[45] This organic farm uses a more targeted method of rotational grazing, moving cattle to paddocks as soon as the grass stops growing, allowing the cattle to graze in it and start the growth process again, thus accelerating the increase of soil carbon levels.[46] This particular farmer has been involved in the development of the methodology (especially the soil carbon sampling technology) by the Central Queensland University,[47] and is the chairperson Healthy Soils Inc. Landcare, an organisation that 'conducts research, on farm trials and other methodologies to assist landholders, farmers and graziers to improve long term viability meanwhile reducing their reliance on chemicals; thus, reducing soil degradation and erosion.'[48] Another example is the Tallawang Carbon Sequestration Project.[49] This project is part of a bigger on-farm innovations project that had started already in 2002, also including

[42] The Full Carbon Accounting Model (FullCAM), see the Australian Government website http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/land-sector.
[43] The CFI Soil Sampling and Analysis Method and Guidelines 2014, available online http://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/publications/cfi-sampling-guidelines (accessed 20 April 2017).
[44] Verschuuren, above note 3 at 41-42.
[45] Project ID: ERF101857, see project register through http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register.
[46] R. Conaghan, Rural Weekly, 27 March 2015, http://www.ruralweekly.com.au/news/soil-test-breaks-vital-ground/2585983/.
[47] Ibid.; CQUni, CQUni researchers involved in healthy soils field, 22 July 2014, https://www.cqu.edu.au/cquninews/stories/engagement-category/2015/cquni-researchers-involved-in-healthy-soils-field-day.
[48] See the Healthy Soils Inc. website, http://www.healthysoils.org.au.
[49] Project ID: ERF101522, see project register, above note 45.

the construction of leaky weirs and swales to slow water flow.[50] This has increased the soil moisture and vegetation growth. Slashing and targeted grazing have increased soil organic matter and encouraged regeneration of native grasses. Both grazing and the number of livestock present are fluctuating with the carrying capacity of the area. Within ten years, these measures led to 250% increase in stock carrying capacity, 15-23% profit margin on cattle production, constant river outflow regardless of inflow, improved landscape hydrology, and increased native biodiversity.[51]

In 2016, a set of semi-structured interviews was conducted with key stakeholders to discover stakeholder experiences with the Australian carbon farming legislation. Respondents included representatives from responsible government bodies, farmers' associations, financial and accounting institutions active in the agricultural sector, consultancy active in the area of carbon farming, as well as a climate change NGO.[52] As to soil carbon projects, three conclusions were mentioned and broadly recognized by all stakeholders:

First, soil carbon projects were especially mentioned for having an astonishing impact on soil quality and on agricultural production. It was mentioned that farmers see the positive results participating farmers have and start to become engaged too, partly because of the additional revenue generated through the carbon credits, but more importantly because of the increase of food production and the generation of more revenue from crops. One respondent referred to an example he knew, of two brothers who had farmland adjacent to each other. One of them was involved in a soil carbon project, the other was not. "After a while, you could clearly see the difference, with much more and better growing crops on the land of the first. The other brother had to drive across his brother's land to reach his own land and saw the difference every day". Although many respondents stressed that conservatism, especially among older farmers, slows down the adoption of soil carbon sequestration practices, they all feel that slowly the farming sector is changing and is taking up these new practices. According to all those interviewed, the CFI Act has been pivotal in pushing this change.

Second, many stakeholders praised the government for having taken the risk of allowing soil carbon projects under the CFI Act, even though there was uncertainty about how to regulate these activities and despite the fact that soil carbon projects were considered to be somewhat risky in the sense that, at the time of adoption of the methodology, it was not entirely certain how much abatement would be generated, or whether abatement would be generated at all. One carbon agent said: "You can criticize this for not being perfect. But this was a good choice, because at least things could get started. While monitoring, we are learning. Soil carbon is a very promising methodology for the future, we are really moving ahead fast now, which would not have been possible without the Emissions Reduction Fund. The government was willing to take that risk. It is not perfect, but it is good. The soil carbon methodology leads to innovation in the sector. In the end, this will be good for the farming sector in a much broader

[50] Soils for Life, Case study, Innovations for Regenerative Landscape Management Project (September 2012), http://www.soilsforlife.org.au/cs-tallawang.
[51] Ibid.
[52] A broad account and analysis of the findings of the entire project have been published in Verschuuren, above note 3. Full dataset has been stored in open access data repository, https://easy.dans.knaw.nl/ui/datasets/id/easy-dataset:68057 (accessed 20 April 2017).

sense than just GHG mitigation. We have developed, tested and improved a methodology that will be important for the rest of the world as well".

Third, soil carbon projects come with high transaction costs. Soil carbon measures need to be implemented for three years before a farmer can claim credits. This requires an investment upfront that small farms cannot easily take. Assessing the impact of soil carbon projects is costly too. Detailed and far-reaching monitoring, reporting and verification requirements were set in the regulatory framework, so as to assure that the emission cuts are real, additional and verifiable.[53] These requirements are too complex to be carried out by farmers themselves. They need the help of consultants ('carbon agents') to comply. As a consequence, carbon agents work with their clients throughout the entire project, up to ten years. Much of the money generated through the carbon credits, therefore, ends up in the hands of the carbon agents rather than in those of the participating farmer (it is thought that around one third of the revenue is spent on carbon agents). Reducing this administrative burden, for instance through using sensory systems, automated tracking devices, drones, and automated reporting, is considered an important improvement that is yet to be achieved.

4. Soil carbon projects under the EU's climate and agricultural policies

4.1 Introduction

Although there are many uncertainties on the vulnerability of the EU's agricultural sector to climate change, and its adaptation potential,[54] it is clear that from 2050 onwards, substantive yield losses are expected, especially in southern Europe.[55] Considerable yield losses are also expected for central, western and northern Europe.[56] To achieve the EU's long term mitigation targets in a cost-effective way, it is estimated that agriculture should reduce its emissions by 36 per cent by 2030, and by 42-49 per cent by 2050.[57] To meet adaptation and mitigation requirements, strong policies are needed. As far as *adaptation* is concerned, research shows that strong top-down policies that are linked with, and fed by, bottom-up initiatives, are needed to achieve the required level of adaptation in agricultural sector.[58] Holistic strategies have to be adopted that go beyond technical approaches aimed at stimulating autonomous farm-level risk reduction.[59] For *mitigation* in agriculture, a similar conclusion was reached: high-impact technical and policy interventions will be needed to achieve the 2 degrees climate goal.[60] Without further policy action, EU agricultural emissions are projected to decrease by only 2.3% in

[53] Verschuuren, above note 3 at 19.
[54] M. Donatelli et al., Assessing Agriculture Vulnerabilities for the Design of Effective Measures for Adaption to Climate Change (EU, JRC Report 2012).
[55] R.S. Kovats et al., 2014: Europe. In: V.R. Barros et al. (eds.), Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press 2014), 1284.
[56] Ibid.
[57] Grosjean et al., supra note 6 at 4.
[58] L. Bizikova, E. Crawford, M. Nijnik, R. Swart, Climate Change Adaptation Planning in Agriculture: Processes, Experiences and Lessons Learned from Early Adapters, (2014) 19 Mitigation and Adaptation Strategies for Global Change 411, at 425.
[59] Ibid. at 426.
[60] Wollenberg et al., above note 11 at 3863.

2030,[61] so far short of the 36 per cent target mentioned above. It is generally accepted, however, that current EU climate and agriculture policies are largely insufficient: the agricultural emissions reduction potential in Europe 'lies untapped and dormant',[62] and on the EU's agricultural adaptation and mitigation strategies: 'it is difficult to escape the conclusion that the emperor has few (if any) clothes as far as actual policies are concerned.'[63]

In this section, I will review current and future EU's climate and agriculture policies with a view to determine its potential to foster soil carbon sequestration projects across Europe, to design the emperor's clothes. In line with Bizikova and others,[64] I will look into the EU's climate change policy (mitigation and adaptation, section 4.2), and the CAP (section 4.3). Although climate smart agriculture projects can also be funded under the LIFE+ Regulation, this instrument is not discussed here because of the ad hoc nature of LIFE+ funding.[65] It cannot serve as an instrument to stimulate large scale adoption of soil sequestration projects across Europe's farms.

4.2 Soil carbon under the EU climate policy

So far, the EU did not focus much attention on agriculture in its climate policy, neither its adaptation policy, nor its mitigation policy. The EU's Adaptation Strategy refers to the CAP in which adaptation measures have been integrated to a limited extent.[66] I will discuss these adaptation measures when reviewing the CAP in section 4.3 below. As far as mitigation is concerned, incentives to reduce emissions from agriculture are hardly foreseen in the EU's climate policy.[67] Agriculture is a non-ETS sector, which means that emissions from agriculture are covered by the Effort Sharing Decision,[68] at least as far as emissions from livestock are concerned. Emissions from land-use, land-use change and forestry (LULUCF) are not covered by the Effort Sharing Decision.[69] Soil carbon sequestration efforts, therefore, currently do not help Member States to achieve their EU climate targets. As a consequence, most Member States do not have binding rules in place aimed at soil carbon sequestration, or at climate change adaptation or mitigation in the agricultural sector more broadly. Some states, at best, invite farmers to introduce climate smart farming methods through the use of soft law instruments aimed at

[61] Ignacio Pérez Domínguez, Thomas Fellmann, et al., An Economic Assessment of GHG Mitigation Policy Options for EU Agriculture (EU, JRC Science for Policy Report 2016), at 4.
[62] Grosjean et al., above note 6, at 1.
[63] Blandford and Hassapoyannes, above note 6 at 202.
[64] Above note 58.
[65] Regulation (EU) No 1293/2013 of the European Parliament and of the Council of 11 December 2013 on the establishment of a Programme for the Environment and Climate Action (LIFE) and repealing Regulation (EC) No 614/2007 (LIFE+ Regulation 2014-2020), OJ L 347/185.
[66] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, An EU Strategy on adaptation to climate change, COM (2013) 0216 final, 8.
[67] Alan Matthews, Incentivising soil carbon sequestration, blogpost 4 April 2014, http://capreform.eu/incentivising-soil-carbon-sequestration/ (accessed 9 May 2017).
[68] Decision 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, (2009) OJ L 140/136.
[69] Art. 9 Effort Sharing Decision.

providing information to those interested.[70] Member States are only required to report their current and future actions with regard to LULUCF emissions and removals to the European Commission as of 2014,[71] and do not have to keep track of emissions and removals from cropland and grassland until 2021.[72]

This unambitious nature of the current agricultural climate policy will have to disappear with the coming of age of climate law. A first indication is the proposal for a European Regulation on the inclusion of greenhouse gas emissions and removals from land use and forestry into the EU's 2030 climate framework (LULUCF Regulation).[73] According to this proposal, from 2021, emissions and removals in land use and forestry sectors, including agricultural land use for arable crops and grassland, must be balanced.[74] This regulation, therefore, will be an important first step towards regulating agricultural emissions and probably will be a stimulus for the adoption of soil carbon projects across Europe.

The proposal for a new Effort Sharing Regulation setting out the rules for the non-ETS sectors for the 2021-2030 period,[75] intends to reward Member States that manage to increase carbon sequestration in soils or through vegetation in the land sector (including agriculture) to a greater extent than their emissions in the land use sector.[76] As just stated, the proposal for a LULUCF Regulation requires Member States only to achieve a balance. Member States that achieve a surplus can use these emission reductions to cover the target set by the Effort Sharing Regulation to a certain extent.[77] If and when these proposals are adopted, soil carbon sequestration will finally become a policy option to be considered by the Member States, although only to a limited extent: only 280 million tonnes of CO_2 equivalent can be accredited to land use measures of a total of 2,500 million tonnes emitted by the Effort Sharing Decision sectors…[78]

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[70] In 2008, for example, the Netherlands government, concluded a non-legally binding 'Covenant Clean and Economical Agro Business' with agribusiness organisations.

[71] Art. 10 Decision No 529/2013/EU of the European Parliament and of the Council of 21 May 2013 on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities, (2013) OJ L 165/80.

[72] Art. 3(2) Decision No 529/2013/EU.

[73] Proposal for a Regulation of the European Parliament and of the Council on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry into the 2030 climate and energy framework and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change, 20 July 2016, COM(2016) 479 def.

[74] Art. 4 Proposal LULUCF Regulation.

[75] Proposal for a Regulation of the European Parliament and of the Council on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 for a resilient Energy Union and to meet commitments under the Paris Agreement and amending Regulation No 525/2013 of the European Parliament and the Council on a mechanism for monitoring and reporting greenhouse gas emissions and other information relevant to climate change, COM (2016) 0482 final.

[76] Art. 7(1)(b) Proposal Effort Sharing Regulation.

[77] Annex 3 of the proposal lists the total net removals from deforested land, afforested land, managed cropland and managed grassland that Member States may take into account for compliance with the Effort sharing Regulation for the period 2021-2030.

[78] Ibid. For individual Member States, the totals are between 0.02 million tonnes CO2 equivalent for Malta and 58.1 million tonnes for France. For the total of ESD emissions, see Eurostat's Greenhouse gas emissions in ESD

4.3 Soil carbon under the CAP

The current CAP encourages farmers to apply climate-friendly practices and techniques, including soil carbon sequestration. Both the cross-compliance mechanism, the direct payments and the subsidies for rural development relate partly to taking climate measures. A total of around 25 per cent of European agricultural subsidies for the period 2014-2020 are earmarked for climate measures in agriculture. About a quarter of this focuses specifically on the development of climate-friendly agricultural practices and techniques.[79] When fully utilized, this amounts to roughly 25 billion euro for the seven year period.[80]

4.3.1 Cross compliance

Farmers benefitting from the CAP have to comply with rules aimed at keeping land in good agricultural and environmental condition (GAEC).[81] Such rules also encompass rules focused on climate change.[82] Three measures that are or may be beneficial to soil carbon sequestration are covered: minimum soil cover, minimum land management reflecting site specific conditions to limit erosion, and maintenance of soil organic matter level through appropriate practices including ban on burning arable stubble.[83] While these rules require Member States to set some basic level of protection of carbon levels in agricultural soils, they are generally considered to be largely ineffective due to the fact that Member States are allowed considerable leeway in interpreting and implementing the standards.[84] Standards have been implemented in a lax way, have not been enforced,[85] and, despite being operational since 2005, did not halt the loss of soil carbon.[86]

4.3.2 Green direct payments

sectors, http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=t2020_35 (accessed 9 May 2017).

[79] European Commission, Agricultural policy. COP 21: united for climate, Brussel: EC 2015, https://ec.europa.eu/agriculture/sites/agriculture/files/climate-change/pdf/cop21-what-eu-agricultural-policy-does-for-climate_en.pdf (accessed 21 April 2017).

[80] A total of €408.31 billion (38 per cent of the entire EU budget) is spent through the CAP 2014-2020: €308.72 billion under the direct payments, and €99.6 billion under the rural development policy, see Gianluca Sgueo, Francesco Tropea and Marie-Laure Augere-Granier, How the EU budget is spent: Common Agricultural Policy, European Parliamentary Research Service Blog (20 July 2016), https://epthinktank.eu/2016/07/20/how-the-eu-budget-is-spent-common-agricultural-policy/.

[81] Regulation (EU) No 1306/2013 of the European Parliament and of the Council of 17 December 2013 on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814/2000, (EC) No 1290/2005 and (EC) No 485/2008, OJ L 347/549, Art. 91.

[82] Art. 93(1)(a) Regulation (EU) 1306/2013.

[83] Annex 2 Regulation (EU) 1306/2013.

[84] K. Hart, Green direct payments: implementation choices of nine Member States and their environmental implications, Brussel: IEEP 2015.

[85] Art. 64(2) Regulation (EU) 1306/2013 lists a range of situations in which no sanctions may be imposed.

[86] Matthews, above note 67 at 3-4.

The green direct payments introduced in the 2013 CAP reform are all beneficial for soil carbon sequestration and adaptation: crop diversification, the maintenance of permanent pastures and the establishment of ecological focus area.[87]

In order to receive crop diversification funds, farmers have to grow at least three different crops. This obligation, however, does not include crop rotation, and one of the crops can still take up as much as 75 per cent of the farm's arable land.[88] Hence, this policy is considered to be not effective from a climate change perspective,[89] although some 75 per cent of arable land in the EU is affected by the crop diversification obligation.[90]

Keeping permanent grassland probably is the most important measure for soil carbon sequestration as it prevents farmers from ploughing or converting grassland. This prohibition only applies to areas designated as sensitive areas by the Member States, both areas inside the protected areas under the EU Birds and Habitats Directives, or otherwise, for instance areas on carbon-rich soils.[91] Member States are not allowed to decrease the overall size of permanent grassland by more than 5 per cent compared to 2015.[92] This element of the policy is criticized too as it had been included in the cross-compliance rules, and thus obligatory for all farmers, before the 2013 reform. With the transfer to the direct payments in the reform, application of the policy now depends on the willingness of farmers to apply for payments for this type of activity, and the way Member States apply the leeway granted to them by the Regulation.[93] Moreover, the 5 per cent decrease threshold does signal the intention to drastically increase the amount of carbon sequestered in grasslands. A review showed that by 2016, around 16 per cent of the EU permanent grasslands had been classified as environmentally sensitive.[94]

For larger farms (bigger than 15 hectares), ecological focus areas can be designated which have to cover at least 5 per cent of the arable land of the farm.[95] Ecological focus areas may focus on 'soil carbon friendly' uses, such as land lying fallow, buffer strips, areas with short rotation coppice, areas with green cover and areas with nitrogen-fixing crops.[96] The 5 per cent can also be applied 'collectively', i.e., by adjacent farms, to a maximum of ten farms, as long as together they achieve the 5 per cent threshold.[97] Around 68 per cent of EU arable land is affected by ecological focus area obligations.[98]

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[87] Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009, OJ L 347/608, Art. 43.
[88] Art. 44(1) Regulation (EU) No 1307/2013.
[89] Blandford and Hassapoyannes, above note 6 at 189; Grosjean et al., above note 6 at 4.
[90] Alan Matthews, Research for Agri Committee - The Future of Direct Payments (European Parliament, 2016), 41.
[91] Art. 45(1) Regulation (EU) No 1307/2013.
[92] Art. 45(2) Regulation (EU) No 1307/2013.
[93] Matthews, above note 67 at 3.
[94] Matthews, above note 90 at 41.
[95] Art. 46(1) Regulation (EU) No 1307/2013.
[96] Art. 46(2) Regulation (EU) No 1307/2013.
[97] Art. 46(6) Regulation (EU) No 1307/2013.
[98] Matthews, above note 90 at 41.

A review requested by the European Parliament after one year of the revised CAP showed that the crop diversification and permanent grassland measures did not lead to immediate changes at farm level.[99] Changes that were observed are considered to have taken place due to farmers changing practices as part of good farm husbandry anyway.[100] The review also shows that of all the area designated as environmental focus areas, only 26.9 per cent was actually devoted to the most beneficial elements for the environment, and that the environmental benefits of this instrument largely depend on the choices made by Member States and farmers because of the large margin of discretion offered by the Regulation.[101] Another review concluded that the greening opportunities in the reformed CAP have, in most cases, not been taken.[102] Reviews also find that it is very difficult, if not impossible, to quantify environmental performance due to the lack of robust baseline data and the relatively protracted timescales for monitoring change whilst also disentangling the effects of greening from those of other drivers and policy instruments.[103] The European Commission seems to run into the same problem as they were unable, in their 2017 review of the implementation of the ecological focus area obligation, to reach any conclusion on the impacts of this obligation on climate change mitigation and adaptation.[104]

4.3.3 Rural development policy

Soil carbon sequestration projects could be easily funded through the EU's rural development policy, the second pillar of the CAP, as two of the six priorities for rural development are favourable to soil carbon sequestration and adaptation: restoring ecosystems, including through improving soil management (priority 4),[105] and promoting a shift towards a climate resilient agriculture, including through fostering carbon conservation and sequestration (priority 5).[106] Farmers who carry out substantial changes in their operations aimed at soil carbon sequestration for a period of at least five years may, therefore, be subsidized by the European Agricultural Fund for Rural Development (EAFRD). There is a mandatory minimum allocation of 25 per cent of the EAFRD budget for projects on the two priorities just mentioned. The Member States' Rural Development Programmes (RDP), through which all financing takes place, are steered into a climate friendly direction in several other ways too:

- Climate change mitigation and adaptation is mentioned as a thematic sub-programme for which an additional 10 percent support may be granted.[107]

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[99] Ibid.
[100] Ibid.
[101] Ibid. at 42.
[102] K. Hart, A. Buckwell, D. Baldock, Learning the Lessons of the Greening of the CAP (LUPG 2016), at ii.
[103] Ibid.
[104] The review only spends four sentences on the potential impact of EFA on climate change adaptation and mitigation, using the word 'could' in three of these… European Commission, Report from the Commission to the European Parliament and the Council on the implementation of the ecological focus area obligation under the green direct payment scheme, COM (2017) 152 final, at 13.
[105] Art. 5(4)(c) Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005, OJ L 347/487.
[106] Art. 5(5)(e) Regulation (EU) No 1305/2013.
[107] Art. 7(1)(f) and 7(3) Regulation (EU) No 1305/2013.

- RDPs have to demonstrate that these contain an appropriate approach towards climate change mitigation and adaptation and have to contain a SWOT analysis with attention for the special needs concerning climate change mitigation and adaptation.[108]
- Agri-environment-climate measures are compulsory measures for which support has to be made available at the national or regional level.[109]

The latter type of measures enable support for soil carbon sequestration and adaptation, depending on choices made by the Member States. Projects under this measure have to run for a period of five to seven years, but this commitment period may be extended should that be necessary in order to achieve or maintain environmental benefits sought.[110] For soil carbon sequestration projects, it is clear that (very) long commitments are in order (see further section 5 below). Payment is not based on the amount of CO_2 sequestered, but a fixed amount per hectare per year for land brought under this measure.[111] A review of the first year of the reformed CAP, shows that 46 percent of all expenditure was allocated for measures aimed at restoring ecosystems (priority 4) and 8 per cent at climate change (priority 5).[112] However, of the 46 percent for priority 4, only 14.3 per cent was allocated for soil management improvement, and for priority 5 just 7.6 per cent was allocated for greenhouse gas emissions reduction measures on agricultural land.[113] The reviewers, more generally, conclude that the rural development policy area is characterized by high path-dependency and inertia.[114]

5. Towards a new regulatory framework for soil carbon sequestration and adaptation

5.1 Assessment of current and proposed instruments

Only as of 2021, EU climate law will start to focus on soil carbon sequestration and associated adaptation, provided that the proposals for the LULUCF Regulation and the ESD Regulation will be adopted. Emissions and removals in the wider land use sector have to be balanced, and such a balance can be achieved by enhancing soil carbon sequestration in agricultural cropland and grassland. Member States that achieve a surplus through soil carbon sequestration can use these emission reductions to cover the target set by the Effort Sharing Regulation to a limited extent (less than 10 per cent of all of the emissions by the sectors covered by the ESD). Although this is an important first step, it leaves much room for Member States that for instance can opt to achieve the balance through a strong focus on forestry rather than on agriculture. The adaptation needs associated with the necessary increase in food

[108] Art. 8(1) Regulation (EU) No 1305/2013. This is in line with a similar general requirement laid won in Art. 96(7)(a) Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006, OJ L 347/320.
[109] Art. 28 Regulation (EU) No 1305/2013.
[110] Art. 28(5) Regulation (EU) No 1305/2013.
[111] Art. 28(8) and Annex II Regulation (EU) No 1305/2013.
[112] Matthews, above note 90 at 257.
[113] Ibid. at 300.
[114] Ibid. at 228.

production require the European farming sector to drastically convert to climate smart practices. It is not likely that this proposal will set such a transition in motion.

The CAP, despite its stronger focus on climate change since the 2013 reform in 2013, is not expected to stimulate a transition to climate smart agriculture either.[115] Soil carbon projects can receive funding both under the green direct payments, and under the rural development policy. Whether such projects are actually carried out with CAP funding depends entirely on initiatives by farmers (for green direct payments), or by Member States (for the rural development policy). Unfortunately, there are not many indications that Member States radically focus their RDPs on climate change, perhaps with the exception of Ireland.[116] In the review of the first year of the reformed CAP, stakeholders hardly climate change.[117] It seems, therefore, that a more powerful steering of policies and of farmers is needed.

The CAP also has several inherent constraints as far as soil carbon sequestration and associated adaptation are concerned. I discuss five constraints, most of which are caused by the fact that the CAP is not linked to the EU climate mitigation policy but serves as a separate instrument with a much wider policy goal than combatting climate change:

- Data. The accounting rules do not require farm level quantification of the amount of carbon sequestered linked to the payment, so it cannot be assessed whether and in how far an increase in soil carbon levels is real, additional and verifiable. Integrating the CAP more into the EU's climate policy requires rules to be set in place to assure a reliable measuring of the carbon sequestered, as is illustrated by the Australian example discussed above.
- Payments. Related to the previous issue, payments are based on the amount of hectares per year of measures under the RDP, not on the amount of CO_2 sequestered. This is a consequence of the provision that payments can only cover additional costs and income forgone resulting from the commitments made.[118] Such indirect payments, therefore, do not stimulate farmers to sequester as much carbon as possible.[119]
- Commitment period. Projects financed under the CAP are characterized by a relatively short lifespan, 1-5 years for green direct payments, and 5-7 years for projects under a RDP. Under a climate policy, such a lifespan is almost futile, as combatting climate change requires measures that cover decades, if not the entire 21st century. That is why in Australia, carbon sequestration projects are required to run for twenty five 25 or even a hundred years.
- Available funds. The EU has a relatively low amount of money available for climate measures under the CAP (25 billion in 7 years for 28 countries), and what is worse is that the funds that are actually handed out for climate friendly projects such as soil carbon enhancement, are much lower than what has been earmarked due to inertia in the sector. A factor that further

[115] Grosjean et al., above note 6 at 4.
[116] Ireland's Green Low-Carbon Agri-Environment Scheme (GLAS), see Joseph Curtin, Tom Arnold, A Climate-Smart Pathway for Irish Agricultural Development. Exploring the Leadership Opportunity (Dublin: IIEA 2016).
[117] European Commission, Commission Staff Working Document, Review of greening after one year, Annex 5: Synopsis report on stakeholder consultation, SWD (2016) 218 final, part 6/6.
[118] Art. 28(6) Regulation (EU) No 1305/2013.
[119] Matthews, above note 67 at 5.

complicates assessing the impact of CAP funding on climate change mitigation and adaptation in the agricultural sector is the fact that climate measures are hard to single out, as already indicated also in the first two issues raised here.

- Generic character. The CAP relies heavily on command-and-control style provisions and does not displays flexibility for farmers how to achieve the policy targets. [120] This character does not match soil carbon projects as these need to be tailored at farm level, taking into account local environmental factors as well as the characteristics of the individual farm.

The conclusion that both current and proposed policies and instruments are completely inadequate to stimulate large scale soil carbon sequestration on agricultural land, or more general, the conversion to climate smart agricultural practices, is inevitable. That is why an alternative approach needs to be developed.

5.2 Alternative approach

A further stimulus to the adoption of soil carbon projects that currently is not being discussed but that needs to be investigated at European level soon is the inclusion of agriculture in the EU ETS through allowing regulated industries to buy offsets from the agricultural sector, following the examples set by California, Alberta, and, to a certain extent, Australia.[121] These countries show that it is possible to stimulate soil carbon sequestration (and other climate smart agriculture practices and technologies) through the ETS, provided an elaborate regulatory regime has been put in place to ensure integrity.[122] When in place, sectors covered by the ETS will be allowed to finance sequestration projects on farm land, thus paying farmers for their efforts. The recent report of the Agricultural Markets Task Force, a European Commission expert group, also proposes to incentivise to farm carbon in addition to crops.[123]

The Task force, however, proposes to do this through redirecting funds under the CAP after 2020. It is debatable, though, whether this will be a successful strategy given the inherent shortcomings mentioned above (section 5.1). Some of the current constraints can perhaps be repaired, such as the short commitment period, or the provision that payments can only cover additional costs and income forgone. It is highly unlikely, though, that the CAP budget will be big enough to cover an EU wide adoption of carbon farming practices. An evaluation of the Australian carbon farming legislation indicated that government funds will never suffice to roll out an incentive mechanism across all farms in the country and that private funds need to come in, either through a carbon tax or an ETS.[124] The latter seems very suitable for the EU with its well-developed ETS that, hopefully, will pick up speed again after

[120] Katharina Rietig, Sustainable Climate Policy Integration in the European Union, (2013) Environmental Policy and Governance 23, 197, at 307.
[121] Verschuuren above note 3 at 9. Agricultural offsets are also allowed under the newly established Chinese ETS, see Dong Sun, Jingqi Sun, Xingping Zhang, Qingyou Yan, Qianru Wei, Yun Zhou, Carbon Markets in China: Development and Challenges, (2016) 52:6 Emerging Markets Finance and Trade 1361.
[122] Verschuuren, above note 3 at 50.
[123] Agricultural Markets Task Force, Improving Market Outcomes. Enhancing the Position of Farmers in the Supply Chain (Brussels, 2016) 49.
[124] Verschuuren, above note 3 at 44.

the structural reform takes effect in the fourth trading phase, which runs from 2021 until 2030.[125] Regulation aimed at establishing a finance flow from large industrial emitters to the farming sector, with its capacity to sequester large quantities of carbon on farm land, is also more in line with the polluter pays principle.[126]

Introducing the possibility to use offsets from agricultural projects in the EU ETS is not an easy task. It requires the drafting of a lot of detailed rules and regulations, such as rules that require farmers to establish a baseline level of soil carbon, and to monitor, report and verify the amount of CO_2 sequestered in the projects allowed under the ETS offsets regime. Commitment periods have to be set, and these have to be decades instead of years, and have to be legally registered on the land, so that future buyers have to take over the commitment for the remainder of the period. Methodologies have to be developed that determine the scope and type of projects that are allowed. Fortunately, the EU can fall back on experiences in Australia, where extensive methodologies on a range of carbon farming methods, such as soil carbon sequestration, already exist for a number of years now and have been positively evaluated.[127]

Integrating agricultural offsets in the EU ETS is not the silver bullet that will push the entire sector towards climate smart agriculture. The barriers to market-based instruments in agriculture as discussed by Grosjean and others and as evident also in Australia (high transaction costs to monitoring, reporting and verification, leakage, and distributional impacts on farmers) will limit the effectiveness of the instrument.[128] Additional instruments, therefore, will remain important, first and foremost the CAP. Climate smart practices that are not (fully) covered by the ETS should remain or be brought under the CAP. The CAP, generally, needs to be much more focused on climate change mitigation and adaptation, by removing the current constraints. Additional instruments should also be targeted at consumers, especially instrument aimed at steering consumers' dietary choices away from meat, for instance by a meat tax.[129]

As a final remark, it should be noted that alternative approach is potentially contrary to current WTO law, especially in case benefits from soil carbon sequestration projects, either from improved productivity or the sale of carbon credits under the EU ETS, greatly surpass the costs associated to the introduction of soil carbon sequestration measures.[130]

6. Conclusion

[125] Torbjørg Jevnaker, Jørgen Wettestad, Ratcheting Up Carbon Trade: The Politics of Reforming EU Emissions Trading, (2017) 17:2 Global Environmental Politics 105.
[126] Art. 191(2) TFEU.
[127] Verschuuren, above note 3 at 48.
[128] Grosjean et al., above note 6 at 9-14; Verschuuren, above note 3 at 40.
[129] Cordelia Christiane Bähr, Greenhouse Gas Taxes on Meat Products: A Legal Perspective, (2015) 4:1 Transnational Environmental Law 153. Similarly, Grosjean et al., above note 6 at 25, and Verschuuren, above note 3 at 49.
[130] Verschuuren, above note 5 at 185.

This paper assessed current and proposed EU climate law and the legal instruments associated to the common agricultural policy to see whether and in how far soil carbon sequestration and associated adaptation is or can be promoted through the use of these current or proposed instruments. The assessment shows that current and proposed policies and instruments are completely inadequate to stimulate large scale adoption of soil carbon projects across Europe. Given the structural flaws that were found, it is highly likely that this is true for all climate smart agricultural practices. That is why an alternative approach needs to be developed. The first element of this new approach is focused on EU climate policy: the inclusion of agriculture in the EU ETS through allowing regulated industries to buy offsets from the agricultural sector, following the examples set by California, Alberta, and -to a certain extent- Australia. Lessons learned from these experiences will be helpful when drafting new EU rules and regulations aimed at setting up a reliable and robust regulatory offsets system under the EU ETS. Such rules include, for example, the establishment of baseline levels of soil carbon, monitoring, reporting and verification of the amount of CO_2 sequestered in the projects allowed under the ETS offsets regime. The second element is aimed at the CAP. The CAP, generally, needs to be much more focused on climate change mitigation and adaptation. Shortcomings that need to be addressed are the short commitment period (needs to be extended up to a hundred years), the fact that accounting is not based on quantification of carbon sequestration/emission reduction and that payments are based on amounts of hectare under a certain management scheme instead of on amount of carbon sequestered or avoided emissions, and the generic character of many of the rules which precludes that rules are sufficiently tailored to individual farms. In addition, member states should have less room to pay compensation for insufficiently climate smart projects. Such improvements do not take away the need to open up a new income stream for farmers from offsets under the ETS, as the CAP will never have sufficient funds for the deep and full transition of Europe's agriculture sector that is needed.