

## ARTICLE

# *Towards an EU Regulatory Framework for Climate-Smart Agriculture: The Example of Soil Carbon Sequestration*

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### Abstract

This article assesses current and proposed European Union (EU) climate and environmental law, and the legal instruments associated with the Common Agricultural Policy (CAP), to see whether soil carbon sequestration is sufficiently promoted as a promising example of ‘climate-smart agriculture’. The assessment shows that current and proposed policies and instruments are inadequate to stimulate large-scale adoption of soil carbon projects across Europe. Given the identified structural flaws, it is likely that this is true for all climate-smart agricultural practices. An alternative approach needs to be developed. Under EU climate policy, agriculture should be included in the EU Emissions Trading System (ETS) by allowing regulated industries to buy offsets from the agricultural sector, following the examples set by Australia and others. The second element of a new approach is aimed at the CAP, which needs to be far more focused on the specific requirements of climate change mitigation and adaptation. Yet, such stronger focus does not take away the need to explore new income streams 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.

**Keywords:** Climate change mitigation, Climate change adaptation, Food security, Common Agricultural Policy, Emissions trading, European Union

## 1. INTRODUCTION

The agricultural sector faces three tremendous, interrelated challenges: reducing greenhouse gas (GHG) emissions, adapting to the changing climate, and producing

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more food for a growing and wealthier world population. It is obvious that these three challenges are linked: producing more food will lead to more GHG emissions, which will increase negative impacts on productivity through climate change, which necessitates more adaptation. Climate-smart agriculture is an approach to developing the technical, policy, and investment conditions to achieve sustainable agricultural development for food security under climate change.<sup>1</sup> It comprises three pillars: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing or removing GHG emissions. So far, only a few countries in the world have regulatory instruments in place aimed at encouraging farmers to convert to climate-smart practices, although these schemes all have a primary focus on mitigation.<sup>2</sup> Experiences in these countries, such as Australia, show that in practice, increased resilience is a frequent side-effect of carbon-offset projects, particularly those projects aimed at increased carbon sequestration in agricultural soils. Soil carbon plays an important role in maintaining soil structure, improving soil-water retention, fostering healthy soil microbial communities, and providing fertility for crops.<sup>3</sup>

A comprehensive regulatory framework to incentivize the agricultural sector to eschew conventional practices and become climate smart is still lacking, not just in the European Union (EU), but worldwide.<sup>4</sup> The current EU Common Agricultural Policy (CAP) does include climate change related measures, but seems largely inadequate as a catalyst for the widespread adoption of climate-smart agriculture.<sup>5</sup> This article assesses current and proposed EU climate and environmental law and the legal instruments associated with the CAP to determine whether and to what extent climate-smart agricultural practices and technologies can be promoted through the use of these current or proposed instruments, with a focus on soil carbon sequestration and associated adaptation. In doing so, it draws upon experiences in Australia.

The article consists of three parts. Firstly, a broad literature review examines the current knowledge on the benefits of increased soil carbon sequestration for adaptation (Section 2). Secondly, using the desk study method, current EU climate, environmental and agricultural policies are reviewed with the aim of finding anchor points for a policy that encourages farmers to increase soil carbon sequestration (Section 3). The focus is on both the CAP and EU climate policy, in particular the EU

<sup>1</sup> Food and Agriculture Organization of the United Nations (FAO), *Climate-Smart Agriculture Sourcebook* (FAO, 2013), p. ix.

<sup>2</sup> J. Verschuuren, 'Towards a Regulatory Design for Reducing Emissions from Agriculture: Lessons from Australia's Carbon Farming Initiative' (2017) 7(1) *Climate Law*, pp. 1–51, at 6.

<sup>3</sup> D. Kane, *Carbon Sequestration Potential on Agricultural Lands: A Review of Current Science and Available Practices* (Breakthrough Strategies & Solutions, 2015); R. Lal, 'Soil Carbon Sequestration to Mitigate Climate Change' (2004) 123(1–2) *Geoderma*, pp. 1–22; F. Alliaume et al., 'Changes in Soil Quality and Plant Available Water Capacity Following Systems Re-design on Commercial Vegetable Farms' (2013) 46 *European Journal of Agronomy*, pp. 10–19.

<sup>4</sup> J. Verschuuren, 'Stimulating Climate Smart Agriculture within the Boundaries of International Trade Law' (2016) 10(4) *Carbon and Climate Law Review*, pp. 177–86, at 177.

<sup>5</sup> D. Blandford & K. Hassapoyannes, 'The Common Agricultural Policy in 2020: Responding to Climate Change', in J.A. McMahon & M.N. Cardwell (eds), *Research Handbook on EU Agriculture Law* (Edward Elgar, 2015), pp. 170–202; G. Grosjean et al., 'Options to Overcome the Barriers to Pricing European Agricultural Emissions', Working Paper, Nov. 2016, available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2734677](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2734677).

Emissions Trading Scheme (ETS) and the Effort Sharing Decision, as well as proposed regulations and directives under the EU climate and environmental policies. Thirdly, an empirical study into the experiences with soil carbon projects under Australia's carbon farming legislation considers the regulatory approach that was chosen in that country and stakeholder experiences with the Australian legislation (Section 4). Australia was selected for this empirical research because it is one of only a handful of countries in the world with a regulatory framework in place that allows farmers to generate carbon credits through increased soil carbon sequestration. Finally, Section 5 proposes a new regulatory approach, based on the Australian experiences and the assessment of the current EU climate and agriculture policies.

## 2. BENEFITS OF SOIL CARBON SEQUESTRATION FOR CLIMATE CHANGE MITIGATION AND ADAPTATION, AND FOOD SECURITY

Soils contain large quantities of carbon, mainly made up of decomposing plant materials and microbes. The Earth's soils contain around 2,500 gigatonnes (Gt) of carbon, four times more than vegetation.<sup>6</sup> Through soil degradation, much of the natural soil carbon stocks have been lost. It has been estimated that the carbon 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.<sup>7</sup> 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.<sup>8</sup> The carbon sequestration potential through restoration of organic agricultural soils can be as high as 663 megatonnes (Mt) CO<sub>2</sub> equivalent per year in 2035,<sup>9</sup> or even 1.2 Gt.<sup>10</sup> Soil erosion control and soil restoration have an estimated carbon sequestration capacity of between 5 and 15% of global emissions.<sup>11</sup> 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.<sup>12</sup>

Increasing soil carbon sequestration has a very interesting positive impact on climate change adaptation. Measures aimed at soil carbon sequestration increase the ability of soils to hold moisture and to better withstand wind and water erosion,

<sup>6</sup> Kane, n. 3 above, p. 3.

<sup>7</sup> E. Lugato et al., 'Potential Carbon Sequestration of European Arable Soils Estimated by Modelling a Comprehensive Set of Management Practices' (2015) 20(11) *Global Change Biology*, pp. 3557–67, at 3557.

<sup>8</sup> P. Smith, 'Agricultural GHG Mitigation Potential Globally, in Europe and in the UK: What Have We Learnt in the Last 20 Years?' (2012) 18(1) *Global Change Biology*, pp. 35–43. One gigatonne (Gt) is 1,000 megatonnes (Mt). One megatonne is 1,000 million kilogrammes.

<sup>9</sup> R. Sommer & D. Bossio, 'Dynamics and Climate Change Mitigation Potential of Soil Organic Carbon Sequestration' (2014) 144(1) *Journal of Environmental Management*, pp. 83–7, at 85. Note that this publication was criticized for being too negative on this potential: see L. Lassaletta & E. Aguilera, 'Soil Carbon Sequestration is a Climate Stabilization Wedge: Comments on Sommer and Bossio (2014)' (2015) 153(1) *Journal of Environmental Management*, pp. 48–9.

<sup>10</sup> E. Wollenberg et al., 'Reducing Emissions from Agriculture to Meet the 2°C Target' (2016) 22(12) *Global Change Biology*, pp. 3859–64, at 3863.

<sup>11</sup> M.G. Rivera-Ferre et al., 'Re-framing the Climate Change Debate in the Livestock Sector: Mitigation and Adaptation Options' (2016) 7(6) *WIREs Climate Change*, pp. 869–92, at 874.

<sup>12</sup> *Ibid.*

enrich ecosystem biodiversity, help cropping systems to better withstand droughts and floods, increase fertility for crops through restoring healthy soil microbial communities, and increase livestock efficiency (sustainable intensification).<sup>13</sup> Other potential positive side effects of practices aimed at soil carbon sequestration include various environmental benefits, such as avoided use of chemical fertilizers and pesticides, and improved biodiversity and wildlife.<sup>14</sup>

Examples of soil carbon sequestration practices relevant for Europe include the use 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, reduced grassland management intensity, perennial cropping, nutrient management consisting of compost (crop residue addition) and organic manure, and judicious use of irrigation water.<sup>15</sup>

Given the potentially beneficial impacts of soil carbon sequestration projects on farmland, such projects are considered an important element of policies aimed at encouraging farmers to adopt climate-smart practices.<sup>16</sup> Climate-smart agricultural practices and technologies not only reduce emissions from agriculture, but also increase the resilience of agro businesses against the impacts of climate change while also allowing for an increase in production.<sup>17</sup> A global increase in production is necessary based on an expected increase in global food demand by at least 40%, and perhaps as much as 70%, by 2050, caused by the growing world population (from seven billion today to nine billion in 2050) and by the dietary changes of a wealthier middle class in countries such as China and India.<sup>18</sup> Such increase in food production will have to be achieved under decreasing opportunities as a result of climate change. In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) finds that for the major crops in tropical and temperate regions (wheat, rice and maize), climate change without adaptation will negatively affect production with local temperature increases of 2°C or more.<sup>19</sup> In fact, the IPCC finds that climate

<sup>13</sup> 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), pp. 811–922, at 846–7; 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), pp. 485–534, at 515 and 518; Kane, n. 3 above, p. 18; Rivera-Ferre et al., n. 11 above, p. 884.

<sup>14</sup> A. Freibauer et al., 'Carbon Sequestration in the Agricultural Soils of Europe' (2004) 122(1) *Geoderma*, pp. 1–23, at 14–5.

<sup>15</sup> Kane, n. 3 above, p. 11–7; Lal, n. 3 above, pp. 11–3; J. Chang et al., 'Effect of Climate Change, CO<sub>2</sub> Trends, Nitrogen Addition, and Land-Cover and Management Intensity Changes on the Carbon Balance of European Grasslands' (2016) 22(1) *Global Change Biology*, pp. 338–50.

<sup>16</sup> FAO, n. 1 above, pp. 8, 22.

<sup>17</sup> *Ibid.*, p. ix.

<sup>18</sup> B. Campbell et al., *Agriculture and Climate Change: A Scoping Report* (Meridian Institute, 2011), p. 3; D.A.N. Ussiri & R. Lal, *Carbon Sequestration for Climate Change Mitigation and Adaptation* (Springer, 2017), p. 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* (World Resources Institute, 2013).

<sup>19</sup> Porter et al., n. 13 above, p. 488.

trends have already negatively affected wheat and maize production in many regions,<sup>20</sup> which has led some to comment that even the Paris Agreement goal of 1.5°C will be insufficient to prevent productivity loss in agriculture.<sup>21</sup> In the absence of mitigation, there is likely to be negative yield impacts for *all* crops where local warming exceeds 3°C, even with the benefits of higher CO<sub>2</sub> and rainfall (both of which positively affect plant growth).<sup>22</sup> There is high confidence that irrigation demand will increase significantly in many areas (by more than 40% across Europe, the United States (US), and parts of Asia).<sup>23</sup> For Europe, the impacts are not entirely negative for food security. For example, the IPCC has reported that declines in frost occurrence will lead to longer growing seasons, although temperature and moisture stress often leads to greater inter-annual variability in crop suitability.<sup>24</sup> A wide range of adaptation measures is considered necessary. According to the IPCC, effective adaptation of cropping could be critical in enhancing food security and sustainable livelihoods, especially in developing countries.<sup>25</sup> It is, therefore, not only clear that the adaptation goal, enshrined in Article 2(1)(b) of the Paris Agreement, is especially relevant for farmers,<sup>26</sup> but also that a deep transformation of agriculture is needed to achieve not only adaptation, but mitigation<sup>27</sup> and food security needs as well.<sup>28</sup>

### 3. SOIL CARBON PROJECTS UNDER EU CLIMATE AND AGRICULTURAL POLICIES

#### 3.1. *Introduction*

Although there are many uncertainties regarding the vulnerability of the EU's agricultural sector to climate change, and its adaptation potential,<sup>29</sup> it is clear that from 2050 onwards, substantive yield losses are expected, especially in

<sup>20</sup> *Ibid.*, p. 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 will benefit from climate change. Overall, there will be a steady decline in the world's food production because of climate change: *ibid.*, p. 505. It should be noted, however, that there is 'massive uncertainty about the ultimate impacts of climate change on global agriculture, food prices and land use': T.W. Hertel, 'The Challenges of Sustainably Feeding a Growing Planet' (2015) 7 *Food Security*, pp. 185–98, at 192.

<sup>21</sup> Paris (France), 12 Dec. 2015, in force 4 Nov. 2016, available at: [http://unfccc.int/paris\\_agreement/items/9485.php](http://unfccc.int/paris_agreement/items/9485.php). See, e.g., the blogpost by B. Campbell (Director of the CGIAR Research Program on Climate Change, Agriculture and Food Security, coordinated by the University of Copenhagen (Denmark)), 'Climate Change: Half a Degree Will Make a World of Difference for the Food We Eat', *Huffpost*, 12 Sept. 2015, available at: [http://www.huffingtonpost.com/bruce-campbell-phd/climate-change-half-a-deg\\_b\\_8756428.html](http://www.huffingtonpost.com/bruce-campbell-phd/climate-change-half-a-deg_b_8756428.html).

<sup>22</sup> Porter et al., n. 13 above, p. 505.

<sup>23</sup> J. Cisneros et al., 'Freshwater Resources', in Field et al. (eds), n. 13 above, pp. 229–69, at 251.

<sup>24</sup> Porter et al., n. 13 above, p. 504.

<sup>25</sup> *Ibid.*, p. 514.

<sup>26</sup> N. 21 above.

<sup>27</sup> S. Oberthür, 'Perspectives on EU Implementation of the Paris Agreement' (2016) 10(1) *Carbon and Climate Law Review*, pp. 34–57, at 44.

<sup>28</sup> J. Verschuuren, 'The Paris Agreement on Climate Change: Agriculture and Food Security' (2016) 7(1) *European Journal of Risk Regulation*, pp. 54–7, at 56.

<sup>29</sup> M. Donatelli et al., *Assessing Agriculture Vulnerabilities for the Design of Effective Measures for Adaptation to Climate Change* (European Union JRC Report, 2012).

southern Europe.<sup>30</sup> Considerable yield losses are also expected for central, western and northern Europe.<sup>31</sup> 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% by 2030, and by 42–49% by 2050.<sup>32</sup> To meet adaptation and mitigation requirements, strong, long-term policies are needed.<sup>33</sup> As far as *adaptation* is concerned, research shows that strong top-down policies, which are linked to and fed by bottom-up initiatives, are needed to achieve the required level of adaptation in the agricultural sector.<sup>34</sup> Holistic strategies have to be adopted that go beyond technical approaches aimed at stimulating individual farm-level risk reduction.<sup>35</sup> For *mitigation* in agriculture, a similar conclusion was reached: high-impact technical and policy interventions will be needed to achieve the 2°C climate goal.<sup>36</sup> Without further policy action, EU agricultural emissions, mostly through methane from cattle and nitrous oxide from fertilizers and tillage, are projected to decrease by only 2.3% in 2030,<sup>37</sup> falling far short of the 36% target. In this section, current and future EU climate and agriculture policies will be reviewed with a view to determining their potential to foster soil carbon sequestration projects across Europe. The focus will be on the EU's climate change and environmental policies (mitigation and adaptation, Section 3.2), and the CAP (Section 3.3). 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.<sup>38</sup> It cannot serve as an instrument to stimulate the large-scale adoption of soil sequestration projects across European farms.

### 3.2. Soil Carbon under the EU Climate and Environmental Policies

So far, the EU has not focused much attention on agriculture in its climate, adaptation or mitigation policies. The EU's Adaptation Strategy refers to the CAP because adaptation measures have already been integrated into the CAP to a limited extent.<sup>39</sup>

<sup>30</sup> 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), pp. 1267–326, at 1284.

<sup>31</sup> *Ibid.*

<sup>32</sup> Grosjean et al., n. 5 above, p. 4.

<sup>33</sup> K. Hart et al., *Research for Agri Committee: The Consequences of Climate Change for EU Agriculture. Follow-up to the COP21-UN Paris Climate Change Conference* (European Parliament, 2017), p. 14.

<sup>34</sup> L. Bizikova et al., 'Climate Change Adaptation Planning in Agriculture: Processes, Experiences and Lessons Learned from Early Adopters' (2014) 19(4) *Mitigation and Adaptation Strategies for Global Change*, pp. 411–30, at 425.

<sup>35</sup> *Ibid.*, p. 426.

<sup>36</sup> Wollenberg et al., n. 10 above, p. 3863. See also A. Leip et al., 'Impacts of European Livestock Production: Nitrogen, Sulphur, Phosphorus and GHG Emissions, Land-Use, Water Eutrophication and Biodiversity' (2015) 10(11) *Environmental Research Letters*, pp. 115004/1–13.

<sup>37</sup> I. Pérez Domínguez et al., *An Economic Assessment of GHG Mitigation Policy Options for EU Agriculture*, JRC Science for Policy Report (European Union, 2016), p. 4.

<sup>38</sup> Regulation (EU) No. 1293/2013 on the Establishment of a Programme for the Environment and Climate Action (LIFE) and Repealing Regulation (EC) No. 614/2007 [2013] OJ L 347/185 (LIFE+ Regulation 2014–20).

<sup>39</sup> European Commission Communication, 'An EU Strategy on Adaptation to Climate Change', COM(2013) 0216 final, p. 8.

These adaptation measures will be discussed when reviewing the CAP in Section 3.3 below. As far as mitigation is concerned, incentives to reduce emissions from agriculture are barely addressed in EU climate policy.<sup>40</sup> Agriculture is a non-ETS sector, which means that emissions from agriculture are covered by the Effort Sharing Decision,<sup>41</sup> 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.<sup>42</sup> 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. At best, some states invite farmers to introduce climate-smart farming methods through the use of soft law instruments aimed at providing information to those interested.<sup>43</sup> Member States are required only to report their current and future actions with regard to LULUCF emissions and removals to the European Commission as of 2014,<sup>44</sup> and do not have to keep track of emissions and removals from cropland and grassland until 2021.<sup>45</sup>

The unambitious nature of the current agricultural climate policy will have to be revisited in light of current developments in climate law. For example, an EU Regulation has been proposed to incorporate GHG emissions and removals from land use and forestry into the EU's 2030 climate framework (LULUCF Regulation).<sup>46</sup> According to this proposal, from 2021 emissions and removals must be balanced in land-use and forestry sectors, including agricultural land use for arable crops and grassland.<sup>47</sup> This Regulation, therefore, could be an important first step towards regulating agricultural emissions and will probably act as a stimulus for the adoption of soil carbon projects across Europe.

In addition, the proposal for a new Effort Sharing Regulation, which sets out the rules for the non-ETS sectors for the 2021–30 period,<sup>48</sup> intends to reward Member

<sup>40</sup> A. Matthews, 'Incentivising Soil Carbon Sequestration', *Blogpost*, 4 Apr. 2014, available at: <http://capreform.eu/incentivising-soil-carbon-sequestration>.

<sup>41</sup> Decision 406/2009/EC on the Effort of Member States to Reduce Their GHG Emissions to Meet the Community's GHG Emission Reduction Commitments up to 2020 [2009] OJ L 140/136 (Effort Sharing Decision).

<sup>42</sup> *Ibid.*, Art. 9

<sup>43</sup> In 2008, e.g., the Dutch government concluded a non-legally binding 'Covenant Clean and Economical Agro Business' with agribusiness organizations: see Ministry of Agriculture, Covenant Schone en Zuinige agrosectoren, available at: <https://www.rvo.nl/onderwerpen/duurzaam-ondernemen/groene-economie/agrosectoren>.

<sup>44</sup> Decision No. 529/2013/EU on Accounting Rules on GHG 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, Art. 10.

<sup>45</sup> *Ibid.*, Art. 3(2).

<sup>46</sup> Proposal for a Regulation on the Inclusion of GHG Emissions and Removals from Land Use, Land Use Change and Forestry into the 2030 Climate and Energy Framework and Amending Regulation (EU) No. 525/2013 on a Mechanism for Monitoring and Reporting GHG Emissions and Other Information Relevant to Climate Change, 20 July 2016, COM(2016) 479 def (LULUCF Regulation).

<sup>47</sup> *Ibid.*, Art. 4.

<sup>48</sup> Proposal for a Regulation on Binding Annual GHG 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 (EU) No. 525/2013 on a Mechanism for Monitoring and Reporting GHG Emissions and Other Information Relevant to Climate Change, COM(2016) 0482 final.

States that manage to increase carbon sequestration in soils or through vegetation in the land sector (including agriculture) by permitting them to exceed emissions in this sector.<sup>49</sup> The proposal for a LULUCF Regulation requires Member States only to achieve a balance. Member States that achieve a surplus may, within limits, use these emissions reductions to cover the target set by the Effort Sharing Regulation.<sup>50</sup> If and when these proposals are adopted, soil carbon sequestration will finally be considered as a policy option by Member States – at least to some extent: 280 million tonnes of CO<sub>2</sub> equivalent can be accredited to land-use measures out of a total of 2,500 million tonnes emitted by the Effort Sharing Decision sectors.<sup>51</sup>

From 2013 until 2016, the European Commission also attempted to regulate certain GHG emissions from agriculture when revising the National Emissions Ceiling Directive (NEC Directive), which focuses primarily on emissions reductions rather than carbon sequestration. The proposal for the new Directive on the reduction of national emissions of certain atmospheric pollutants included a methane reduction target of –33% in 2030 for the EU as whole.<sup>52</sup> The Member States did not accept this,<sup>53</sup> which led to the rare inclusion of a ‘declaration’ at the end of the Directive in which the Commission states that it still considers that there is a strong air quality case for keeping the development of methane emissions in the Member States under review and that it intends to further assess the impact of such emissions and, where appropriate, submit a legislative proposal with the aim of limiting methane emissions.<sup>54</sup>

Another failed attempt that could have encouraged soil carbon sequestration was the proposal for a Soil Framework Directive.<sup>55</sup> The proposal, among other things, required Member States to stop soil degradation, including the decline of organic matter in soils.<sup>56</sup> Unfortunately, the proposal never received sufficient support in the Council of the EU and was subsequently withdrawn.<sup>57</sup>

<sup>49</sup> *Ibid.*, Art. 7(1)(b).

<sup>50</sup> *Ibid.*, Annex 3 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 2021–30.

<sup>51</sup> *Ibid.* For individual Member States, the totals are between 0.02 million tonnes CO<sub>2</sub> equivalent for Malta and 58.1 million tonnes for France. For the total of emissions under the Effort Sharing Decision, see Eurostat’s GHG emissions in those sectors, available at: [http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=t2020\\_35](http://ec.europa.eu/eurostat/tgm/table.do?tab=table&plugin=1&language=en&pcode=t2020_35).

<sup>52</sup> Proposal for a Directive on the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC, COM(2013) 0920.

<sup>53</sup> J. Crisp, ‘Governments Ditch EU Methane Limits’, *EURACTIV Network*, 12 June 2015, available at: <http://www.euractiv.com/section/agriculture-food/news/governments-ditch-eu-methane-limits>.

<sup>54</sup> Directive (EU) 2016/2284 on the Reduction of National Emissions of Certain Atmospheric Pollutants, Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC [2016] OJ L 344/1 (NEC Directive).

<sup>55</sup> Proposal for a Directive Establishing a Framework for the Protection of Soil and Amending Directive 2004/35/EC, COM(2006) 0232 final.

<sup>56</sup> E.g., *ibid.*, Art. 6.

<sup>57</sup> Withdrawal of Obsolete Commission Proposals [2014] OJ C 153/3.



### 3.3. 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% of European agricultural subsidies for the period 2014–20 are earmarked for climate measures in agriculture. About a quarter of this focuses specifically on the development of climate-friendly agricultural practices and techniques.<sup>58</sup> When fully utilized, this amounts to roughly €25 billion for the seven-year period.<sup>59</sup>

#### *Cross compliance*

Farmers who benefit from the CAP are required to comply with rules aimed at keeping land in good agricultural and environmental condition (GAEC).<sup>60</sup> These rules focus in part on climate change.<sup>61</sup> Three measures that may be beneficial to soil carbon sequestration are covered: (i) minimum soil cover; (ii) minimum land management reflecting site-specific conditions to limit erosion; and (iii) maintenance of soil organic matter levels through appropriate practices, including a ban on burning arable stubble.<sup>62</sup> While these rules require Member States to set a basic level of protection of carbon levels in agricultural soils, they are generally considered to be largely ineffective because Member States are afforded considerable leeway in interpreting and implementing the standards,<sup>63</sup> which have been implemented in a lax way or have not been enforced.<sup>64</sup> Despite being operational since 2005, the GAEC requirements have not prevented the loss of soil carbon.<sup>65</sup>

<sup>58</sup> European Commission, 'Agricultural Policy. COP 21: United for Climate', 2015, available at: [https://ec.europa.eu/agriculture/sites/agriculture/files/climate-change/pdf/cop21-what-eu-agricultural-policy-does-for-climate\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/climate-change/pdf/cop21-what-eu-agricultural-policy-does-for-climate_en.pdf).

<sup>59</sup> A total of €408.32 billion (38% of the entire EU budget) is to be spent through the CAP 2014–20: €308.72 billion under the direct payments, and €99.6 billion under the rural development policy: G. Sgueo, F. Tropea & M.L. Augere-Granier, 'How the EU Budget is Spent: Common Agricultural Policy', *European Parliamentary Research Service Blog*, 20 July 2016, available at: <https://epthinktank.eu/2016/07/20/how-the-eu-budget-is-spent-common-agricultural-policy>.

<sup>60</sup> Regulation (EU) No. 1306/2013 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 [2013] OJ L 347/549, Art. 91.

<sup>61</sup> *Ibid.*, Art. 93(1)(a).

<sup>62</sup> *Ibid.*, Annex 2.

<sup>63</sup> K. Hart, 'Green Direct Payments: Implementation Choices of Nine Member States and Their Environmental Implications', Institute for European Environmental Policy, Sept. 2015, available at: [http://www.birdlife.org/sites/default/files/attachments/greening\\_implementation\\_report\\_ieep.pdf](http://www.birdlife.org/sites/default/files/attachments/greening_implementation_report_ieep.pdf). See also the critical report by the European Court of Auditors, *Making Cross-Compliance More Effective and Achieving Simplification Remains Challenging* (2016).

<sup>64</sup> Art. 64(2) Regulation (EU) 1306/2013 (n. 60 above) lists a range of situations in which no sanctions may be imposed.

<sup>65</sup> Matthews, n. 40 above, pp. 3–4.

### *Green direct payments*

The green direct payments, introduced in the 2013 CAP reform, are all potentially beneficial for soil carbon sequestration and adaptation. They cover crop diversification, the maintenance of permanent pastures, and the establishment of ecological focus areas.<sup>66</sup>

In order to receive crop diversification funds, farmers must grow at least three different crops. This obligation, however, does not require crop rotation, and one single crop can still take up as much as 75% of the farm's arable land.<sup>67</sup> Therefore, although some 75% of arable land in the EU is subject to the crop diversification obligation,<sup>68</sup> this policy is not considered to be effective from a climate change perspective.<sup>69</sup>

Keeping permanent grassland is probably the most important measure for soil carbon sequestration, as it prevents farmers from ploughing or converting grassland. This prohibition applies only to areas designated as sensitive by the Member States pursuant to the EU Birds and Habitats Directives<sup>70</sup> or otherwise, for example, areas on carbon-rich soils.<sup>71</sup> Member States are not allowed to reduce the overall size of permanent grassland by more than 5% compared with levels in 2015.<sup>72</sup> This element of the policy has also been criticized, as it was included in the cross-compliance rules and was therefore obligatory for *all* farmers receiving direct payments before the 2013 reform. With the transfer to direct payments in the reform, the application of the policy now depends on the willingness of farmers to apply for payments for this type of activity, and on the way in which Member States apply the leeway granted to them by the Regulation. This has weakened the protection of carbon-rich soils.<sup>73</sup> Moreover, the 5% reduction threshold does not signal the intention to drastically increase the amount of carbon sequestered in grasslands. A review showed that, by 2016, around 16% of the EU permanent grasslands had been classified as environmentally sensitive.<sup>74</sup>

For larger farms (of more than 15 hectares), ecological focus areas must be designated which cover at least 5% of the arable land of the farm.<sup>75</sup> Ecological focus

<sup>66</sup> Regulation (EU) No. 1307/2013 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 [2013] OJ L 347/608, Art. 43.

<sup>67</sup> *Ibid.*, Art. 44(1).

<sup>68</sup> A. Matthews, *Research for Agri Committee – The Future of Direct Payments* (European Parliament, 2016), p. 41.

<sup>69</sup> Blandford & Hassapoyannes, n. 5 above, p. 189; Grosjean et al., n. 5 above, p. 4.

<sup>70</sup> Directive 2009/147/EC on the Conservation of Wild Birds [2010] OJ L 20/7; Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora [1992] OJ L 206/7.

<sup>71</sup> Regulation (EU) No. 1307/2013, n. 66 above, Art. 45(1).

<sup>72</sup> *Ibid.*, Art. 45(2).

<sup>73</sup> Matthews, n. 40 above, p. 3. Similarly, B. Allen & A. Maréchal, *Agriculture GHG Emissions: Determining the Potential Contribution to the Effort Sharing Regulation* (Institute for European Environmental Policy, 2017), pp. 26–7; Hart et al., n. 33 above, p. 92.

<sup>74</sup> Matthews, n. 68 above, p. 41.

<sup>75</sup> Regulation (EU) No. 1307/2013, n. 66 above, Art. 46(1).

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.<sup>76</sup> The 5% can also be applied ‘collectively’ (by adjacent farms) to a maximum of ten farms, as long as together they achieve the 5% threshold.<sup>77</sup> Around 68% of EU arable land is affected by ecological focus area obligations.<sup>78</sup>

A review requested by the European Parliament after one year of the revised CAP showed that the crop diversification and permanent grassland measures had not led to immediate changes at farm level.<sup>79</sup> Observed changes were attributed to farmers amending their practices as part of good farm husbandry.<sup>80</sup> The review also demonstrated that of the total area designated as ecological focus areas, only 26.9% was actually devoted to the most beneficial uses for the environment, and that the environmental benefits of this instrument therefore depend largely on the choices made by Member States and farmers because of the large margin of discretion provided by the Regulation.<sup>81</sup> Another review concluded that the greening opportunities in the reformed CAP have, in most cases, not been taken.<sup>82</sup> Reviews also find that it is very difficult, if not impossible, to quantify environmental performance because of the lack of robust baseline data and the relatively protracted timescales for monitoring change, while also disentangling the effects of greening from those attributable to other drivers and policy instruments.<sup>83</sup> The European Commission seems to encounter the same problem: in its 2017 review of the implementation of the ecological focus area obligation, it was unable to reach any conclusion on the impacts of this obligation on climate change mitigation and adaptation.<sup>84</sup>

### *Rural development policy*

Soil carbon sequestration projects could easily be 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);<sup>85</sup>

<sup>76</sup> *Ibid.*, Art. 46(2).

<sup>77</sup> *Ibid.*, Art. 46(6).

<sup>78</sup> Matthews, n. 68 above, p. 41.

<sup>79</sup> *Ibid.*

<sup>80</sup> *Ibid.*

<sup>81</sup> *Ibid.*, p. 42.

<sup>82</sup> K. Hart, A. Buckwell & D. Baldock, *Learning the Lessons of the Greening of the CAP* (Land Use Policy Group, 2016), p. ii.

<sup>83</sup> *Ibid.*

<sup>84</sup> The review devotes only four sentences on the potential impact of ecological focus areas 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, p. 13.

<sup>85</sup> Regulation (EU) No. 1305/2013 on Support for Rural Development by the European Agricultural Fund for Rural Development (EAFRD) and Repealing Council Regulation (EC) No. 1698/2005 [2013] OJ L 347/487, Art. 5(4)(c).

and promoting a shift towards a climate-resilient agriculture, including through fostering carbon conservation and sequestration (priority 5).<sup>86</sup> 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) under the agri-environment-climate measures provision.<sup>87</sup> There is a mandatory minimum allocation of 25% of the EAFRD budget for projects on the two priorities just mentioned.<sup>88</sup> The Member States' Rural Development Programmes (RDP), through which all financing takes place, are also steered into a climate-friendly direction in several other ways:

- Climate change mitigation and adaptation is mentioned as a thematic sub-programme for which an additional 10% support may be granted.<sup>89</sup>
- RDPs are required to demonstrate an appropriate approach towards climate change mitigation and adaptation, and must contain an analysis of the strengths and weaknesses of the project with attention to the special needs concerning climate change mitigation and adaptation.<sup>90</sup>
- Agri-environment-climate measures are compulsory measures for which support must be made available at the national or regional level.<sup>91</sup>

The latter type of measure enables support for soil carbon sequestration and adaptation, depending on choices made by the Member States. Projects under this measure must run for a period of five to seven years, but this period may be extended if necessary to achieve or maintain the desired environmental benefits.<sup>92</sup> For soil carbon sequestration projects, it is clear that (very) long commitments are in order (see further Sections 4 and 5 below). Payment is not based on the amount of CO<sub>2</sub> sequestered, but is a fixed amount per hectare per year for land brought under this measure.<sup>93</sup> A review of the first year of the reformed CAP shows that 46% of all expenditure was allocated for measures aimed at restoring ecosystems (priority 4) and 8% for climate change (priority 5).<sup>94</sup> However, only 14.3% of the budget for priority 4 was allocated for soil management improvement, and for priority 5 just 7.6% was

<sup>86</sup> *Ibid.*, Art. 5(5)(e).

<sup>87</sup> *Ibid.*, Art. 28.

<sup>88</sup> *Ibid.*, Art. 59(6).

<sup>89</sup> *Ibid.*, Art. 7(1)(f) and 7(3).

<sup>90</sup> *Ibid.*, Art. 8(1). This is in line with a similar general requirement laid down in Art. 96(7)(a) of Regulation (EU) No. 1303/2013 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 [2013] OJ L 347/320.

<sup>91</sup> Regulation (EU) No. 1305/2013, n. 85 above, Art. 28.

<sup>92</sup> *Ibid.*, Art. 28(5).

<sup>93</sup> *Ibid.*, Art. 28(8) and Annex II.

<sup>94</sup> Matthews, n. 68 above, p. 257.

allocated to GHG emissions reduction measures on agricultural land.<sup>95</sup> The reviewers more generally conclude that the rural development policy area is characterized by high path dependency and inertia.<sup>96</sup>

### 3.4. *Interim Conclusion*

The above description and preliminary assessment of current and proposed EU policies in the areas of climate change, air pollution and agriculture show that these policies do not, or only to a very limited extent, address GHG emissions from agriculture or the adaptation needs of Europe's agricultural sector. This conclusion does not come as a surprise. It is generally accepted that current EU climate and agriculture policies are deeply insufficient: the agricultural emissions reduction potential in Europe 'lies untapped and dormant'.<sup>97</sup> On the agricultural adaptation and mitigation strategies of the EU, the verdict is that 'it is difficult to escape the conclusion that the emperor has few (if any) clothes as far as actual policies are concerned'.<sup>98</sup> A further, more detailed assessment of current and proposed policies will be presented in Section 5.1, taking into account the experiences in Australia, which will first be discussed in Section 4.

## 4. REGULATORY APPROACHES ABROAD: AUSTRALIA'S CARBON FARMING LEGISLATION

### 4.1. *Introduction*

Only a few countries in the world have a specific policy in place aimed at reducing emissions from agriculture, such as through encouraging 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 ETS.<sup>99</sup> Since 2012, one of the project types permitted under this scheme is conservation cropping,<sup>100</sup> which focuses primarily on no-till soil management and on continuous cropping.<sup>101</sup> Australia has a broad carbon farming policy in place (the Carbon Farming Initiative), which was designed originally as an offset scheme under an ETS, in a similar way to Alberta's. Before trading commenced, however, the ETS was repealed following a change of government.<sup>102</sup> Since the repeal of the ETS in

<sup>95</sup> *Ibid.*, p. 300.

<sup>96</sup> *Ibid.*, p. 228.

<sup>97</sup> Grosjean et al., n. 5 above, at p. 1.

<sup>98</sup> Blandford & Hassapoyannes, n. 5 above, p. 202.

<sup>99</sup> Specified Gas Emissions Regulation, Alberta Regulation 139/2007, available at: <http://aep.alberta.ca/climate-change/guidelines-legislation/specified-gas-emitters-regulation/default.aspx>.

<sup>100</sup> Quantification Protocol for Conservation Cropping, Apr. 2012, available at: [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/cl11618](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/cl11618). This protocol replaced a protocol aimed at tillage management, in force since 2009.

<sup>101</sup> *Ibid.*

<sup>102</sup> Clean Energy Act 2011, No. 131 (2011). See E. de Lemos Pinto Aydos, 'Australia's Carbon Pricing Mechanism', in L. Kleiser et al. (eds), *Carbon Pricing, Growth and the Environment* (Edward Elgar, 2012), pp. 261–76, at 261.

2015, the carbon farming scheme has become a stand-alone programme under which farmers who generate carbon credits through on-farm projects can sell these credits to the government (the Emissions Reduction Fund).<sup>103</sup> Carbon sequestration in agricultural soils is one of many types of project that are allowed under the scheme.<sup>104</sup>

#### 4.2. Soil Carbon Projects: Detailed Rules

Under the Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth) (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;
- retaining stubble in field;
- undertaking pasture cropping;
- managing pasture through implementing pasture irrigation;
- increasing biomass yields through inputs such as fertilizer, 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; and
- altering the timing, duration and intensity of grazing.

Farmers can select the measures they wish to implement, but have to adopt at least one new management activity.

The land that is used for soil carbon storage must 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 project commenced.<sup>105</sup> The designated land is known as the ‘project area’ and must 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, such as those in the forestry sector, soil carbon projects can have a 100-year permanence period, or a 25-year permanence period.<sup>106</sup> Farmers, therefore, commit to maintain the sequestered carbon for either 25 or 100 years. There are extensive rules on carbon maintenance. A *carbon maintenance obligation* is imposed on the sequestration project proponent to avoid sequestered carbon being emitted after the credits have been issued. This means that participants

<sup>103</sup> Carbon Credits (Carbon Farming Initiative) Act 2011, as amended in 2014; see in more detail Verschuuren, n. 2 above.

<sup>104</sup> For a current overview, see Australian Government, Dept. of the Environment and Energy, ‘Eligible Activities’, available at: <https://www.environment.gov.au/climate-change/emissions-reduction-fund/methods>.

<sup>105</sup> Australian Government, Dept. of the Environment and Energy, ‘Carbon Farming Initiative (CFI) Mapping Guidelines 2015’, available at: <https://www.environment.gov.au/climate-change/emissions-reduction-fund/cfi/publications/cfi-mapping-guidelines-2015>.

<sup>106</sup> CFI Act, s. 86A.

may not carry out activities on lands used for sequestration that will result (or are likely to result) in a reduction below the benchmark level of the sequestration of carbon in the relevant carbon pool on the area.<sup>107</sup> This must be registered in the relevant land title register in order to ensure carbon maintenance in the event that the land is transferred to new owners.<sup>108</sup> 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 must take all reasonable steps to ensure that the number of tonnes of carbon sequestered is brought back to that level.<sup>109</sup> A buffer of an additional 5% abatement must be maintained in order to offset unexpected loss of sequestered carbon.<sup>110</sup> Farmers are allowed to change management activities, but only to an activity with the same or a higher sequestration value.<sup>111</sup>

Originally, soil carbon sequestration achieved through these projects 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 through inputs such as fertilizer, lime and water) the amount of sequestration can now also be determined using default soil carbon enhancement values.<sup>112</sup> For the latter activities, detailed rules exist on how to quantify the amount of carbon sequestered in each activity based on carbon accounting models that were developed in Australia.<sup>113</sup> The rules basically determine the difference between the baseline carbon stock and baseline emissions on one side, and the project carbon stock and emissions in the project area on the other. All GHG emissions are covered, including emissions from livestock grazing in the project area, emissions 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 a qualified person – a technician with qualifications from a nationally accredited course or one recognized by a nationally accredited institution, with competencies prescribed in another set of rules. 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.<sup>114</sup>

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<sup>107</sup> Ibid., s. 97(9).

<sup>108</sup> Ibid., s. 40.

<sup>109</sup> Ibid., s. 97(10).

<sup>110</sup> Ibid., s. 16(2).

<sup>111</sup> Carbon Credits (Carbon Farming Initiative – Estimating Sequestration of Carbon in Soil Using Default Values) Methodology Determination 2015, s. 85.

<sup>112</sup> 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, available at: <http://www.environment.gov.au/climate-change/emissions-reduction-fund/methods>.

<sup>113</sup> For the Full Carbon Accounting Model (FullCAM), see Australian Government, Dept. of the Environment and Energy, 'Land Sector Reporting', available at: <http://www.environment.gov.au/climate-change/greenhouse-gas-measurement/land-sector>.

<sup>114</sup> Laid down in the 'CFI Soil Sampling and Analysis Method and Guidelines 2014': Australian Government, Dept. of the Environment and Energy, 'Sequestering Carbon in Soils in Grazing Systems',

#### 4.3. Experiences with Soil Carbon Projects under the Australian Legislation

Empirical research into experiences with the CFI Act in Australia in 2016 demonstrates that soil carbon projects are becoming increasingly popular among farmers.<sup>115</sup> Initially, however, it was mainly a handful of ‘first movers’ who were active in developing and promoting soil carbon, within the government as well as in the broader farming community. Early projects include, for instance, the 2015 Bindaree Carbon Project.<sup>116</sup> This organic farm uses a more targeted method of rotational grazing, moving cattle to paddocks as soon as the grass stops growing and allowing the cattle to graze in order to restart the growth process, thus accelerating the increase in soil carbon levels.<sup>117</sup> Another example is the Tallawang Carbon Sequestration Project.<sup>118</sup> This project is part of a larger on-farm innovations project that started in 2002, which involved the construction of swales to slow water flow.<sup>119</sup> This increased soil moisture and vegetation growth. Slashing and targeted grazing increase soil organic matter and encourage regeneration of native grasses. Within ten years, these measures led to a 250% increase in stock carrying capacity, a 15 to 23% profit margin on cattle production, constant river outflow regardless of inflow, improved landscape hydrology, and increased native biodiversity.<sup>120</sup>

In 2016, a set of semi-structured interviews was conducted with key stakeholders to document 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, consultancies active in the area of carbon farming, as well as a climate change non-governmental organization (NGO).<sup>121</sup> Three conclusions were broadly recognized by all stakeholders. These are discussed in turn below.

Firstly, soil carbon projects were singled out for having an astonishing impact on soil quality and on agricultural production. It was noted that other farmers see the positive results achieved by participating farmers and start to become engaged too, partly because of the additional revenue generated through the carbon credits, but more importantly because of the increase in food production and the generation of more revenue from crops. One respondent referred to an example of two brothers

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available at: <http://www.environment.gov.au/climate-change/emissions-reduction-fund/methods/sequestering-carbon-in-soils>.

<sup>115</sup> Verschuuren, n. 2 above, pp. 41–2.

<sup>116</sup> Project ID: ERF101857: see Australian Government, Clean Energy Regulator, ‘Emissions Reduction Fund Project Register’, available at: <http://www.cleanenergyregulator.gov.au/ERF/project-and-contracts-registers/project-register> (ERF Project Register).

<sup>117</sup> R. Conaghan, ‘Soil Test Breaks Vital Ground’, *Rural Weekly*, 27 Mar. 2015, available at: <http://www.ruralweekly.com.au/news/soil-test-breaks-vital-ground/2585983>.

<sup>118</sup> Project ID: ERF101522: see ERF Project Register, n. 116 above.

<sup>119</sup> Soils for Life, ‘Case Study, Innovations for Regenerative Landscape Management Project’, Sept. 2012, available at: <http://www.soilsforlife.org.au/cs-tallawang>.

<sup>120</sup> *Ibid.*

<sup>121</sup> Two to four people in each of the five sectors were interviewed. A broad account and analysis of the findings of the entire project have been published in Verschuuren, n. 2 above. Full dataset has been stored in open access data repository, available at: <https://easy.dans.knaw.nl/ui/datasets/id/easy-dataset:68057>.



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'.<sup>122</sup> Although many respondents stressed that conservatism, especially among older farmers, slows down the adoption of soil carbon sequestration practices, they all feel that gradually the farming sector is changing and adopting these new practices. According to all those interviewed, the CFI Act was pivotal in pushing this change.<sup>123</sup>

Secondly, 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 because, at the time of adopting the methodology, it was not entirely clear how much abatement would be generated, or whether abatement would be generated at all. One carbon agent stated:

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 soil carbon methodology leads to innovation in the sector.<sup>124</sup> In the end, this will be good for the farming sector in a much broader 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.<sup>125</sup>

Thirdly, soil carbon projects come with high transaction costs. Soil carbon measures need to be implemented for at least three years before the increase of carbon in the soil is measurable and verifiable so that the farmer can claim credits. This requires an upfront investment that small farms cannot easily make. Assessing the impact of soil carbon projects is costly too. Detailed and far-reaching monitoring, reporting and verification requirements are included in the regulatory framework in order to ensure that the emissions cuts are real, additional and verifiable.<sup>126</sup> These requirements are too complex to be carried out by farmers themselves. In order to comply they need the help of consultants ('carbon agents').<sup>127</sup> As a consequence, carbon agents work with their clients throughout the entire project, for 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.<sup>128</sup> Reducing this administrative burden, for example, through using sensory systems, automated tracking devices,

<sup>122</sup> Interview with representative of agricultural investment bank, Sydney, NSW (Australia), 23 May 2016.

<sup>123</sup> Verschuuren, n. 2 above, pp. 31–2.

<sup>124</sup> See also *ibid.*, p. 44.

<sup>125</sup> Interview with carbon agent, Sydney, NSW (Australia), 19 May 2016.

<sup>126</sup> Verschuuren, n. 2 above, p. 19.

<sup>127</sup> *Ibid.*, pp. 35, 39.

<sup>128</sup> Respondents were reluctant to give a precise percentage. When asked whether one third was a rough estimate, most respondents acknowledged that this could very well be the case.

drones, and automated reporting, has been identified as an important development that could address this issue.<sup>129</sup>

## 5. TOWARDS AN IMPROVED EU REGULATORY FRAMEWORK FOR SOIL CARBON SEQUESTRATION

### 5.1. *Assessment of Current and Proposed Instruments*

EU climate law will start to focus on the sequestration potential in agriculture as of 2021, provided that the proposals for the LULUCF Regulation<sup>130</sup> and the Effort Sharing Regulation<sup>131</sup> are adopted. If so, emissions and removals in the wider land-use sector will need 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 emissions reductions to cover a small part of the target set by the Effort Sharing Regulation (less than 10% of all emissions by the sectors covered by the current Effort Sharing Directive). Although this is an important first step, it leaves much room for Member States, which, for example, 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 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, is not expected to stimulate a transition to climate-smart agriculture either.<sup>132</sup> Soil carbon projects can receive funding both under the green direct payments scheme and under the rural development policy. Whether such projects are actually carried out with CAP funding depends entirely on farmers taking the initiative (for green direct payments), or on the Member States (for the rural development policy). Unfortunately, with the exception of Ireland, there are few indications that Member States plan to radically focus their RDPs on climate change.<sup>133</sup> In the review of the first year of the reformed CAP, stakeholders hardly mentioned climate change.<sup>134</sup> 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. Five constraints are particularly relevant, most of which are attributable to the fact that the CAP is not linked to the EU climate

<sup>129</sup> Interview with respondent from agricultural sector organization, Canberra, ACT (Australia), 31 May 2016.

<sup>130</sup> N. 46 above.

<sup>131</sup> N. 48 above.

<sup>132</sup> Grosjean et al., n. 5 above, p. 4; Hart et al., n. 33 above, p. 91.

<sup>133</sup> Ireland's Green Low-Carbon Agri-Environment Scheme (GLAS): see J. Curtin & T. Arnold, *A Climate-Smart Pathway for Irish Agricultural Development. Exploring the Leadership Opportunity* (Institute of International and European Affairs, 2016).

<sup>134</sup> 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.

mitigation policy but is a separate instrument, with a much wider policy goal than combating 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 and verified whether and to what extent an increase in soil carbon levels is real and additional. It would be better to integrate the CAP into the EU's climate policy, which requires rules to ensure a reliable measuring of sequestered carbon, as illustrated by the Australian example. Experiences with accounting rules for biofuels under the EU Renewable Energy Directive will probably be helpful in this regard.<sup>135</sup>

### *Payments*

Direct payments are based on the amount of hectares committed per year,<sup>136</sup> not on the amount of CO<sub>2</sub> sequestered. In addition, measures under RDPs can only cover additional costs and income forgone as a result of the commitments made.<sup>137</sup> In both instances, these payments do not encourage farmers to sequester as much carbon as possible.<sup>138</sup>

### *Commitment period*

Projects financed under the CAP are characterized by a short lifespan. Green direct payments are annual payments based on the previous year's position. Payments for permanent cropping, permanent grassland and permanent pasture are granted only for land qualifying as such for five years,<sup>139</sup> but the commitment remains a one-year commitment.<sup>140</sup> Under the agri-environment-climate measure commitments have to be undertaken for a period of five to seven years.<sup>141</sup> Such short lifespans are almost futile under a climate policy, as combating climate change requires measures that cover decades, if not the entire 21<sup>st</sup> century. This is why carbon sequestration projects in Australia are required to run for 25 or even 100 years.

### *Available funds*

The EU has relatively limited funds available for climate measures under the CAP (€25 billion in seven years for 28 countries). Furthermore, because of inertia in the sector, the funding amounts actually provided to climate-friendly projects, such as soil carbon enhancement, are much lower than the amounts earmarked.<sup>142</sup> A factor that further complicates assessing the impact of CAP funding on climate change

<sup>135</sup> Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources and Amending and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC, Arts 17–20 [2009] OJ L 140/16.

<sup>136</sup> Regulation (EU) No 1307/2013, n. 66 above, Art. 32(1).

<sup>137</sup> Regulation (EU) No 1305/2013, n. 85 above, Art. 28(6).

<sup>138</sup> Matthews, n. 40 above, p. 5.

<sup>139</sup> Regulation (EU) No. 1307/2013, n. 66 above, Art. 4(1)(g) and (h).

<sup>140</sup> See, e.g., *ibid.*, Art. 43(9).

<sup>141</sup> Regulation (EU) No. 1305/2013, n. 85 above, Art. 28(5).

<sup>142</sup> Matthews, n. 68 above, p. 228.

mitigation and adaptation in the agricultural sector is that climate measures are hard to single out from the measures that receive direct payments, as has been illustrated in the preceding discussions.

### *Generic character*

The CAP relies heavily on command-and-control style provisions and does not display flexibility for farmers on how best to achieve the policy targets.<sup>143</sup> This approach is inconsistent with 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 Australian experiences underline and strengthen the interim conclusions presented in Section 3.4. Both current and proposed EU policies and instruments are inadequate to encourage large-scale soil carbon sequestration on agricultural land or, more generally, the conversion to climate-smart agricultural practices. That is why an alternative approach needs to be developed.

### *5.2. Alternative Approach*

A further stimulus to the adoption of soil carbon projects, which currently is not being discussed but which requires further investigation at European level, is the inclusion of agriculture in the EU ETS. This could be implemented by enabling regulated industries to buy offsets from the agricultural sector, following the examples set in Alberta (Canada), Australia, and elsewhere.<sup>144</sup> These countries demonstrate 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 is put in place to ensure integrity.<sup>145</sup> 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 incentivize farmers to farm carbon in addition to crops.<sup>146</sup> The Task Force, however, proposes to redirect funds under the CAP after 2020. It is debatable whether this will be a successful strategy, given the inherent shortcomings mentioned above.<sup>147</sup> Some of the current constraints can perhaps be addressed, such as the short commitment period under the green direct payments, or the provision that payments can only cover additional costs and income

<sup>143</sup> K. Rietig, 'Sustainable Climate Policy Integration in the European Union' (2013) 23(5) *Environmental Policy and Governance*, pp. 297–310, at 307.

<sup>144</sup> For an overview of all states that allow agricultural offsets under an ETS, see Verschuuren, n. 2 above, p. 9. Agricultural offsets are now also allowed under the newly established Chinese ETS: see D. Sun et al., 'Carbon Markets in China: Development and Challenges' (2016) 52(6) *Emerging Markets Finance and Trade*, pp. 1361–71.

<sup>145</sup> Verschuuren, n. 2 above, p. 50.

<sup>146</sup> Agricultural Markets Task Force, 'Improving Market Outcomes. Enhancing the Position of Farmers in the Supply Chain', Nov. 2016, p. 49, available at: [https://ec.europa.eu/agriculture/sites/agriculture/files/agri-markets-task-force/improving-markets-outcomes\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/agri-markets-task-force/improving-markets-outcomes_en.pdf).

<sup>147</sup> Section 5.1 above.

forgone under the agri-environment-climate scheme. However, it is highly unlikely that the CAP budget will be large 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 be used, either through a carbon tax or an ETS.<sup>148</sup> The latter seems very suitable for the EU with its well-developed ETS which, hopefully, will pick up speed again after the structural reform takes effect in the fourth trading phase, which runs from 2021 until 2030.<sup>149</sup> A much higher carbon price than the current value of around €5, however, will be necessary to achieve substantial change in farming practices.<sup>150</sup> Regulation aimed at establishing a finance flow from large industrial emitters and the energy sector 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, as laid down in Article 191(2) of the Treaty on the Functioning of the EU (TFEU).<sup>151</sup> Under this principle, it only seems logical that the sectors responsible for the majority of GHG emissions will contribute to the financing of sequestration measures on farm land, and thus at helping to combat climate change caused by their emissions.

Introducing the option to use offsets from agricultural projects in the EU ETS is not an easy task. It requires drafting many 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<sub>2</sub> sequestered in the projects allowed under the ETS offsets regime. Commitment periods have to be set, and these have to span decades rather than years, and must be legally registered on the land, so that future buyers are required to assume the commitment for the remainder of the period. Methodologies must be developed to determine the scope and types of project 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, have existed for a number of years now and have been positively evaluated.<sup>152</sup>

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 – including high transaction costs for monitoring, reporting and verification, leakage, and distributional impacts on farmers – are evident in Australia and will limit the effectiveness of the instrument.<sup>153</sup> Additional instruments, therefore, remain important, first and foremost through further reform of the CAP. Climate-smart practices that are not (fully) covered by the ETS should remain or be brought under the CAP. In general, the CAP needs to focus far more on climate change

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<sup>148</sup> Verschuuren, n. 2 above, p. 44.

<sup>149</sup> T. Jevnaker & J. Wettstad, 'Ratcheting Up Carbon Trade: The Politics of Reforming EU Emissions Trading' (2017) 17(2) *Global Environmental Politics*, pp. 105–24.

<sup>150</sup> M. Castro e Silva & M. Silva, 'Leapfrogging Agriculture as Usual: The Potential Contribution and Sustainability Benefits of Organic Farming to Carbon Sequestration in Portugal' (2015) 4(1) *International Journal of Agriculture, Innovations and Research*, pp. 205–11, at 208.

<sup>151</sup> Lisbon (Portugal), 13 Dec. 2007, in force 1 Dec. 2009, [2010] OJ C 83/47, available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2012:326:FULL:EN:PDF>.

<sup>152</sup> Verschuuren, n. 2 above, p. 48.

<sup>153</sup> Grosjean et al., n. 5 above, pp. 9–14; Verschuuren, n. 2 above, p. 40.

mitigation and adaptation, and current constraints should be removed.<sup>154</sup> Additional instruments should also target consumers, especially instruments aimed at steering consumers' dietary choices away from meat, for example, via a meat tax.<sup>155</sup>

As a final remark, it should be noted that the alternative approach proposed here should be designed carefully so as to avoid a conflict with World Trade Organization (WTO) law.<sup>156</sup>

## 6. CONCLUSION

This article has assessed current and proposed EU climate and environmental law, and the legal instruments associated with the CAP, to determine whether and to what extent climate-smart agriculture is or can be promoted through the use of these current or proposed instruments, with a focus on the example of soil carbon sequestration. The assessment reveals that current and proposed policies and instruments are inadequate to stimulate the large-scale adoption of soil carbon projects across Europe. Given the structural flaws identified in this study, it is highly likely that this is true for all climate-smart agricultural practices. As such, an alternative approach needs to be developed. The first element of the proposed new approach is focused on EU climate policy: the inclusion of agriculture in the EU ETS by allowing regulated industries to buy offsets from the agricultural sector, following the examples set by other countries, such as Australia.

Lessons learned from these experiences will be helpful in drafting new EU rules and regulations aimed at establishing a reliable and robust regulatory offsets system under the EU ETS. Such rules include, for example, the establishment of baseline levels of soil carbon, as well as monitoring, reporting and verification of the amount of CO<sub>2</sub> sequestered in the projects allowed under the ETS offsets regime. The second element is aimed at the CAP, which generally needs to be far more focused on climate change mitigation and adaptation. Shortcomings that need to be addressed include the short commitment period, which needs to be increased to 100 years. Other deficiencies include the fact that accounting is not based on the quantification of carbon sequestration or emissions reduction, and that payments are based on numbers of hectares under a certain management scheme instead of on the amount of carbon sequestered or avoided emissions. Finally, the generic character of many of the current provisions precludes the development of rules that are specifically tailored to individual farms. In addition, Member States should have less opportunity to pay compensation for insufficiently climate-smart projects. However, no amount of improvement will obviate the need to develop 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 the European agriculture sector that is needed to achieve the Paris Agreement's mitigation goals, while adapting to the changing climate in order to be able to meet the rising global food demand.

<sup>154</sup> Hart et al., n. 33 above, p. 96.

<sup>155</sup> C.C. Bähr, 'GHG Taxes on Meat Products: A Legal Perspective' (2015) 4(1) *Transnational Environmental Law*, pp. 153–79. Similarly, Grosjean et al., n. 5 above, p. 25, and Verschuuren, n. 2 above, p. 49.

<sup>156</sup> The most relevant factor to take into account is the balance between the benefits from the sale of carbon credits under the EU ETS and the costs associated with the introduction of soil carbon sequestration measures. See, in more detail, Verschuuren, n. 4 above, p. 185.