

October 2020

# CLIMATE AND SOIL POLICY BRIEF: BETTER INTEGRATING SOIL INTO EU CLIMATE POLICY



## Key recommendations:

- There is a clear need for a comprehensive high-level policy framework for soil and its contribution to climate objectives at EU level. This framework should address the many sustainability challenges and opportunities soils face, but also ensure that the contribution of soils to climate mitigation and adaptation is well planned and organised in coherence with the rest of the EU climate policy architecture.
- The EU should set a target date as soon as possible for all agricultural soils to be a net carbon sink, in-line with the EU's net-zero GHG target in 2050.
- Develop concrete solutions to address hotspot issues in Europe. For example, in the restoration and rewetting of peat and wetlands.

## INTRODUCTION: WHY SHOULD SOIL BE INCLUDED IN THE HIGHEST LEVELS OF CLIMATE PLANNING AND STRATEGY.

Soils are often overlooked as a key factor in mitigating and adapting to climate change. Earth's soils represent the largest terrestrial carbon store. They contain roughly 2,500 gigatons of carbon, more than three times the amount of carbon in the atmosphere and four times the amount stored in plants and animals<sup>1</sup>. Soils remove approximately 25% of the equivalent carbon emitted through the world's fossil fuel use each year.

As the main rural land users, the agriculture and forestry sectors are in a key position to contribute to the removal of carbon from the atmosphere through the capture and storage of carbon in soils and biomass. In addition to mitigating climate change, improved carbon conservation and sequestration in soils contributes to healthy soil functions and the production of commodities and many other ecosystem services<sup>2</sup>. Increasing the carbon content of soils is also important to improve the resilience of soils to climatic changes and thus enables the adaptation of agriculture and forestry sectors to climate change impacts. Failing to protect soils can, conversely, lead to significant carbon loss, increase the vulnerability of land-based production and undermine ecosystem functions and condition.

Soil carbon levels vary based on underlying environmental, geomorphological, and topographical conditions, combined with the way land is used and managed. The carbon content of arable systems can be poor – but arable land also represents the most significant opportunity for increased carbon sequestration.

Soils under grassland and forests are a net carbon sink, estimated to remove up to 80 million tonnes of carbon per year in the EU<sup>3</sup>. For comparison, this is roughly the total annual GHG emissions of Austria<sup>4</sup> and is greater than the 67 million tonnes of CO<sub>2e</sub> emitted in 2018 by intra-EU flights<sup>5</sup>. However, together EU croplands and grasslands are net sources of emissions, releasing about 75.3 MtCO<sub>2e</sub> in 2017. Most of these emissions arise on organic soils (carbon-rich soils such as peatland). More specifically, only 1.5% of the cropland is covered with organic soils but represents 55% of the total soil emissions for cropland. For grassland, the 3% area covered by organic soils is emitting as much carbon as the 97% grassland area of mineral soils is sequestering carbon.<sup>6</sup> This means that specific hotspots are responsible for a high proportion of emissions related to soils.

The EU should thus aim to urgently transition arable soils from net-emitters to net-sinks of carbon; such a change could represent a significant change in net emissions. This will require both measures to increase carbon sequestration, and – importantly – measures to

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<sup>1</sup> Lal, R. Carbon sequestration. (2008) Philosophical Transactions of the Royal Society B 363, 815-830. <https://doi.org/10.1098/rstb.2007.2185>

<sup>2</sup> Concepts related to soil assessment. iSQAPER. <https://www.isqaper-is.eu/soil-quality/concepts-of-soil-quality-indicators/147-concepts-related-to-soil-assessment#part2>

<sup>3</sup> EEA. Soil Organic Carbon. (20 February 2017). <https://www.eea.europa.eu/data-and-maps/indicators/soil-organic-carbon-1/assessment>

<sup>4</sup> <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/1180.pdf>

<sup>5</sup> [https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0557R\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0557R(01)&from=EN)

<sup>6</sup> European Commission (2018). IN-DEPTH ANALYSIS IN SUPPORT OF THE COMMISSION COMMUNICATION COM(2018) 773: A Clean Planet for all A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy. [https://ec.europa.eu/clima/sites/clima/files/docs/pages/com\\_2018\\_733\\_analysis\\_in\\_support\\_en\\_0.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_analysis_in_support_en_0.pdf)

reduce carbon loss. Research into this area should be a key focus of Horizon Europe<sup>7</sup>.

The EU has committed to climate neutrality in 2050, and the Commission has proposed a target of a 55% reduction by 2030 compared to 1990.<sup>8</sup> In an interesting nod to the importance of the carbon sinks, the EC's proposed target is a "net target", so that increases in the carbon sink would be included in this target. While this approach is controversial, and the details remain to be finalised in negotiations with the co-legislators, it highlights that agriculture and forestry's contribution through carbon sequestration in soil and vegetation will be essential to reach these targets and to compensate for unavoidable GHG emissions of other sectors. Presently the LULUCF Regulation, requires that the agriculture and forest sector need to contribute to the EU's 2030 emission reduction target, through the "no debit" rule, which requires that accounted emissions from land use are entirely compensated by an equivalent removal of CO<sub>2</sub> from the atmosphere through action in the sector.

Given the urgency of the climate crisis and need for emission reductions in all sectors, the EU should be leading the way on using soil as a tool for climate policy; a priority reinforced by the numerous co-benefits in other areas of environmental, social, and economic sustainability (biodiversity, flood management, sustainable food production, supporting the bio-economy, climate adaptation).

## WHAT CAN BE DONE?

### Preserve what we have and prevent further losses

The most effective way to manage soil carbon in order to mitigate climate change is to preserve existing stocks in soils, especially the large stocks in peat and other soils with a high content of organic carbon. The largest emissions of CO<sub>2</sub> from soils result from the draining of organic soils. Local factors, such as ecosystems and weather conditions, have a significant impact on soil organic carbon, meaning that policy decisions to improve soil organic matter need to be made at the national and sub-national level, particularly when deciding on land-use change or afforestation. Initiatives to preserve natural, older growth forests and the soils they contain are particularly important.

It is also very important to prevent unnecessary "land-take" in urban environments through land recycling and densification (e.g. using an old industrial site for infrastructure or urban expansion) when building new developments. Today only 13% do so.<sup>9</sup>

### Increase the sequestration of carbon where we can

There are known and tested agricultural management practices (AMPs) that can significantly improve the sequestration of carbon in soils. These include the use of cover crops, diversified crop rotation, tillage methods with minimum soil disturbance (minimum or low-till), organic farming, and the use of organic matter additions to soil. Closing nutrient cycles (bringing nutrients from societal wastes back to agricultural land) is also important to

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<sup>7</sup> <https://ieep.eu/news/five-recommendations-for-achieving-healthy-soils-by-2030-through-horizon-europe>

<sup>8</sup> European Commission. (2020). 2030 Climate Target Plan. [https://ec.europa.eu/clima/policies/eu-climate-action/2030\\_ctp\\_en](https://ec.europa.eu/clima/policies/eu-climate-action/2030_ctp_en)

<sup>9</sup> EEA. (30 September 2019) Land and soil in Europe — Ever-sprawling urban concrete? <https://www.eea.europa.eu/signals/signals-2019-content-list/articles/land-and-soil-in-europe>

both improve the functioning of soils allowing them to sequester more carbon, and reducing demand for nutrient inputs from finite and/or energy-intensive sources. Agroforestry (i.e. the practice of including trees or shrubs in crop and/or animal production systems on the same plot of land) can also contribute, for example by adding additional photosynthetic capacity to land, and can not only limit environmental damage but actively provide environmental benefits and synergies such as against erosion, improving biodiversity, storing carbon, and regulating water.

### **Adaptation to improve carbon sinks**

Good quality soils and sustainable soil management practices are an important part of climate adaptation. Healthy soil is alive with microorganisms that are able to cycle nutrients making them available for healthy plant growth. Healthy plants are typically more resilient to pest and disease outbreaks, and thus may help to provide protection for new pathogens as climatic conditions change. The structure of healthy soils helps to absorb water, reducing flooding and conserving water during droughts. Healthy plant root systems similarly help to prevent take up water and slow its movement through catchments. Erosion is a major threat to agriculture and healthy ecosystems, so its prevention is a major priority for adaptation. Many of the AMPs, such as using cover crops, limiting tillage, and managed grazing, that help for climate mitigation are similarly useful for climate adaptation.

### **Monitoring to track progress and understand change**

Policy action in the area of soils suffers from a problem of incomplete and insufficiently granular data on soil quality and particularly linking it to agricultural management practices, as well as the slow responsiveness of

monitoring. In part, this is related to the fact that soils respond and develop relatively slowly to management change, especially with regards to carbon sequestration. However, much could be done to build a more systematic, effective, and responsive monitoring and assessment system that could help to build more effective soil policy. There are new monitoring and assessment techniques for agricultural soils that could be deployed as part of the EU and Member State policy architecture. They could improve the situation markedly, especially if this was linked systematically to an understanding of the agricultural management practices being deployed<sup>10</sup>.

### **Distinguish between negative emissions, sinks and emissions reductions?**

Recently climate policy experts have started pushing for greater disaggregation of objectives for GHG emissions reductions vs. carbon sequestration<sup>11</sup>. This would help to design specific policies to meet each of the two objectives and increase transparency and effectiveness.

Reliance on carbon sinks alone for controlling climate change or offsetting other sectors is not enough because their impact can quickly be reversed. Therefore, the policies to maintain and increase existing sinks need to be designed taking into account the vulnerable nature of such sinks under agricultural land use. Clarity between goals for emission reductions and carbon removals could help in encouraging more active climate policies on soil and focus efforts on maintenance efforts.

### **Clear target**

A target date for when agricultural soils will become a net carbon sink in the EU should be set. This objective needs to reflect the overarching target of climate neutrality by 2050.

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<sup>10</sup> Link to ISQAPER deliverable 8.4 document

<sup>11</sup> McLaren, D. P., Tyfield, D. P., Willis, R., Szerszynski, B., & Markusson, N. O. (2019). Beyond "Net-Zero": A

Case for Separate Targets for Emissions Reduction and Negative Emissions. *Frontiers in Climate*, 1. <https://doi.org/10.3389/fclim.2019.00004>

IPCC scenarios for meeting the Paris Agreement goals generally rely on carbon removal and storage technologies, even though their use is unproven. Direct air capture increases energy demand and bears higher costs than nature-based solutions. Land carbon sinks will minimise the need for such unsustainable technologies while delivering multiple co-benefits. European agricultural soils should be turned into a carbon sink as soon as possible.

## HOW DOES THE EU POLICY FRAMEWORK BRING SOIL AND CLIMATE TOGETHER AT A STRATEGIC LEVEL?

The EU's climate policy architecture and strategy need to lay out a clear framework for how to improve the use of soils as a carbon sink. This is needed now to enable long-term changes to start. At present, the EU does not have a robust legal framework for soil policy, yet the new EU Biodiversity strategy calls for a revision of the Thematic Strategy for Soil Protection and includes the proposal for EU nature restoration targets. Both could see a much needed and more strategic priority given to soils' roles in both climate ambition and nature protection.

Climate policy in the EU is framed primarily by the Climate Law and by the Energy Union Governance Regulation. National Energy and Climate Plans (NECPs) are the central instruments in the Governance Regulation – applying to all sectors of the economy including the agricultural and LULUCF sectors. They are designed to set out national objectives and corresponding policies and measures to meet greenhouse gas reduction objectives for a ten year period (2021-2030 in the first iteration).<sup>12</sup> They “should provide as much clarity and

predictability as possible” and facilitate Member States' programming of funding and investments in the next multi-annual financial framework (MFF) 2021-2027. NECPs are thus crucial documents setting the direction of policy and providing the practical details of how countries intend to reach their 2030 climate goals.

The NECPs will be important for setting agendas within national governments and public administrations. Member States have significant autonomy to develop NECPs as they see fit. Although it is not the role of NECPs to lay out detailed elements of soil-related policy, they should at a minimum provide a signal of the priority placed on using them as carbon sinks, and indicate how this will be achieved. Details should be provided in the CAP Strategic Plans, and there should be a clear link between NECPs and the CAP Strategic Plans on this point to ensure effective coordination and implementation.

## WHAT DO NECPs SAY ABOUT SOIL?

Here we review a selection of NECPs (ATAT, DK, DE, CZ, EE, EL, FR, IT, NL, HR, ES, SE) to see what signals the draft NECPs give about policy intention toward soils and climate and how Member States treat the priority of soils in their climate strategies. We look briefly at the emphasis placed on the soil as an element within agriculture, forestry and LULUCF policies, and at whether targets or goals mention the potential contribution from soil management.

*Comprehensive Strategy and Measures:* Some NECPs present a reasonably comprehensive soil and climate policy, setting out overarching policy goals and some details of the policies

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<sup>12</sup> Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, <https://eur-lex.europa.eu/legal->

[content/EN/TXT/?uri=uris-  
erv:OJ.L.2018.328.01.0001.01.ENG&toc=OJ:L:2018:328:FULL](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=urisERV:OJ.L.2018.328.01.0001.01.ENG&toc=OJ:L:2018:328:FULL)

and measures that will be used to achieve these. Spain for example presents the policy objectives of reducing GHG emissions from agriculture and presents a number of soil-based policies. It has separate objectives to enhance agricultural sinks and to enhance forest sinks, including through soil-related measures. Strategies, policies and measures are laid out in detail, such as “Prevention of forest fires, including with the objective also of protecting soil carbon”, “Hydrological-forest restoration in areas at high risk of erosion”, “Promoting arable crop rotation on unirrigated land”, a national anti-desertification strategy and the development and implementation of the National Soil Inventory. Germany also mentions intensifying the carbon storage potential of the soil as a goal and lists a large number of measures, as well as the development of a national cultivation strategy to implement these measures. Intensification of carbon storage in different land-use types is discussed, including arable land, grassland, forests, and bogs. A research programme to enhance the sink function of soils and forests, develop strategies to reduce soil degradation, and develop climate-friendly farms is also being funded.

France also presents carbon sequestration in soils as an important goal. The NEC provides fewer details about the specific measures, although examples are provided, and the document points to the National Low-Carbon Strategy, the existing ‘4p1000, soils for food security and the climate’ initiative, possible initiatives under the forest strategy, and the National Biomass Mobilisation Strategy as containing specific measures toward this goal.

*Strategic guidance but little detail:* The Dutch NECP lays out high-level goals with regard to soil, laying a goal of “climate-neutral production of food and non-food” by 2050, including carbon sequestration and the reduction of emissions from soils. It claims that “central government is focusing on the sustainable management of all Dutch agricultural soils in 2030, with a focus on emission reduction in soil and land use (nitrous oxide and peat

meadows).”).” However, it does not include much detail about the specific measures to be used.

*Soil not embedded in NECP:* Many NECPs are less comprehensive. For example, the Swedish NECP does not explicitly mention soil and is quite general about the role of agriculture in managing soils. It outlines measures already taken under the 2014-20 Rural Development Programme and mentions that “land carbon” is already protected in nature reserves. The document discusses a general strategy to protect forests, without reference to soils, and without much detail. The Danish NECP is similarly vague: even though it does mention a few specific initiatives to secure climate contributions from agriculture and forestry, these are not particularly soil focused. However, the NECP promises that a Climate Action Plan for Agriculture will be developed in 2020, which does give an opportunity for future updates of the NECP to contain further detail.

*Descriptive but not prescriptive:* Some NECPs contain details of a wide range of existing agricultural and forest measures that are expected to improve the sequestration potential of soils, but are less specific about this as an explicit goal or strategy, or about how *future* policy development could improve the situation. Czechia for example discusses in some detail the deterioration of soil quality in general and lists a number of policy measures that can be used to combat these effects. Carbon sequestration in soil is mentioned as being facilitated by various policies such as cross-compliance (specific GAECs) under the CAP and the Rural Development Programme measures. However, it mainly describes existing policies and is not clear on how future policy developments will improve the sequestration of carbon in the soil, or reduce soil-related emissions further, other than by simply continuing existing measures.

*Adaptation:* Some NECPs mention the impact of climate change on soils, but usually are not explicit about adaptation measures to protect soil from the impacts of climate change. Spain

mentions its anti-desertification strategy. Czechia mentions that the area under cultivation will need to be increased due to reduced yields. Austria explicitly mentions its priority to introduce medium- to long-term climate change adaptation measures in order to “protect and stabilise terrestrial carbon pools and maintain ecosystem performance.” Estonia also mentions a priority on soil adaptation measures.

*Monitoring:* Most NECPs do not touch on monitoring or assessment of soils, with the exception of the Spanish NECP, which promises the development and implementation of a National Soil Inventory.

## CONCLUSION

Soil is treated in a wide range of ways in the NECPs reviewed here. A few present a fairly comprehensive set of goals and follow-up policies and measures, while others restrict themselves to a description of the current policy mix. Others present high-level goals, but do not describe detailed measures. Whilst only a small sample, this signals the urgent need to integrate soil carbon policies in wider climate strategies, to consider the interaction with other key tools, how to foster synergies

and to better understand the potential and planned contributions of soils toward the EU’s collective climate goals.

While some aspects of this may be dealt with through CAP Strategic Plans (CSPs), their integration and broader strategic priority should be better embedded in the EU climate policy framework – which should clearly identify the CAP as a delivery mechanism. In the absence of a bottom-up approach to this from Member States, there is a clear need for a comprehensive high-level framework for the soil policy contribution to climate objectives at the EU level. This framework should address the many other sustainability issues that soils face, but also ensure that the contribution of soils to climate mitigation and adaptation is well planned and organised in coherence with the rest of the EU climate policy architecture. Such a framework could also establish binding requirements for Member States to achieve quantified objectives set in the EU legislation so that the coherence between the CAP and other policies translates into implementation and results.

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*This briefing was produced by Thorfinn Stainforth and Catherine Bowyer*



**This project has received funding from:**



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Chinese Academy of Agricultural Sciences and the Chinese Academy of Sciences. Agreement No. 2016YFE0112700.



The European Union’s Horizon 2020 research and innovation programme under grant agreement No 635750.