EEB
European Environmental Bureau

Beyond net-zero emission in agriculture

Creating an enabling climate governance for agriculture

Climate

Nature

According to the United Nations emission gap report of 2019, meeting the Paris agreement's target to limit global warming to +1.5°C will require the European Union (EU) to cut greenhouse gas (GHG) emissions by at least 65% by 2030 compared to 1990's levels, and to become climate-neutral by 2040. However, under the impetus of the EU Green Deal, European institutions reached an agreement on the European Climate Law in April 2021, setting a new 2030 target to reduce net emissions by at least 55% with respect to 1990, as proposed by the European Commission in its Impact Assessment accompanying the Climate Target Plan Communication in September 2020. The EEB continues to call on the EU to increase the gross emission reductions target to at least 65% by 2030, alongside a separate target to increase natural carbon sinks. The Fit for 55 Package to be adopted by the EC in July 14 will propose the revision of the regulatory framework for agriculture emissions, namely the LULUCF and of the Effort Sharing regulations.

To set the EU on track to achieve the Paris Agreement, all economic sectors must cut their carbon dioxide emissions to reach climate neutrality, yet focusing on specific sectors alone will not be enough. The EU must also manage its land and natural resources more sustainably to provide nature-based climate solutions. Additionally, our food and agricultural systems are not only contributing to climate breakdown, but also to the deterioration of ecosystems and unprecedented rates of species loss. Therefore, climate policy efforts cannot be seen in isolation from efforts to restore our ecosystems as both of these efforts and their consequences are intertwined, with positive and negative feedbacks. Transitioning our farming model towards agroecological practices will be a win-win for both the climate and biodiversity crises.

In this paper we present the *EEB pathway* for ambitious climate actions in EU agriculture. and we make proposals for a new model of climate policy governance for GHG emissions from agriculture and related land use, which could go beyond net-zero emissions by 2050 whilst simultaneously addressing the interdependency between climate and other environmental issues.

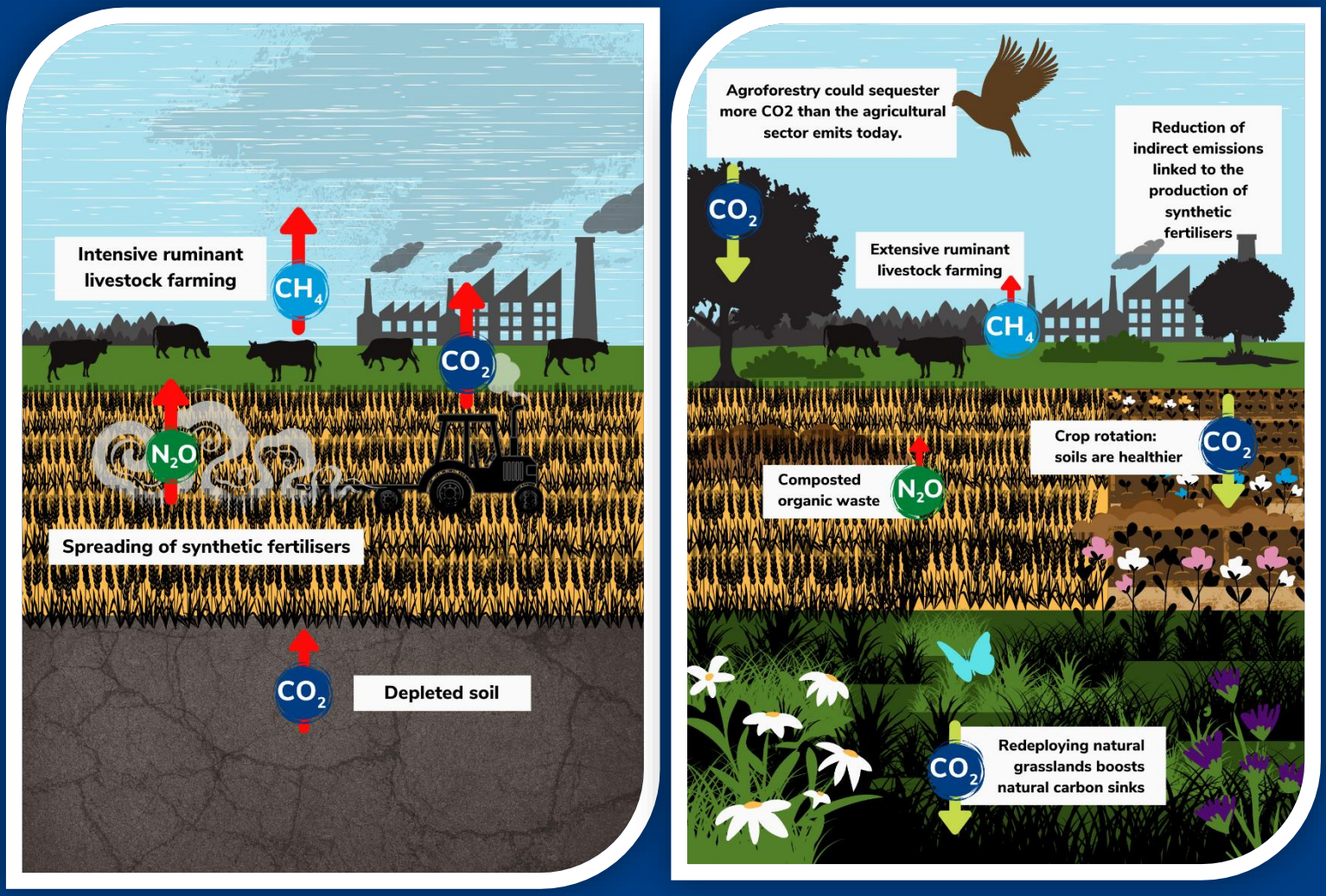

Figure 1. GHG emissions in agriculture, from business as usual (left) to agroecology (right)

Agriculture activities have a complex impact on GHG emissions

Agricultural activities have the particularity to emit three different GHGs, each with their own longevity and impact in the atmosphere: carbon dioxide (CO_2) from poor soil management and land use changes; methane (CH_4) mainly from ruminant digestion and poor manure management[1]; and nitrous oxide (N_2O) from excess fertilisation of agricultural soils. A single farm management choice often has knock-on effects on all gases and other environmental dimensions. For instance, one farmer might decide to enhance CO_2 sequestration into their grassland. This will require the farmer to rethink the size of their herd, thus impacting CH_4 emission, their fertiliser plan along with N_2O emissions and forage management, in turns impacting their land use choices with potential impact on N_2O and CO_2. Indeed, the carbon and nitrogen cycles are coupled systems and addressing them in isolation can lead to overlook potential positive and negative feedbacks (see Guenet et al., 2020). The same goes with the complex interconnections between climate and other environmental issues such as biodiversity, water management or air pollution. Therefore, any climate governance addressing emissions stemming from farmers' decisions should be systemic and ensure to reconnect land use and production activities.

[1] In the EU, the majority of anthropogenic methane emissions come from agriculture (53%), of which more than 80% from the livestock sector; 17% from manure management and around 1% from rice cultivation.

Redefining our food and agricultural system around agroecology

The intensive farming systems of industrialised countries by far exceed planetary boundaries[2] and produce more calories than ever before; yet 820 million people are still exposed to chronic hunger and undernourishment (FAO, 2020). Agroecology has the potential to reverse these trends by using a systemic approach and by addressing the biological complexity of farming. Agroecology is defined by the FAO as the practice of "applying ecological concepts and principles to optimize interactions between plants, animals, humans and the environment". It is not a specific production system, but rather an approach that relies on, and maximises, ecological processes to support production systems; it is a way of thinking holistically about agronomy, ecology, and biology.

Agroecology is a good answer to the countless climate and environmental issues emanating from the food we eat. In an agroecological future, we would also naturally eat more healthily. We would eat more fruit, vegetables, and pulses and less but better meat, seafood, eggs and dairy. This could allow us to simultaneously counter environmental degradation and the burden of diet-related diseases.

Transitioning to agroecology in Europe (and worldwide) will strongly improve our long-term food security, by preserving the natural capital we depend on to produce food. The *EEB pathway* shows that Europe can feed itself based on fully agroecological agriculture, on the condition that we shift towards healthier, more plant-based diet.

[2] https://www.researchgate.net/publication/320356605_Agriculture_production_as_a_major_driver_of_the_Earth_system_exceeding_planetary_boundaries

The current EU climate regulatory framework has failed to reduce GHG emissions from agriculture

While it is recognised by the scientific community that agriculture is a crucial sector to reach the EU's climate international commitments[3], the **EU agricultural and climate policies have failed to reduce GHG emissions from the sector or improve its carbon sequestration**. In its Climate Target Plan, the EC highlighted that reducing non-CO_2 emissions is the most challenging in the agriculture sector. Despite more than 100 billion euros being spent on '"climate spending" between 2014 and 2020 from the Common Agricultural Policy (CAP), GHG emissions from the agricultural did not decrease in the same time period[4]. As recently highlighted by European Court of Auditors, the CAP's failure is notably due to the absence of both EU- and national-level emissions reduction targets for agriculture. Secondly, the CAP does not aim to provide incentives to reduce livestock numbers; instead, it continues to support farmers who cultivate drained peatlands; and did not increase the support for agroforestry and the conversion of arable land to permanent grassland for the period 2014-2020 compared to the 2007-2013 period[5].

The future CAP will not put the sector on the right track to achieve the objectives of the European Green Deal[6,7]. Furthermore, the Farm to Fork strategy, despite recognising the unsustainability of current livestock production and consumption, is lacking clear commitments to tackle livestock emissions.

Following the presentation of the EU Green Deal and the EU target to achieve climate-neutrality by 2050[8], enshrined in the European Climate Law, the European Commission (EC) announced that it will present a new EU climate and energy regulatory framework for 2030 (known as the "Fit for 55" legislative package), which follows the Climate Target Plan of September 2020. Among other regulatory files, the EC will propose a revision of two regulations addressing emissions linked to agriculture: the Effort Sharing Regulation (ESR), and the Land use, land use change and forestry (LULUCF) regulation. This offers a unique opportunity to create an enabling climate governance also for agriculture.

Under the current EU climate regulatory framework, most emissions linked to farm management are split over two regulations:

1. The Effort Sharing Regulation (ESR) governs emissions linked to agricultural activities and are mostly non-CO_2 emissions from livestock and fertiliser use. Therefore, we will refer to them as non-CO_2 agricultural emissions. They represent 10% of total EU GHG emissions.

The ESR predominantly addresses emissions from agriculture, transport, buildings, industry not covered by the EU Emission Trading System (ETS), and waste sectors. In 2018, the ESR represented 57% of the total GHG emissions in the EU. The regulation sets legally binding annual GHG emissions targets for the 2021-2030 period that each Member State must reach. However, they are aggregate targets covering all the aforementioned sectors. In other words, Member States can choose to focus their GHG reduction efforts on some sectors to achieve their target. *Table 1* shows that non-CO_2 emissions from agriculture have been largely left unaddressed to reach the national targets. According to the EEA, Effort Sharing (ES) emissions have declined by almost 11% between 2005 and 2018 but **agriculture, the third largest source of emissions in the ES sectors, contributed only 1% of the emissions reduction effort**[9].

[3] Clark et al, 2020. Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets. Science 370, 705–708.

[4] European Court of Auditors, Special report 16/2021, "Common Agricultural Policy and climate: Half of EU climate spending but farm emissions are not decreasing", June 2021.

[5] *Ibid.*

[6] Joint Letter, "Withdrawal of the Commission proposal for the post-2020 Common Agricultural Policy", 30 October 2020.

[7] EEB,2021. New EU farm policy will worsen environmental crises for years

[8] European Commission, Communication, "Stepping up Europe's 2030 climate ambition: Investing in a climate-neutral future for the benefit of our people", 17 September 2020, COM(2020) 562 final.

[9] European Environment Agency, *National action across all sectors needed to reach greenhouse gas Effort Sharing targets*, Briefing, 10 March 2020.

Table 1. ES emissions reduction per economic sectors for the period 2005-2018

Economic sector	Total amount (in Mt CO_2eq)	Contribution to overall reductions in Effort Sharing emissions
Buildings	155	50%
Waste	66	21%
Non-ETS industries	61	20%
Transport	25	8%
Agriculture	2	1%

2. The LULUCF regulation governs emissions from land use, notably agriculture-related land use emissions from cropland and grassland.

Concerning agriculture-related land use emissions under the LULUCF regulation, **CO_2 emissions from croplands and grasslands have been quite stable** since 2005 **and remain a net source of CO_2 emissions**. In the EU-27, 98% of agricultural lands are considered as mineral soils and the remaining 2% as organic soils, often referred to as peatlands. Peatlands have the potential to be large carbon sinks when they remain untouched. However, when farmers drain organic soils, they become a source of GHG emissions. Restoring peatlands should be a priority, notably through rewetting and paludiculture[10].

Establishing specific binding EU-level targets for non-CO agricultural emissions and agriculture-related land use emissions.

Whilst other sectors have contributed to GHG reduction, the current climate policy architecture has *de facto* given the agriculture sector a free pass in the fight against climate change. Even worse, EU governments are not projecting any further significant reduced emission targets by 2030. Member States have chosen to focus their reduction efforts in other sectors, and in particular those that are governed by an additional climate legislation such as buildings with the energy performance of buildings directive. Consequently, **non-CO_2 emissions from agriculture have stagnated since 2005 and have even increased in the 2012 – 2017 period.** Only new specific binding EU-level targets translated into national GHG reduction targets for the sector will make it contribute fairly and effectively to climate action.

The European Environmental Bureau urges the European Commission to establish such targets in its "Fit for 55" Package. Whether under the ESR and the LULUCF regulation or in the future under an Agriculture, Forestry and Land Use (AFOLU) regulation[11]. **We call the EC to set:**

- **a binding EU level target of 350 Mt CO_2eq by 2030** (-20% compared to 2005 level**) for non-CO_2 agricultural emissions with the view to reach 150 Mt CO_2eq by 2050** (-65% compared to 2005 level);
- **and a binding EU-level target to bring agriculture-related land use emissions down to net-zero by 2030 with a view to reaching net removals of -150Mt CO^2 by 2050.**

To present technically and scientifically feasible targets that translate our vision for the future of European agriculture, the *European Environmental Bureau pathway* (*EEB pathway*) has been developed using the ARISE (AgRIculture and

[10] http://www.mires-and-peat.net/pages/volumes/map27/map2705.php

[11] As set out in the Inception Impact Assessment, the related Impact Assessment work on the revision of the LULUCF Regulation will examine the option that the non-CO2 emissions from agriculture as well as the CO_2 emissions and removals from land use are combined under the LULUCF Regulation, as of 2031, an exercise that would entail the establishment of national sectoral targets for the land sector including all related GHG emissions and removals.

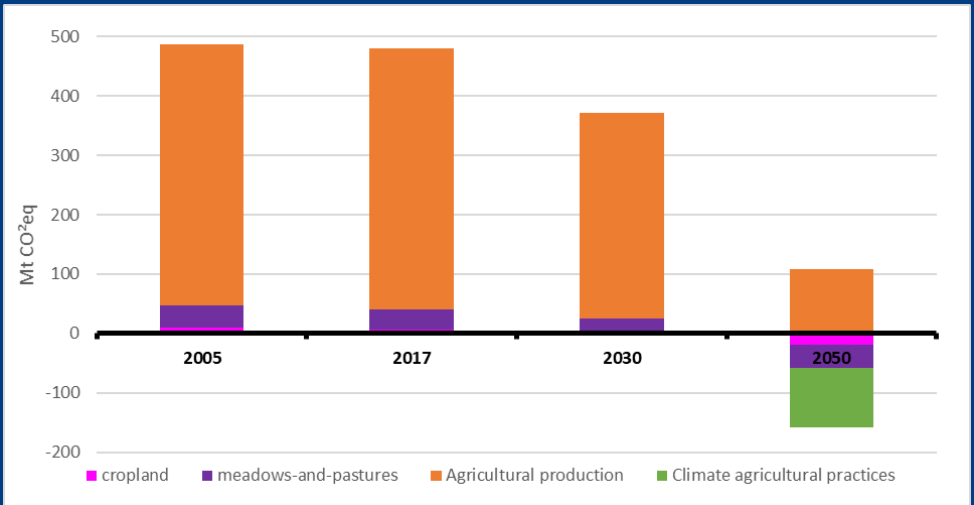

Figure 2. GHG emissions reduction for agriculture and agricultural land emission

food SystEm interactive) model[12]. *EEB pathway* builds on the work carried by the FAO, 2018, the scenario developed by the IDDRI and an ambitious level of dietary changes as proposed by Costa et al.,2021. Two additional constraints to the existing scenario were imposed in the *EEB pathway*: **maintenance of the current grassland and cropland area, and peatland restoration.**

The *EEB pathway* shows that agriculture could easily go beyond Net-Zero emissions by 2050 if our food and agricultural systems start to transition toward agroecology and we adopt healthier and more sustainable diets. Figure 2 shows that emission from agriculture activities (in orange) could be reduced to **110 Mt CO_2eq by 2050,** which represents a 75% reduction compared to 2005 levels; while agricultural land use could go **from being a net source of GHG to a net sink of -150 Mt CO_2eq by 2050**. Therefore, the EEB call to reduce agricultural emissions towards net-zero is technically achievable. However, to get there, action would need to start in this decade, with about a **20% cut in agricultural GHG emissions by 2030 compared to 2005 and bring agriculture-related land use emissions down to net-zero by 2030.** The required structural change of the agricultural sector means that efforts provided between now and 2030 will only begin to show a significant measured effect by 2040.

If governments decided to incentivize the adoption of agroforestry, non-CO_2 agricultural emissions and agriculture related land use emissions could go easily beyond net-zero emissions. Kay et al. (2019) shows that implementing agroforestry in hotspots of environmental pressures, representing 8.9% of total EU farmland, could sequestrate up 43% of EU agricultural GHG emissions. The EEB pathway explores the potential of agroforestry based on the same estimates than the aforementioned study but covering all EU farmland. Potentially, agroforestry could generate a sink of -1400Mt CO_2, almost a ten-fold increase with respect to the agricultural-related land use sink generated by mainstreaming agroecological practices.

The *EEB pathway* demonstrates the transition towards agroecology and takes better account of the interdependency between environmental and climate dimensions. While technological innovations such as precision farming or feed additives offer some short-term targeted solutions on a single issue, they do not provide the required step change to address the multiple environmental crises that Europe is facing today. Ultimately, any short-term techno-fix solutions will not provide any means for farmers to respond to the more frequent extreme weather events and may prevent farmers to adapt their production model.

Nevertheless, "techno-fix" solutions are often promoted on the basis that they have minimum impact on crop yield and therefore are more suitable answer to global food security. Ensuring food security, particularly in light of the ongoing pandemic and current and future crises are important objectives of which European agriculture should contribute to, but must do so within its environmental limits. Ignoring the urgent need to systematically address climate change, the biodiversity crisis and the resilience of farmers will fail to put European agriculture on a sustainable path.

[12] The ARISE model was made initially available as part of the EU Calculator's transition pathway explorer and it is currently being developed as a separate independent and sectoral model (2021. Baudry G., R. Slade. *Designing a sustainable future for the European bioenergy system by 2050: The agri-food system calculator*. Presentation at the 29th EUBCE conference. We therefore thank the authors for providing us with the early access model. ARISE will be publicly available this fall 2021.

Creating an enabling climate governance for agriculture

Given the deep interconnections between the different GHG sources and sinks influenced by agriculture, the European Commission should ensure that the new governance of GHG emission from agricultural activities and related land use are integrated. To do so, the EEB recommends the following six essential elements to be introduced in the "Fit for 55" package:

1. Enabling targets in the future EU climate governance
2. An enabling flexibility within the agricultural sector
3. An enabling institutional framework
4. An enabling sectoral roadmap
5. Enabling sectoral policies
6. Enabling financial mechanisms

1 Enabling targets in the future EU climate governance

According to the *EEB* pathway, the EU could reach climate-neutrality in agriculture by 2050. To do so, agricultural emissions should be reduced to at least 150 Mt CO_2eq by 2050, whilst agriculture-related land use emissions should move from being a net emitter to become a net sink of -150 Mt CO_2eq (equivalent to 37% of today non-CO_2 emissions). To achieve these targets and given the necessary structural changes of the agricultural sector, it is key to develop a vision beyond 2030. Given that the current EU climate policy failed to address agricultural emissions, the "Fit for 55" Package should set a clear strategical direction and should clearly define the binding EU-level and national GHG agriculture targets whether under the ESR and the LULUCF regulation or in the future under an Agriculture, Forestry and Land Use (AFOLU) regulation[13]

The EU wide targets must be translated into national targets for each Member State. The national targets should reflect Member States' potential to reduce agricultural GHG emissions and increase removals based on the national structure of the sector and the national share of agriculture in the total GHG emissions. For instance, a special effort should be dedicated for restoring peatlands in Germany, Poland, Finland, and Romania – the largest CO_2 emitters from drained organic soils in the EU. Similarly, for Member States such as Ireland or the Netherlands, that have a high proportion of methane in their total GHG emissions, efforts should focus in reducing their livestock population. A performance and monitoring framework should be put in place to ensure accountability of Member States towards the Union's objective. This performance and monitoring framework would ensure timely reporting and provide dissuasive penalties in case of underperformance.

2 An enabling flexibility within the agricultural sector

The current EU climate architecture includes the possibility to off-set emissions from the ES sectors using LULUCF credits in order for Member States to reach their national targets. This has been an obstacle to reducing emissions in agriculture, as the allowed flexibilities are larger for Member States with a high share of agricultural emissions. The promised increase of removals in agricultural lands and the forestry sector should not be used to offset a lack of reduced emissions in other sectors.

However, the question of flexibilities between agricultural emissions and removals from agriculture-related land use could be re-assessed in the future. At this moment, agricultural lands are net emitters of CO2. The *EEB pathway* indicates that by 2050, the transition to agroecology and the adoption of certain practices could lead to –150 MT CO2 eq of removal. Agricultural lands could potentially go beyond this target by mainstreaming agroforestry. At the same time, the agricultural sector will remain a net emitter of non-CO_2

[13] As set out in the Inception Impact Assessment, the related Impact Assessment work on the revision of the LULUCF Regulation will examine the option that the non-CO2 emissions from agriculture as well as the CO2 emissions and removals from land use are combined under the LULUCF Regulation, as of 2031, an exercise that would entail the establishment of national sectoral targets for the land sector including all related GHG emissions and removals.

emission due mostly to livestock rearing. The EEB pathway indicates that these emissions amount to 110 MT CO2 eq[14]. If the EU achieved such a reduction, residual emissions would have to be compensated by an equivalent amount of removals. To provide the right incentives to reconnect agricultural activities and land management, offset shall only be allowed between residual non-CO_2 emissions and agricultural related land use emissions. This could be done in two ways. First, by implementing an EU-wide target governing solely agricultural emissions and agriculture-related land use removals under a new AFOLU legislation. Second, by allowing flexibility between the ESR and LULUCF regulation. This flexibility would be strictly limited between the residual emissions from agriculture and the sink from agricultural lands.

3

An enabling institutional framework

Agriculture is traditionally the exclusive responsibility of the EU directorate general for agriculture, while climate policy is under the responsibility of the EU directorate general for climate. This institutional setup is often mirrored at national level. However, given the relationship between agriculture and land use, environment, food, and nutrition, and the failure to address GHG emissions from agriculture in the EU so far, the question of how best to arrange the EU institutional framework to address agriculture and climate change is highly relevant. The European Green Deal has called for a systemic approach to environmental challenges. The EEB strongly supports this and believes that increased collaboration between sectoral policy-makers is crucial to achieve effective climate action in agriculture, whilst simultaneously tackling wider environmental and societal issues.

The new climate governance must ensure vertical and horizontal coordination. The new institutional framework should give the mandate to a joint body composed of several representatives from different directorates, institutions, independent experts and representatives of the private sector and civil society, to ensure coordination, mainstreaming and monitoring of climate change and mitigation policy across sectoral policies. The joint body must have the mandate to adopt policy recommendations. A similar joint body on climate change and agriculture should be also established in the Member States to coordinate the actions of different Ministries that are notably responsible for Agriculture, Environment and Climate. Both EU and national joint bodies must be composed of relevant actors to design and control the implementation of the roadmaps to reach climate-neutrality in the sector (see section below).

4

An enabling sectoral roadmap

The EEB encourages the EC to design a sectoral roadmap that identifies the best practices that should be implemented by the EU and Member States to achieve both the EU and national targets specific to agriculture as well as achieve climate-neutrality by 2050 for each sector. Many practices have already been identified and could be scaled-up. For instance, the best practices to reduce nitrous oxide could integrate the non-exhaustive following list of practices: promotion of farming systems using crop rotation, including nitrogen fixing crops, low-emission manure storage systems, low-emission manure processing and composting systems as well as nitrogen management.

[14] Such emission residuals are achievable only if the transition towards agroecological is accompanied by dietary changes.

5

Enabling sectoral policies

Sectoral policies are instrumental in implementing climate objectives. Sectoral legislation can also be useful to provide a framework to support the transition towards agroecological practices and promote a healthier and more sustainable diet.

- The Common Agricultural Policy: the CAP post-2027 will have a crucial role to play and would be compatible to reach climate-neutrality in the sector if it provides incentives to: support the reduction of livestock numbers and moving towards more plant-based diet; mainstream agroecological practices and phase out synthetic fertilizers; and redeploy natural grasslands, invest in agroforestry as well as protect and restore peatlands.
- The Sustainable Use of Pesticides Directive: the heavy use of pesticides is one of the main drivers of collapsing biodiversity within the EU. Integrated Pest Management should be compulsory for all farmers since it emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural pest control mechanisms.
- The forthcoming Nature restoration Law: agricultural intensification is one of the main drivers of habitat fragmentation, loss and degradation as a result of land change. This new law must be targeted and result in urgent large-scale restoration across the EU and should create synergies between the biodiversity and the climate crisis agenda.

In general, wider policy coherence should be ensured with environmental policy instruments who could provide synergies in addressing climate and environmental issues such as the Zero Pollution Action Plan recently published by the European Commission and the implementation of the EU Methane Strategy.

6

Enabling financial mechanisms

The EC has proposed to allocate 25% of the EU budget to climate action in the Multiannual Financial Framework (MFF). Potentially, public spending within the EU budget can unlock further public and private investment. However, EU funding has a negative record on climate action related to agriculture. The funding must be allocated to research and development as a priority in order to scale-up promising agroecological practices.

Despite the calls for action, EU institutions are still incentivising harmful agricultural practices. EU funds that encourage the production and consumption of animal products should be phased out and redirected to accelerate a transition towards sustainable livestock production and healthy and sustainable diets that are higher in plant-based foods and include considerably less and better produced meat, dairy and eggs.

Finally, monitoring climate spending is crucial to achieve EU Green Deal ambitions. The European Commission must develop a robust methodology supported by scientific evidence to ensure that policy instruments truly deliver on their plan to reduce GHG emissions without negative trade-offs on other environmental dimensions such as biodiversity.

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European Climate Foundation

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