

# Carbon farming: is it the game-changer for agroforestry?

Agroforestry farmers get little support from the Common Agricultural Policy, but certified carbon farming payments will encourage its use. Here we make suggestions for the certification rules.

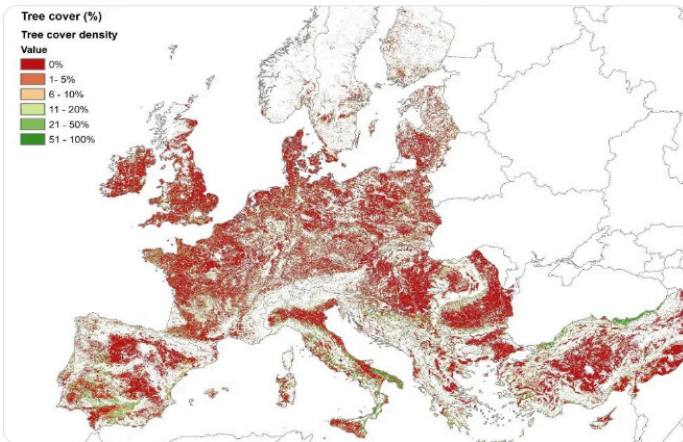


Figure 1: Areas with zero trees (deep red) on European grassland/cropland (Corine and Copernicus data 2018). New tree planting should be focused here.  
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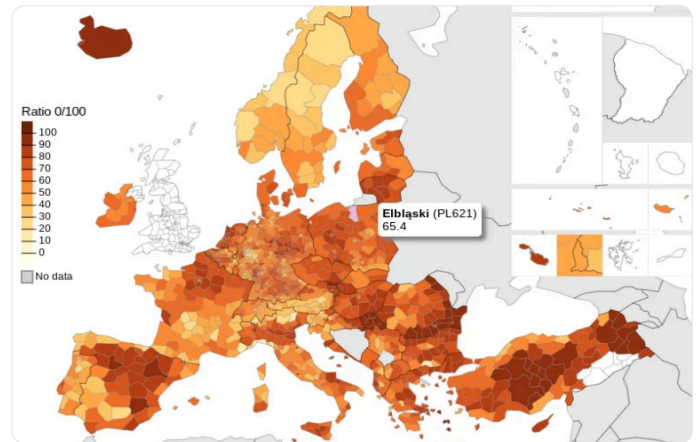


Figure 2: Provinces (NUTS3) with fewer trees on grassland/cropland areas (dark brown). Tree planting in these areas will bring greatest environmental benefit.  
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## /// Context ///

Funding for agroforestry is provided through the Common Agricultural Policy only for BE-FL, CZ, DE, EL, ES, IT, PI, PT and SK. However, even these Member States make very small sums available, and seldom publish the planting area targets.

Nevertheless, large-scale planting of agroforestry could be encouraged by agreement on the EU Carbon Removals Certification Regulation (CRCR – [10.4.24](#)). This agreement on the draft text will be followed by publication of an initial version of the Monitoring Reporting and Verification (MRV) rules for the certification of carbon-farming by October 2024. Three sets of rules are envisaged: a) agricultural soils and agroforestry, b) rewetting of peatlands, c) sustainable forest management.

EURAF is cooperating with several projects to input to these MRV rules. We recommend that the initial planning and establishment of agroforestry can be funded through the CAP, with successful plantations being accepted into voluntary or statutory certification from year 6 onwards. For example

- in year 0 tree-planting would be planned and baseline soil samples taken using “ecoschemes”
- in year 1 tree-planting would be supported through CAP “investment measures”

**Agroforestry is funded in the CAP of only seven Member States. Carbon farming support would make it viable everywhere.**

**Parklands, hedges, tree-lines and copses will benefit farms by bringing soil carbon, environmental improvement and increased revenues: especially in the “tree desert” areas of Europe.**

- in years 2-5 annual support would continue as a CAP “agri-environment-climate measure”.
- in year 6 the agroforestry area would be “adopted” into an approved voluntary carbon farming scheme, and a carbon-credit given according to observed tree-growth, sampled soil carbon changes and modelled emissions reductions.

The draft CRC Regulation recommends use of the national CAP Land Parcel Identification System (LPIS) to identify carbon-farming parcels. CAP/Copernicus orthophotos and Sentinel 1-2 images ([link](#)) will be used to monitor tree growth and soil carbon changes. Removals and reductions from the crop/grass alleys and tree-strips will be given in a combined report at the end of each 5-year monitoring period. The “activity period”, used for the overall calculation of carbon credits, will span the economic rotation of planted trees. Furthermore, if farmers elect to class the tree lines as statutory “Landscape Features” they will be protected in the same way as forest trees – giving a guarantee of “permanence” to the agroforestry system, and a potentially higher unit value for the carbon.

**95.2 million hectares of cropland/grassland in the EU-27 have zero trees, and 117.9 million hectares have less than 10% tree-crown-cover. Planting 10% of this by 2040 needs 750kha/yr. Is it possible?**



Figure 3: The six types of sustainability listed in the EU Sustainable Finance Initiative. The CRCF focuses on mitigation. (See EURAF Policy Briefing #28).  
Author: European Commission | © CC-BY

## /// Solution for a Resilient Future ///

To gain EU certified status, projects must meet 16 criteria (A-P) given in Annex I of the Carbon Removals Certification Regulation (CRCR). The first 14 concern removals and reductions – and can be met for agroforestry (AF) using existing methods. The final two concern sustainability monitoring, and new methods need to be developed – see next section.

**A. Description of “activity” and the practices and processes covered, including the activity and monitoring period.** For the purposes of the CRCR, agroforestry will be defined as “a land use system where trees and/or shrubs are purposefully grown in combination with agriculture in an agricultural parcel or on its boundaries”. The Monitoring Period will be 5 years, and the Activity Period (“rotation length”) will balance economics with long-term carbon capture and emission reductions.

**B. Rules for identifying carbon removal sinks and GHG emission sources.** Will follow IPCC (2003 and 2019) guidance including “temporary” net carbon removals, GHG net-emissions and predicted harvested wood products and biochar. Options for monitoring of GHG reductions from slurry and enteric fermentation will be included.

**C. Rules for calculation of a “standardised baseline”.** Must be “representative of the standard performance of comparable practices and processes in similar social, economic, environmental and technological circumstances and take into account the geographical context, including local pedoclimatic and regulatory conditions”. This is not practical for AF, because of insufficient data in different pedoclimatic conditions. Project baselines will therefore be used.

**D. Rules for calculating total carbon removals.** Will follow IPCC methodology, supplemented by best practice for measurement of carbon removals and GHG reductions in tree-lines and the soils of agricultural alleys. Monitoring methods (e.g. [CIFOR-ICRAF 2011](#)), models (e.g. [Hi-sAFe](#), [CARAT](#)), and existing standards (e.g. [LBC](#) and [VERRA](#)) will be described.

**E. Rules for calculating LULUCF soil emissions.** Will include all carbon fluxes and GHG emissions in forests, plus carbon fluxes in all land uses and changes (Chapter 7 of national GHG Inventory Reports).

**F. Rules for calculating agricultural soil emissions.** Will include all GHG emissions in agricultural land (Chapter 6 of national GHG Inventory Reports), but not wetlands.

**G. Rules for calculating GHG associated emissions –** Will include direct and indirect greenhouse gas emissions from soils and indirect land use change (ILUC). AF reduces both nitrate leaching and volatilization of ammonia – thereby lowering indirect N<sub>2</sub>O emissions. Land Use Change effects are unlikely since AF will continue as cropland or grassland.

**H. Rules for updating the standardised and activity-specific baselines.** Will include collaborative methodologies and metadata standards for agroforestry in different climate, management and soil conditions, and will eventually allow “standardised baselines”

**I. Rules to address uncertainties.** AF systems are complex, and quantification of uncertainty is vital. Monitoring will follow IPCC Tier 3 methods linked to process-based modelling and evaluation of model parameter sensitivity (Paul et al 2023, Negash et al 2015).

**J. Rules to carry out specific additionality tests.** Will be needed for projects using “activity-specific” baselines. Agroforestry projects should demonstrate: a) sustainability standards which exceed statutory CAP “conditionality” and b) lack of long-term financial viability without carbon payments.

**K. Rules on monitoring and mitigation of any risk of release of stored carbon.** AF projects will declare trees as “productive-landscape-features”, which cannot be removed without felling licences from forest authorities. Risks of fire are much lower in agroforestry than in conventional forestry.

**L. Rules on appropriate liability mechanisms for release of stored carbon.** All registered operators will require insurance but premiums will be lower for AF because of lower fire risk.

**The EU Carbon Removals Regulation gives “headline” monitoring criteria for carbon-farming - do these fit agroforestry?**

**Agroforestry and soil-carbon certification can build on initial CAP measures: eco-schemes (baselines - yr 0), investment (yr 1-establishment) and agri-environment-climate (yr 2-5 - maintenance)**

Tree location	Agroforestry system	Agroforestry practice	
		Agricultural land	Forest land
In parcels	Silvopastoral	1 Wood-pasture	9 Forest-grazing
	Silvoarable	2 Tree-alley-cropping 3 Coppice-alley-cropping 4 Multi-layer gardens	10 Multi-layer-gardens
	Permanent crop	5 Orchard intercropping 6 Orchard grazing	
	Agro-silvo-pasture	7 Alternating cropping and grazing	
Between parcels	Landscape features	8 Hedges, trees in groups, trees in lines, individual trees	
Settlements	Urban agroforestry	11 Homegardens, allotments, etc.	

Figure 4: The Agroforestry Typology used by the European Agroforestry Federation, and published in all EU Languages. | Author: EURAF | © CC-BY

**M. Rules for operationalising the procedures at the end of monitoring periods.** Will measure stored carbon in soil and timber, backed by evidence from LPIS orthophotos, remote sensing tools and certification for harvested wood products and biochar.

**N. Rules on monitoring of soil emission reductions.** Field or lab measurements of N<sub>2</sub>O and CH<sub>4</sub> are difficult and costly. Hence agroforestry projects will mainly rely on published and verified biophysical models.

**Voluntary carbon certification will then continue funding from year 6 onwards, with an option to withdraw from the scheme every 5-years, unless the farmer declares the trees as “landscape-features”.**

### /// Always Moving Forward ///

The final two [CRC](#) MRV Rules in Annex I (O and P) relate to Article 7 (Sustainability), which lists six objectives.

- *Climate change mitigation beyond net carbon removal benefit and net soil emission reduction*
- *Climate change adaptation*
- *Sustainable use and protection of water and marine resources*
- *Transition to a circular economy, including the efficient use of sustainably sourced bio-based materials*
- *Pollution prevention and control*
- *Protection and restoration of biodiversity and ecosystems*

New techniques are needed for projects to demonstrate “no significant harm” (Criteria O) for objectives 2-5 above and a “co-benefit beyond no significant harm” (Criteria P) for objective 6.

**(1) Climate change mitigation beyond net carbon removal and soil emissions.** The original draft of the CRCR did not include emissions from (a) soils, (b) slurry or (c) enteric fermentation. The revised draft now includes (a), and is likely to be amended in 2025 to include (b) and (c). When this happens, UNFCCC GHG climate change mitigation reporting requirements will be fully met.

**How will sustainability be monitored and could “high-biodiversity carbon-farming” get a higher price for carbon?**

**Payments for carbon sequestration can provide the impetus for large-scale introduction of agroforestry on “tree-deserts” and degraded land across Europe. Now we need to agree the monitoring rules!**

**(2) Climate change adaptation.** Agroforestry has a range of benefits for adaptation to climate change. These include a) increased soil organic matter, b) reduced soil erosion, c) increased fertility and resource use efficiency; d) greater resistance to droughts and floods; e) diversified landscapes and biodiversity; f) reduced pest and disease pressure; g) maintained crop yields and animal welfare; h) increased resilience to extreme events – including wildfires and storms; i) improved economic resilience; and j) reduced groundwater and air pollution. Surprisingly, agroforestry is mentioned in less than half of the Adaptation Strategies of EU Member States. See EURAF [Policy Briefing #27](#).

**(3) Sustainable use and protection of water resources.** Agroforestry in upland catchments increases the water holding capacity of soils and reduces stormwater flows. Riparian strips and lines of trees, established in a network of berms and swales, contribute to floodwater dispersal and management. In drought-prone areas, trees can be established after contour ripping, and combined with lagoons to conserve water supply locally. Areas high tree-cover evaporate rainfall which falls in downwind catchments. That evapotranspiration helps cool landscapes. The opportunity for hydrologic bioengineering is great, and needs greater cooperation between local authorities, river-authorities and farmer groups in the planning and planting of agroforestry and landscape features. See draft [Policy Briefing #64](#).



**(4) Contribution to the circular economy.** The circular economy in agriculture means food systems that build natural capital and allow nature to thrive. Agroforestry generates positive environmental outcomes for nature, while delivering a greater range of economic products, such as quality timber, biochar, wood-chips, and animal fodder. Agroforestry can be tailored to local contexts and merged with other practices such as more diverse crop varieties, keyline planting, cover crops, adaptive multi-paddock grazing, and living barns. See draft [Policy Briefing #67](#).

**(5) Pollution prevention and control.** Agroforestry benefits soil health, water quality and atmospheric pollution directly by i) binding soils in place, reducing water erosion, ii) reducing wind speeds and windborne erosion, including atmospheric pollution from phytochemicals, iii) absorbing excess nutrients, and iv) slowing down pollutant leaching to groundwater. The EU Directive on Soil Monitoring will help standardise soil monitoring methods, and the EU Farm Sustainability Tool for Nutrients is being provided by MS to record field-by-field information on soil carbon, fertiliser use and soil nutrient content. See draft [Policy Briefing #65](#).

**(6) Contribution to the protection of biodiversity and restoration of ecosystems.** EU CRCR co-legislators insisted that a positive co-benefit must be demonstrated for “biodiversity and ecosystem restoration” in carbon-farming. Detailed monitoring of biodiversity may be difficult in individual projects but management plans will focus on activities which are known to benefit biodiversity, together with continuing scientific research. Available scientific studies universally show biodiversity benefits of agroforestry compared to intensive agriculture, and a majority also show benefits compared to forest plantations. See draft [Policy Briefing #66](#).

**Rules are being developed by the EU Expert Group on Carbon Removals, and the ResAlliance project will be making submissions. Please use the ResAlliance Forum to make comments and keep in touch.**

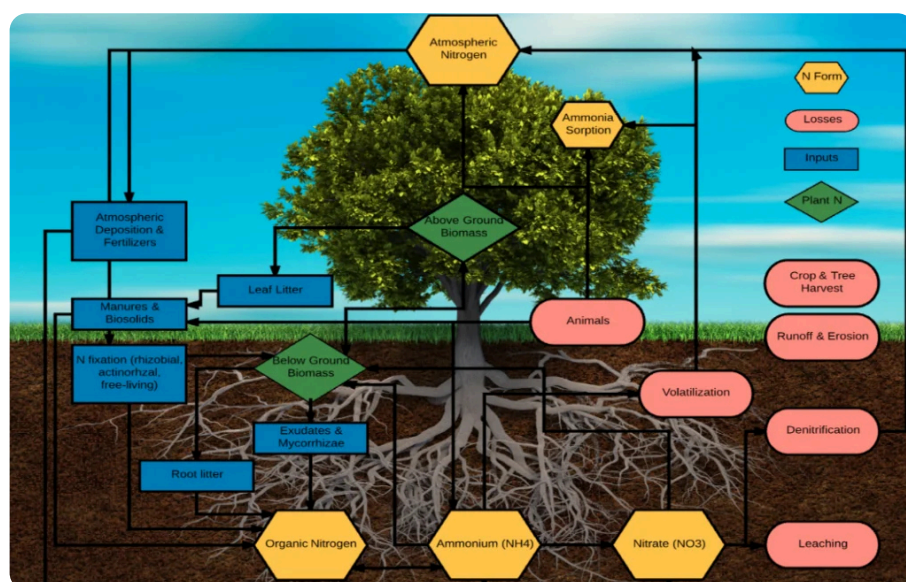


Figure 5: Trees increase soil organic matter and reduce direct emissions of nitrous oxide and indirect emissions of gaseous ammonia and nitrate in drainage.

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**Further information**

- Carbon Gap (2022) “A Guide to Carbon Removal” 2022 [pdf](#)
- CIFOR-ICRAF (2011) A protocol for modelling , measurement and monitoring soil carbon stocks in Agricultural landscapes. [pdf](#)
- DigitAF Project (2024) [www.digitaf.eu](http://www.digitaf.eu)
- EU Commission (2023) Updated [LULUCF Regulation](#)
- EURAF (2022) [Policy Briefing #20](#) “Agroforestry & the Carbon Removals Framework”
- EURAF (2023) [Policy Briefing #26](#) “Agroforestry and the 2040 AFOLU net-zero target.
- EURAF (2023) [Policy Briefing #29](#) “Agroforestry and the Sustainable Finance Initiative”.
- EURAF (2024) [Policy Briefing #8](#) “Agroforestry for carbon farming in the EU”
- EURAF (2024) [Press Release](#) “Agroforestry: vital to Europe’s Land Emissions Neutrality” 6.2.24
- EURAF (draft) [Policy Briefing #64](#). Agroforestry for sustainable use of water resources.
- EURAF (draft) [Policy Briefing #65](#). Agroforestry for pollution control.
- EURAF (draft) [Policy Briefing #66](#). Agroforestry for biodiversity and the protection of ecosystems.
- EURAF (draft) [Policy Briefing #67](#). Agroforestry and the circular economy.
- MVARC (2024) Interactive map of “tree deserts” in EU counties and provinces (NUTS3), [Website](#)
- Negash M, Kanninen M. (2015) Modelling biomass and soil carbon sequestration of indigenous agroforestry systems using CO2FIX approach. *Agric Ecosyst Environ.* 2015;203: 147–155.
- Paul C, Bartkowski B, Dönmez C, Don A, Mayer S, Steffens M, et al. (2023) Carbon farming: Are soil carbon certificates a suitable tool for climate change mitigation? *J Environ Manage.* 330.
- VCS (2024) Verified Carbon Standard [Program Details](#)

**Acknowledgment / Contribution:** Thanks to colleagues in the EU DigitAF Project ([www.digitaf.eu](http://www.digitaf.eu)), particularly for Figures 1 and 2.

**Authors:** Gerry Lawson | **Partners:** EURAF – European Federation of Agroforestry