

SOIL CARBON EUROPE

Healthy Soil & Decarbonization

Position paper · Non-paper

Regenerative Agriculture & Soil Carbon

Regenerate soil health, remove and store carbon on farmland, increase resilience in agriculture

Brussels · November 2026

SOIL CARBON EUROPE

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November 2026 · Version 1.2

Our Mission

Regenerate soil health, remove and store carbon on farmland, increase resilience in agriculture

We believe net zero goals enshrined in the EU's laws and regulations cannot be reached without a significant contribution from the European farming sector.

It is our firm conviction that the regenerative agriculture movement offers significant potential in carbon removal of at least 100 million tonnes annually with strong financial incentives offered by carbon buyers and policy makers.

Soil Carbon Europe (SCE), an association based in Brussels, will bring together farmers currently engaged in regenerative agriculture, leading carbon credit originators and buyers as well as the policy community to facilitate In Soil Carbon credits at scale.

Our mission is to increase the volume of voluntary carbon removal credits based on advanced certification protocols developed in coordination with the European Commission and EU Member States.

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Introduction

Based on preliminary consultations with stakeholders in Brussels, Amsterdam, Berlin, Vilnius, London, Paris, Zurich and Milan we have achieved consensus on the following guiding principles:

1 Soils are strategic infrastructure

Set a quantitative EU target for soil carbon and function to support climate, food security and adaptation

2 Start from principles

The Five Stars set practical principles; farms choose suitable tools and measure outcomes

3 Keep outcomes apart

Keep sequestration, permanent removal, emission reductions and nature gains separate in every claim

4 Biochar adds durability

Sustainable biochar stores part of plant-captured carbon for centuries

5 One digital MRV

Free dMRV for every SCE-network project; blockchain-secured biochar records are next

6 Farmers first

Farmers should not develop projects alone, bear all risk or receive the smallest value share

7 Credits finance the transition

Credits fund farm transitions; buyers must still cut their own emissions

8 Carbon and nature together

Align rules, data and registries across CRCF and the Commission's Roadmap towards Nature Credits

9 Learn on real farms

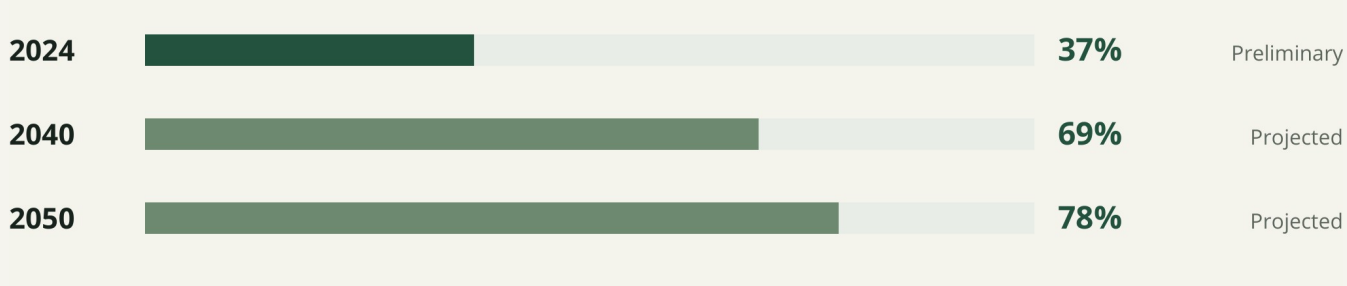
Test methods, costs and results on European demonstration farms before finalising rules

"Farmers should not develop projects alone, bear all risk or receive the smallest value share."

The Scale of the Challenge

The European Climate Law makes climate neutrality by 2050 legally binding. Every tonne of greenhouse gas still emitted then must be balanced by a tonne removed.

Net emission reductions versus 1990



Source: EEA. 2024: preliminary. 2040 and 2050: projections with existing and planned measures.

Where the EU stands

Net emissions in 2024 were 37% below 1990 levels, according to preliminary figures of the European Environment Agency (EEA).

Where current policy leads

With existing and planned measures, the EEA projects net emissions 69% below 1990 in 2040 and 78% below in 2050. Both figures fall short of the targets.

What the Commission assumes

For a 90% net reduction by 2040, remaining emissions must stay below 850 million tonnes of CO_2 equivalent, and removals must reach up to 400 million tonnes a year.

SCE's stress test

SCE plans with a removal need of one billion tonnes a year. This is a stress test for policy design and not a forecast. It reflects the gap that remains in the EEA projection for 2050.

Carbon removal consumes energy

Direct air capture requires in the order of 1,500 kilowatt-hours of heat and electricity per tonne of CO_2. Removing one billion tonnes this way would take about 1,500 terawatt-hours a year, more than half of the EU's current electricity consumption.

“Photosynthesis supplies that energy free of charge.”

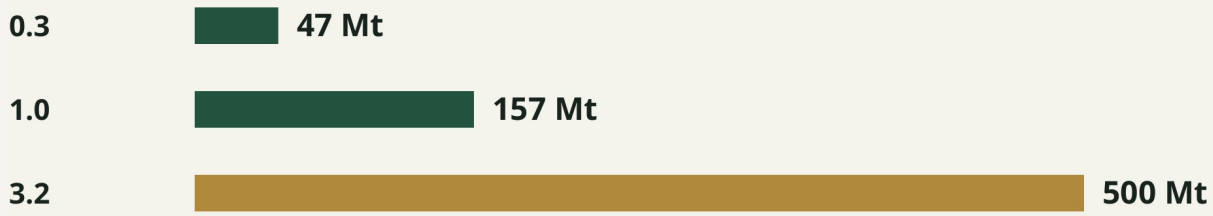
Plants use sunlight to turn atmospheric CO_2 into biomass and soil organic carbon. Oceans, forests and farmland are the three large photosynthetic systems. Forests store substantial carbon, but converting farmland to forest at the scale required would compete with food production. This paper therefore concentrates on agricultural land, which EU policy can influence directly.

The Case for Agricultural Soils

The EU counted 9.1 million farms and 157.4 million hectares of utilised agricultural area in the 2020 agricultural census. No other managed system in Europe offers a comparable surface for carbon sequestration.

The chart shows what different average rates would deliver across that area. It is arithmetic and makes no claim that every hectare can achieve the same rate.

Illustrative annual CO_2 totals across EU farmland



Left: tonnes of CO_2 per hectare and year. Bars: million tonnes of CO_2 per year across 157.4 million hectares. Illustrative arithmetic, not a forecast.

0.3 tonnes of CO_2 per hectare and year

About 47 million tonnes. Close to the 42 million tonnes the Commission expects from carbon farming by 2030

1 tonne of CO_2 per hectare and year

About 157 million tonnes. Upper end of typical published rates for single practices

3.2 tonnes of CO_2 per hectare and year

About 500 million tonnes. Half of SCE's stress test. Requires combined practices on all farmland

What 3.2 tonnes means in the soil

Under illustrative assumptions (25 cm depth, bulk density of 1.3 tonnes per cubic metre, 55% carbon in soil organic matter), one percentage point of soil organic matter equals about 65 tonnes of CO_2 per hectare. A rate of 3.2 tonnes therefore corresponds to an increase of roughly 0.05 percentage points a year.

What practitioners report

Individual regenerative farms report gains well above this benchmark. These results need independent verification before they can guide policy.

What limits apply

Soils differ by type, climate and starting condition, and gains slow as a new balance is reached.

Conclusion

The potential of farmland soil is large enough to justify a strategic EU objective, and uncertain enough to require measurement on real farms. Both follow in this paper.

The Five Stars

Five agronomic principles guide regenerative agriculture for SCE. They describe what the farming system should do. Farmers choose practices that fit their conditions and measure the outcomes separately.

Five principles for healthy soils and productive farms



Illustration of the five principles in a farm landscape.

“A regenerative farm must remain a productive farm.”

The stars set a direction. Soils, climates and farm structures differ across Europe, so the right mix of practices differs too. A practice counts when it suits the farm and when its results can be shown. Soil carbon is measured as an outcome of the system as a whole, alongside crop quality, yield stability and farm economics.

Putting the Principles into Practice

1 Use soil disturbance strategically

No-till or reduced tillage where suitable; shallow cultivation or targeted loosening where it improves rooting, crop establishment or soil function

Outcomes. Better soil structure and rooting, active soil life, less erosion

2 Maximise living roots, photosynthesis and soil cover

Cover crops, undersowing, crop residues and mulch; keep plants growing for as much of the year as practical. Photosynthesis supplies carbon to roots and, through root exudates, to soil microorganisms.

Outcomes. More photosynthesis and feeding of soil life, less erosion and heat stress, better moisture retention

3 Build diverse crop rotation

Multi-year rotations with varied crop seasons, plant families and rooting depths; mixtures and intercropping where useful. Where mulch is used at scale, plan biomass production within the rotation, considering nutrient balance, land use and cost.

Outcomes. More resilient production, functional biodiversity, lower pest pressure

4 Build active soil biology and nutrient cycling

Manage decomposition of green manures, residues, compost and manure to support nutrient cycling; match timing and treatment to material condition, soil and crop needs. Shallow incorporation and sustainable biochar where suitable.

Outcomes. More active soil life, better nutrient cycling and soil structure; measurable gains in soil organic carbon where conditions allow, with biochar carbon accounted for separately

5 Grow healthy, well-nourished crops

Use crop and soil data to balance nutrition for photosynthesis, rooting and metabolism. Root exudates feed microorganisms that can aid nutrient cycling and crop health. Use healthy planting material and targeted organic or mineral inputs as needed.

Outcomes. Strong photosynthesis and rooting, crop quality and stable yields

Quality and yields

Quality and yields belong to regeneration. A regenerative farm must remain a productive farm. Star 5 covers crop health and balanced nutrition; crop quality and yield stability are outcomes to measure.

Healthy planting material

Healthy planting material supports Star 5. Tissue-culture plants can help perennial crops, trees and agroforestry establish where suitable. They are one tool among others, and their effect should be assessed on the farm.

Supporting practices and management

What supports the stars: livestock integration, landscape measures such as swales, buffer strips and hedgerows where they fit the farm, and targeted use of biochar where appropriate.

Observe, measure, test and adapt

Observe soil and crop conditions, use targeted measurements to identify constraints and test changes through on-farm comparisons. Evaluate the results and adapt management, then scale up successful methods. Measurements can include rooting, crop health and quality, soil structure, soil chemistry and biological activity; plant-sap analysis where useful.

The direction is less dependence on synthetic inputs as the soil-plant system improves. Regeneration takes five to ten years.

SCE's approach is consistent with international initiatives such as "4 per 1000", launched by France at COP21 in 2015 to promote higher soil carbon stocks.

From Practice to Outcomes

Regenerative practices produce different kinds of results. Each needs its own measurement, its own claim and, where the EU provides one, its own instrument.

Carbon sequestration in soils and biomass

CO_2 taken from the air by plants and stored in soil organic matter or woody biomass. Storage is biological and reversible

CRCF carbon farming, temporary units

Permanent carbon removal

Carbon stored in a stable form for centuries, as in biochar

CRCF permanent removals

Soil emission reductions

Nitrous oxide, methane or CO_2 emissions avoided through better management

CRCF carbon farming, soil emission reduction units

Nature and biodiversity gains

Measurable improvement of habitats and species on and around the farm

Nature credits, under development

Wider benefits

Water retention, food-system resilience, food quality, less pollution

Recognised as co-benefits and through public funding



Illustrative farm landscape.

On wording

SCE uses "carbon sequestration" for the transfer of atmospheric CO_2 into soil and biomass. "Carbon removal" refers to additional storage against a credible baseline that has been independently verified. Claims must state the storage duration and reversal risk. Soil organic carbon and biochar carbon are tracked as separate stocks.

“A buyer, a regulator and a farmer must all know what a unit stands for.”

Merging the categories is the fastest way to lose trust in agricultural carbon markets.

Wider Benefits of Regenerative Farming

Regenerative farming can improve soil function, crop health and farm resilience alongside carbon storage. These outcomes serve EU objectives for climate adaptation, food security, biodiversity and rural resilience.

Water absorption and retention

More organic matter improves soil structure, infiltration and plant-available water. Estimates of the extra water held per percentage point of organic matter range from a few tens to about 250 tonnes per hectare, depending on soil texture and depth.

Soils act as a distributed reservoir: less runoff and erosion, lower flood risk, more drought resilience.

Food-system resilience

Deeper rooting, better water dynamics and active nutrient cycling. Diverse rotations spread biological and economic risk.

Production is less exposed to drought, intense rain and input price shocks.

Food quality and health

Soil biology, crop diversity and lower reliance on synthetic inputs may influence nutrient density and residues.

A food system that is sufficient, affordable and progressively more nutritious.

Biodiversity and less chemical pollution

Diverse rotations, cover crops, hedgerows and agroforestry create habitat and food for soil organisms, pollinators and birds.

Supports the Nature Restoration Regulation and reduces pressure on water and ecosystems.

How to assess a regenerative transition

“In tonnes of carbon, and equally in yield stability, input dependence, farm profitability and resilience over time.”

On food quality

The link between soil health and nutrient density is plausible and under active study, for instance by the Bionutrient Food Association. SCE does not claim that regenerative farming automatically yields more nutritious food. It asks the EU to fund comparative research on nutrient density, residues and health outcomes across farming systems.

Realistic Expectations and Durability

SCE prefers field data to headline numbers. Overstating what soils can deliver damages credibility as much as understating it.

Rates vary widely

Published gains in European arable soils range from close to zero to around one tonne of CO_2 per hectare and year for single practices. A meta-analysis of cover crops found an average of 0.32 tonnes of carbon per hectare and year, roughly 1.2 tonnes of CO_2 (Poeplau and Don, 2015).

Depleted soils gain most

Soils with low organic matter have the most room to improve. Farms with good soils must not be penalised for having less headroom.

Gains slow down

Soil carbon builds slowly and levels off as a new balance is reached.

“Carbon payments are therefore strongest during the transition years.”

Storage can be reversed

Drought, erosion or a change of management can release stored carbon. Claims must reflect that risk.

How to manage the risk

Commitment periods

Defined commitment periods of five to ten years, with clear rules for losses beyond the farmer's control.

Shared buffers

Buffer reserves held across a portfolio of farms, so that no single farmer carries the full liability.

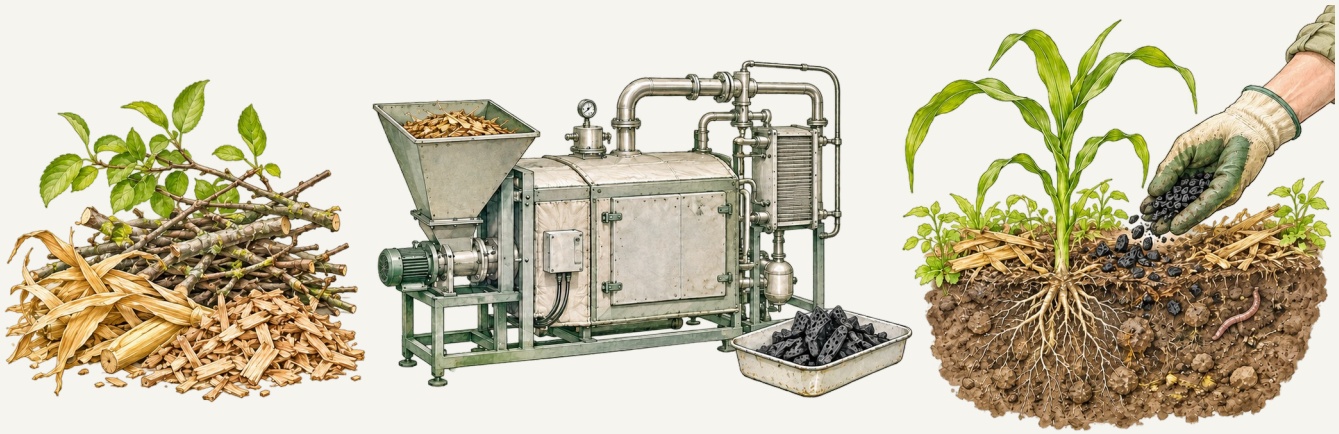
Duration labelling

Honest labelling of duration, so that temporary biological storage is priced and communicated differently from permanent removal.

Biochar and Durable Carbon Storage

Biochar turns part of the carbon captured by plants into a stable material that can resist decay for centuries. It links living carbon in the soil with permanent removal.

From plant carbon to durable storage



Sustainable feedstock
Traceable residues and biomass

Clean pyrolysis
Stable carbon and measured emissions

Agronomic application
Rates suited to soil and crop

Illustrative biochar pathway.

How it works

Biomass is heated with little oxygen (pyrolysis). Carbon that would otherwise return to the air within years stays in the char, which is then worked into the soil.

Where it stands in EU law

Biochar is covered by the CRCF methodology for permanent removals, in force since May 2026.

What it adds on the farm

Depending on soil and crop, it can improve water holding, nutrient retention and soil life.

Why it suits farms

Decentralised pyrolysis units process local biomass close to the field and supply heat at the same time.

SCE's conditions for sustainable biochar

Sustainable feedstock. Residues, prunings and sustainably grown biomass with proof of origin. No competition with food production or with the organic matter the soil needs

Clean production. Pyrolysis gases fully combusted, emissions measured, heat used where possible

Tested quality. Each batch analysed for carbon content, stability and contaminants

Agronomic fit. Applied where soil and crop benefit, at suitable rates. Biochar is no universal remedy

Separate accounting. Biochar carbon and soil organic carbon are measured and reported as two different stocks

Full life cycle. Emissions from transport, processing and application are deducted

dMRV: Proof for Every Tonne

Measurement, reporting and verification must be credible and affordable. SCE's answer is a shared digital MRV that every project in its network receives, free of charge for farmers.

Five layers, one evidence record

1 Parcel

Each field with a unique georeferenced identity. A parcel can be registered only once, which prevents double counting at the source.

2 Practice

Farm practices linked to the Five Stars principles, with dates and locations. Links outcomes to management.

3 Measurement

Soil and crop indicators, remote sensing of cover and moisture, biochar batch data. Proportionate evidence at low cost.

4 Verification

Access for independent certification bodies. Auditors check data instead of collecting it again.

5 Use

Export to certification schemes, registries and reporting. One data set serves CRCF units, nature credits and company reporting.



Illustrative farm monitoring.

Principles of the dMRV

Proportionate

Measure what matters and verify what matters. A farm is not a research laboratory.

Farmer-owned data

Farmers decide who sees their data and for what purpose.

Open and interoperable

Data formats are open, so that certification schemes, national systems and the future EU registry can connect.

Shared

National alliances and research partners can use the same system for their own data collection.

“A farm is not a research laboratory.”

Biochar on the Blockchain

Biochar is the natural starting point for a ledger-based record, because every batch is physical, weighed and tested. SCE will pilot this as the next stage of its dMRV.

1 Production → 2 Application → 3 Certification → 4 Transfer → 5 Retirement

What the ledger records

Production

Each batch receives a digital passport at the pyrolysis unit: origin of the biomass, weight, laboratory values, emission data.

Application

The batch is linked to the geo-referenced parcel where it is worked into the soil.

Certification

The independent certifier confirms the batch. The certified unit refers to one batch and one parcel.

Transfer

Units move only between identified accounts. The registry entry is the token, so no second copy can circulate.

Retirement

Retirement is final and public and names the beneficiary.



Physical batch evidence and laboratory checks.

What this achieves

The same tonne cannot be transferred or retired twice, and buyers and authorities can trace each unit back to its batch and field.

What it does not replace

Independent verification remains necessary. Double registration with another scheme is prevented by the unique parcel identity and by cross-checks between registries.

Safeguards

No tokens on future tonnes, no sale to retail investors and no speculative trading. The legal status under EU financial-market rules is clarified before launch.

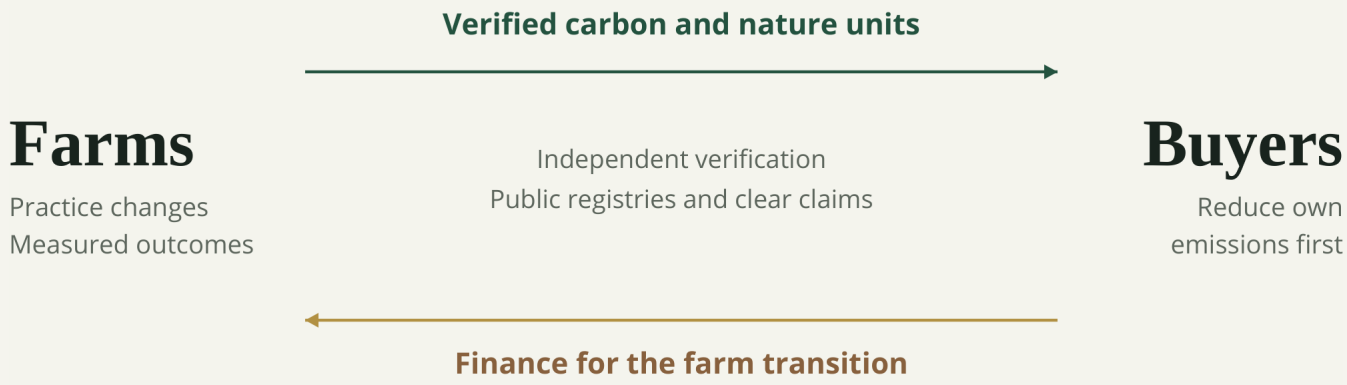
Fit with EU rules

The approach is technology-neutral. It meets the registry requirements of the CRCF and can deliver its data to the EU registry planned for 2028.

Credits Finance the Transition

Carbon and nature credits are instruments to pay for change on farms. They give buyers no licence to continue emitting.

Paying for change on farms



Conceptual relationship between farm outcomes and transition finance.

A transition instrument for farmers

Transition costs arise in the first years, sequestration is highest during the change of practice, and payments are most needed then.

A complement for buyers

Companies should first reduce their own direct and energy emissions. Credits come on top of that.

Honest claims

Buyers state what they bought, which category it belongs to and how long the storage lasts. Temporary storage is never presented as permanent removal.

No greenwashing

Past failures in voluntary carbon markets show how fast trust is lost. Independent verification, public registries and clear claim rules are the safeguard.

“They give buyers no licence to continue emitting.”

Farmers First

A framework that ignores farm economics stays a policy on paper. The farmer must not become the cheapest part of the value chain.



Illustrative collaboration between farmers and an adviser.

Aggregation

The average EU farm has about 17 hectares and cannot carry the fixed cost of a carbon project by itself. Cooperatives, regional programmes and aggregators should handle baselines, MRV, certification and sales on behalf of groups of farms.

Fair share

The share of the final credit price that reaches the farmer has often been low. SCE asks for transparent value chains and a minimum farmer share.

Fair treatment of pioneers

Farmers who changed their practices before carbon finance existed should be recognised for verified storage above a credible regional baseline and for maintaining it.

Three questions every scheme should answer

“Who pays for the transition?
Who captures most of the value?
Who carries the risk
if carbon is lost?”

If the honest answer to all three is "the farmer", the scheme is badly designed.

Simple payments

Public support should reward results that are easy to observe, such as days of green cover, and keep paperwork to a minimum.

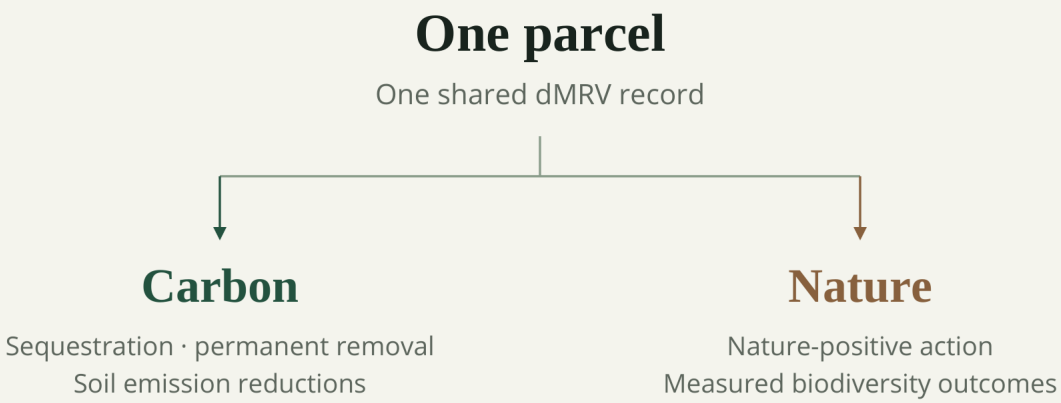
Transition costs

Seed, equipment, advice, sampling and possible yield variation come first. Lower input costs, better soils and steadier yields follow later. Carbon and nature finance should bridge that gap without becoming the farm's main income.

Carbon and Nature in One Architecture

The EU now has two tracks: the CRCF for carbon and the Roadmap towards Nature Credits for biodiversity. For a farmer they describe the same field. SCE asks that they be built to work together.

Shared data, separate claims



CRCF permanent removals

Methodology in force since May 2026

Biochar from sustainable biomass

CRCF carbon farming

Methodologies adopted in July 2026, entry into force pending

Soil carbon, agroforestry and soil emission reductions, with mandatory biodiversity co-benefits

Demand

EU Buyers' Club

Platform open since June 2026

Long-term demand for certified units

Nature credits

Roadmap COM(2025) 374: expert group, work on methodologies and governance until 2027, pilot project, review in 2027

Certification of nature-positive action, followed by credits for measured outcomes

Nature Credits and the EU Buyers’ Club

SCE’s positions on nature credits

Use the Five Stars as a practical basis for certifying nature-positive action on farmland. They are simple, observable and already practised.

Follow the two-step model of the roadmap: certify the action first, then issue credits as results are measured.

Measure once: The same parcel data should serve carbon farming units and nature credits.

Set clear stacking rules: One hectare can deliver carbon and biodiversity. Rules must say when both may be sold and how double counting is excluded.

Think small first: Methods and governance must work for smallholders and aggregated groups.

Separate the roles of project developer, certifier and registry, as the roadmap demands.

SCE’s proposals for the EU Buyers' Club

5–10

years

Multi-year commitments of five to ten years instead of spot purchases.

Price transparency and floors, so that farms can plan.

Standard contracts that allocate risk fairly and protect the farmer's share.

Priority access for aggregated small and medium-sized farms.

Clear category labels, so buyers know whether they purchase temporary carbon farming units or permanent removals.

“The same parcel data should serve carbon farming units and nature credits.”

Real-Farm Demonstration Programme

SCE proposes a network of monitored farms across European regions that produces the data policy still lacks.

1 **Baseline** Year 1

2 **Practice** Years 2–3

3 **Verification** Years 4–5

4 **Scale** From year 5

Programme phases

Baseline · Year 1

Select farms in five to eight regions and record soils, carbon stocks, biodiversity and management in the dMRV.

Practice · Years 2 to 3

Test Five Star practices through farm comparisons; monitor soil, water, biodiversity, yields and farm economics.

Verification · Years 4 to 5

Apply CRCF-aligned verification, test MRV cost and the biochar ledger, record crop quality.

Scale · From year 5

Publish results, feed them into EU methodologies and extend to more farms.



Illustrative monitored farm and trial plots.

Questions to answer

What does MRV cost per farm?

Which sampling intensity gives enough confidence?

Which sequestration rates do combined Five Star practices reach in the field?

How do biochar and living soil carbon interact?

How do crop quality and yields develop?

Partners and open findings

Partners should include farmers and their organisations, national regenerative alliances, the Joint Research Centre, national research institutes, certification bodies, buyers and MRV providers. **All findings are published openly.**

Policy Recommendations

SCE addresses twelve recommendations to the European Commission, the European Parliament and the Member States.

1 Make soils a strategic objective

Recognise the restoration of soil carbon and soil function as an objective for climate, food security and adaptation, and set a quantitative EU target for agricultural soil carbon

2 Reward regenerative outcomes in the CAP

Shift direct payments step by step towards regenerative outcomes with simple, measurable criteria. Example: EUR 365 per hectare for 365 days of green cover, reduced by EUR 1 for each day of bare soil

3 Simplify additionality

Presume additionality for activities that go beyond legal requirements and exceed a standardised regional baseline. Recognise pioneers for verified storage and its maintenance

4 Keep categories and durations distinct

Separate carbon sequestration, permanent removal, emission reductions and nature gains in certification, marketing and reporting

5 Keep MRV proportionate and digital

Tiered requirements by size and risk, supported by digital tools and shared data infrastructure

6 Make aggregation the default

Standard rules for group projects, portfolio monitoring and reversals

Example in SCE's CAP proposal

365

days of green cover

EUR 365 per hectare

EUR 1 less for each day of bare soil

Policy Recommendations Continued

7 Enable sustainable biochar

Practical rules for farm-scale and decentralised production, with strict safeguards on feedstock and emissions

8 Bring removals into EU carbon pricing

Admit permanent removals such as biochar to the EU ETS framework. Give soil carbon units a dedicated demand instrument that reflects their duration

9 Accelerate the EU registry

One EU-administered registry for all certified units ahead of the 2028 deadline, open to digital and ledger-based project data

10 Create a European Central Carbon Bank

An EU institution that buys certified removals, channels revenue from emitters to removers and keeps prices stable. SCE proposes a corridor of EUR 80 to 120 per tonne around a target of EUR 100

11 Connect carbon and nature

Shared data, registries and stacking rules between the CRCF and nature credits

12 Fund real-farm pilots and keep methods learning

Horizon Europe, LIFE and the nature credits pilot support demonstration farms. Methodologies are reviewed regularly against field data

SCE's proposed price corridor



SCE proposal for certified removals, EUR per tonne.

Conclusion

Europe does not need another agricultural carbon system that works only on paper.

“It needs one that works on farms.”

The Five Stars give farmers, buyers and regulators a common language for farm management. Biochar adds durability. A shared dMRV supplies the evidence. Fair rules make sure the value reaches the people who manage the land.

SCE does not sell credits and does not run a standard. It is ready to work with the Commission, the Parliament, Member States, research institutions, certification schemes, buyers and above all farmers, step by step and at a pace the system can absorb.

About SCE

Soil Carbon Europe (SCE) is an international non-profit association (AISBL) based in Brussels. It speaks for farmers and practitioners of regenerative agriculture in European policy.

What SCE does

It represents its members, provides a shared dMRV free of charge to farmers, and connects projects with independent certification and buyers.

What SCE does not do

It does not operate a certification standard, and it does not issue or sell credits.

SOIL CARBON EUROPE

Healthy Soil & Decarbonization

Certification

Projects in the SCE network are referred to independent certification. The current partner is ONCRA, an open certification scheme that has applied for recognition under the CRCF.

Members

farmers and farmer groups, biochar producers, technology and MRV providers, researchers, food and agri-businesses, and national regenerative alliances.

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This position paper represents the views of Soil Carbon Europe (SCE). It is a contribution to European policy discussion and does not represent the official position of any EU institution. Contact: regenerative-agri.eu

Illustrative artwork was generated using AI tools.

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