

Why do research and innovation (R&I) on agriculture and climate action matter?

Impacts of climate change such as increased surface temperatures, changing precipitation patterns and prolonged draughts are becoming increasingly evident. People working on and with the land are most directly affected. To limit and manage those negative impacts, greenhouse gas (GHG) emissions must be reduced through mitigation measures and resilience must be built through adaptation measures.

Agriculture accounts for 11% of direct GHG emissions in the EU, with much higher shares in some countries and in overall emissions of two particularly powerful GHGs: methane (mainly from livestock farming and rice cultivation) and nitrous oxide (mainly from soil management and fertilisers). While agricultural GHG emission levels in the EU have fallen since 1990, the decrease has become slower over time. R&I is needed to achieve necessary further reductions, through technological innovation and changes in agricultural practices, and to inform policy-making.

While some changes in land use, such as conversion of grassland into arable fields, result in additional emissions of carbon dioxide (CO₂), other land-use practices also provide opportunities to remove CO₂ from the atmosphere by storing carbon in soil and in biomass. Next to emission reductions, such land-based carbon removals play an important role in achieving the EU's 2050 climate neutrality objective. R&I is identifying and further developing different options for carbon-removing practices as well as addressing social and technological challenges involved in their widespread application.

Triggered by the continued accumulation of GHG emissions in the atmosphere, changes in temperature, precipitation, and extreme weather events are already affecting crop yields, livestock production, and food security also in Europe. R&I is helping agriculture adapt to climate change, e.g. through the development of decision support tools and customised technologies or the breeding of novel crop varieties.

Agriculture and climate under Horizon 2020 and Horizon Europe



CORDIS search keywords

climate change, mitigation, adaption, transition, resilience, smart solutions



Nb of projects

47 Horizon 2020

77 Horizon Europe*



EU contribution

€ 307 million

€ 600 million

Figures comprise Horizon 2020 SC2 and Horizon Europe CL6 projects, including WP2023-2024 expected projects / Selection of a few projects logos





Success stories on agricultural R&I for climate change mitigation and adaptation

Supporting adaptation and increased resilience

[VISCA](#) (Vineyards' Integrated Smart Climate Application, 2017-2020) developed a decision support system integrating weather forecasting, seasonal predictions, climate projections, crop planning, irrigation modelling and other information to help the southern European wine industry adapt to climate change and remain competitive.

[LANDSUPPORT](#) (2018-2022) developed an easy-to-use web platform that helps land managers make sense of remote sensing data combines satellite, drone and remote sensing data with cutting-edge models. Farmers (as well as policymakers and citizens) can easily find relevant information and make informed environmental choices. The platform also makes it possible to assess resilience to climate change.

Enabling more widespread and successful application of climate-smart agriculture

To protect carbon stored in plants and soils and to increase the amount of CO₂ captured from the atmosphere in the land sector, the European Commission has proposed to create additional incentives for the adoption of climate-smart agricultural practices. This initiative has been informed by Horizon-funded research on the potential for soil carbon sequestration on agricultural land, e.g. in the context of [EJP SOIL](#) (2020-2025).

For carbon farming in particular to become a viable business model, technologies for measuring carbon removals need to be improved, become less expensive and widely available, and Horizon Europe projects are tackling different aspects of this challenge. The creation of an international research consortium on soil carbon, building on [CIRCASA](#) (2017-2021) and [ORCaSa](#) (2022-2025), will accelerate learning about promising technologies and practices on a broader international scale.

Additional projects addressing challenges and opportunities of climate-smart practices have recently been launched or are coming online in the near future, with a focus on networking and place-based innovations (see pages 3 and 4). Among them, [Climate Farm Demo](#) is setting up a large network of 1500 pilot demo farms across 27 European countries, to increase and speed up the adoption and dissemination of practices for adaptation and mitigation, with the aim of reducing GHG emission by 30% on the participating farms.

Horizon 2020 and Horizon Europe collaborative projects on agriculture and climate

Below is a selection of relevant projects under Horizon 2020 and Horizon Europe (Work Programmes 2021 and 2022). Some climate-related projects also contribute to sectorial R&I agendas (e.g. animal production, plant breeding, forestry) or to other horizontal objectives (e.g. agroecology) and are included in different factsheets in this series.

Follow the **CORDIS** links (where available) for more information on the projects' start and end dates, EU contribution, coordinator and results.

Website	Project	CORDIS
Agroecology-TRANSECT	Trans-disciplinary approaches for systemic economic, ecological and climate change transitions	101060816
AgroFossilFree	Strategies and technologies to achieve a European fossil-energy-free agriculture	101000496
BrightSpace	Towards a safe and just operating space for EU agriculture	101060075
CIRCASA	Coordination of international research cooperation on soil carbon sequestration in agriculture	774378
ClieNFarms	Climate Neutral Farms	101036822
Climate Farm Demo*	A European-wide network of pilot farmers implementing and demonstrating climate-smart solutions for a carbon-neutral Europe	101060212
ClimateSmartAdvisors*	Connecting and mobilizing the EU agricultural advisory community to support the transition to Climate Smart Farming	101084179
CREDIBLE*	Building momentum and trust to achieve credible soil carbon farming in the EU	
ECO-READY	Achieving ecological resilient dynamism for the European food system through consumer-driven policies, socio-ecological challenges, biodiversity, data-driven policy, sustainable futures	101084201
EJP SOIL	European Joint Programme on Agricultural Soil Management	862695
CarboSeq	Soil organic carbon sequestration potential of agricultural soils in Europe	
CLIMASOMA	Climate change adaptation through soil and crop management: synthesis and ways forward	
INSURE	Wet management of cultivated peatlands: a sustainable land use option for peat soils	
Road4Schemes	Roadmap for carbon farming schemes	
SOMMIT	Sustainable management of soil organic matter to mitigate trade-offs between C sequestration and nitrous oxide, methane and nitrate losses	
SoilX	Soil management to mitigate climate change-related precipitation extremes	
HyPErFarm	Hydrogen and photovoltaic electrification on farm	101000828
LAMASUS	Land management for sustainability	101060423
MARVIC*	Developing and testing a framework for the design of harmonized, context specific monitoring, reporting and verification systems for soil carbon and greenhouse gas balances by agricultural activities	
MRV4SOC*	Monitoring, reporting, and verification of soil organic carbon and greenhouse gas balance	
ORCaSa	Operationalising the international research cooperation on soil carbon	101059863
RES4LIVE	Energy smart livestock farming towards zero fossil fuel consumption	101000785
TheGreefa	Thermochemical fluids in greenhouse farming	101000801

* Some recently selected projects do not yet have a website and/or CORDIS entry at the time of publication (May 2023).



Relevant sources of information supporting agricultural adaptation to and mitigation of climate change

Climate under EIP-AGRI activities – Focus Groups

- [Carbon storage in arable farming](#)
- [Grazing for carbon](#)
- [Reducing emissions from cattle farming](#)
- [Enhancing production and use of renewable energy on the farm](#)
- [Soil organic matter content in Mediterranean regions](#)

Other relevant R&I programmes

- [PRIMA](#): Partnership for Research and Innovation in the Mediterranean Area

In the pipeline and future funding opportunities

Closed calls (project selection in progress)

- HORIZON-CL6-2023-CLIMATE-01-4: [Demonstration network on climate-smart farming – linking research stations](#)
- HORIZON-CL6-2023-CLIMATE-01-5: [Pilot network of climate-positive organic farms](#)
- HORIZON-CL6-2023-CLIMATE-01-6: [Analysing fossil-energy dependence in agriculture to increase resilience against input price fluctuations](#)

Open calls (until 20 September 2023)

- HORIZON-MISS-2023-SOIL-01-04: [Innovations to prevent and combat desertification](#)
- HORIZON-MISS-2023-SOIL-01-09: [Carbon farming in living labs](#)
- HORIZON-MISS-2023-CLIMA-OCEAN-SOIL-01-01: [Joint demonstration of an integrated approach to increasing landscape water retention capacity at regional scale](#)

Forthcoming calls

- HORIZON-CL6-2024-CLIMATE-01-2: [Socio-economic, climate and environmental aspects of paludiculture](#)
- HORIZON-CL6-2024-CLIMATE-01-3: [Paludiculture – large-scale demonstrations](#)
- HORIZON-CL6-2024-CLIMATE-01-4: [Land use change and local/regional climate](#)
- HORIZON-CL6-2024-CLIMATE-01-7: [EU-China international cooperation on improving monitoring for better integrated climate and biodiversity approaches, using environmental and Earth observation](#)

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