

CARBON FARMING IN THE EU

Prospects & Challenges

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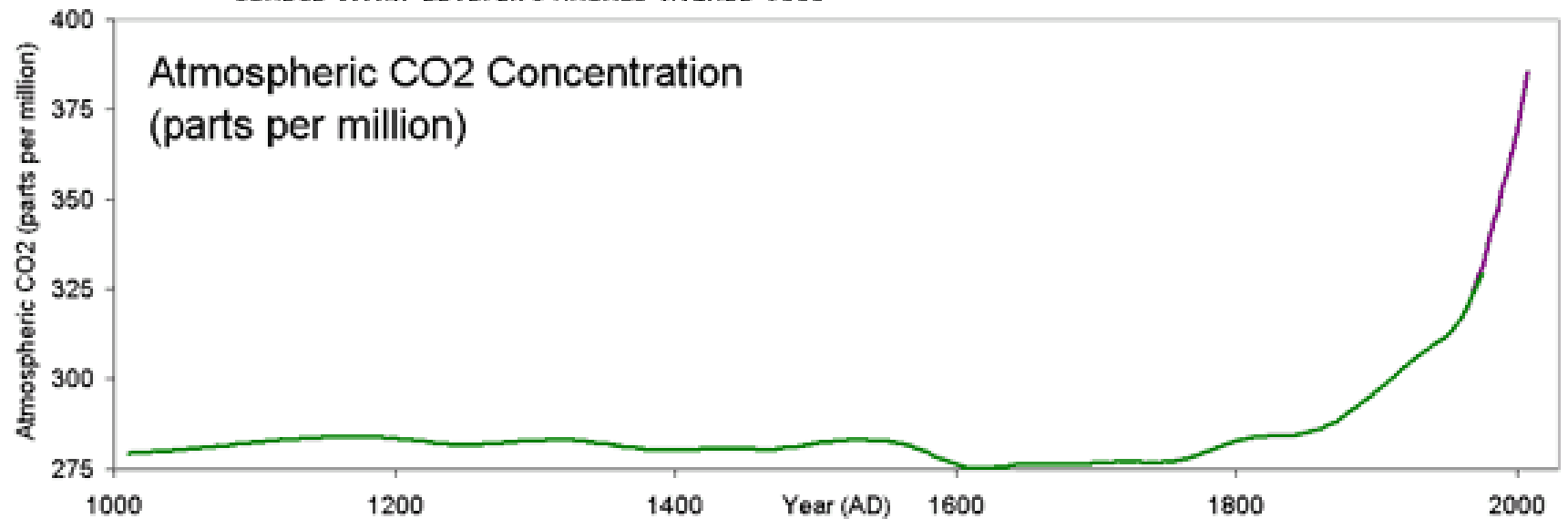
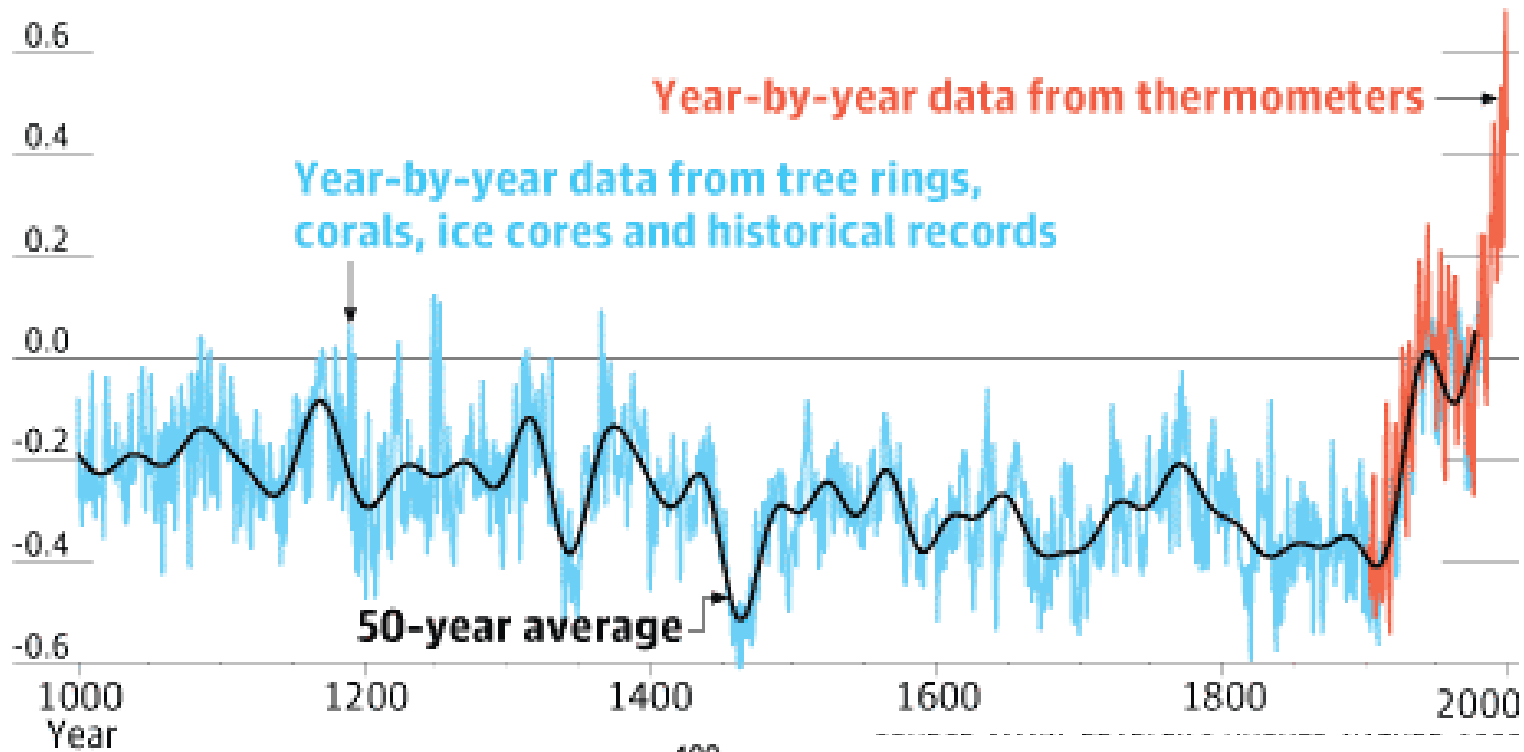


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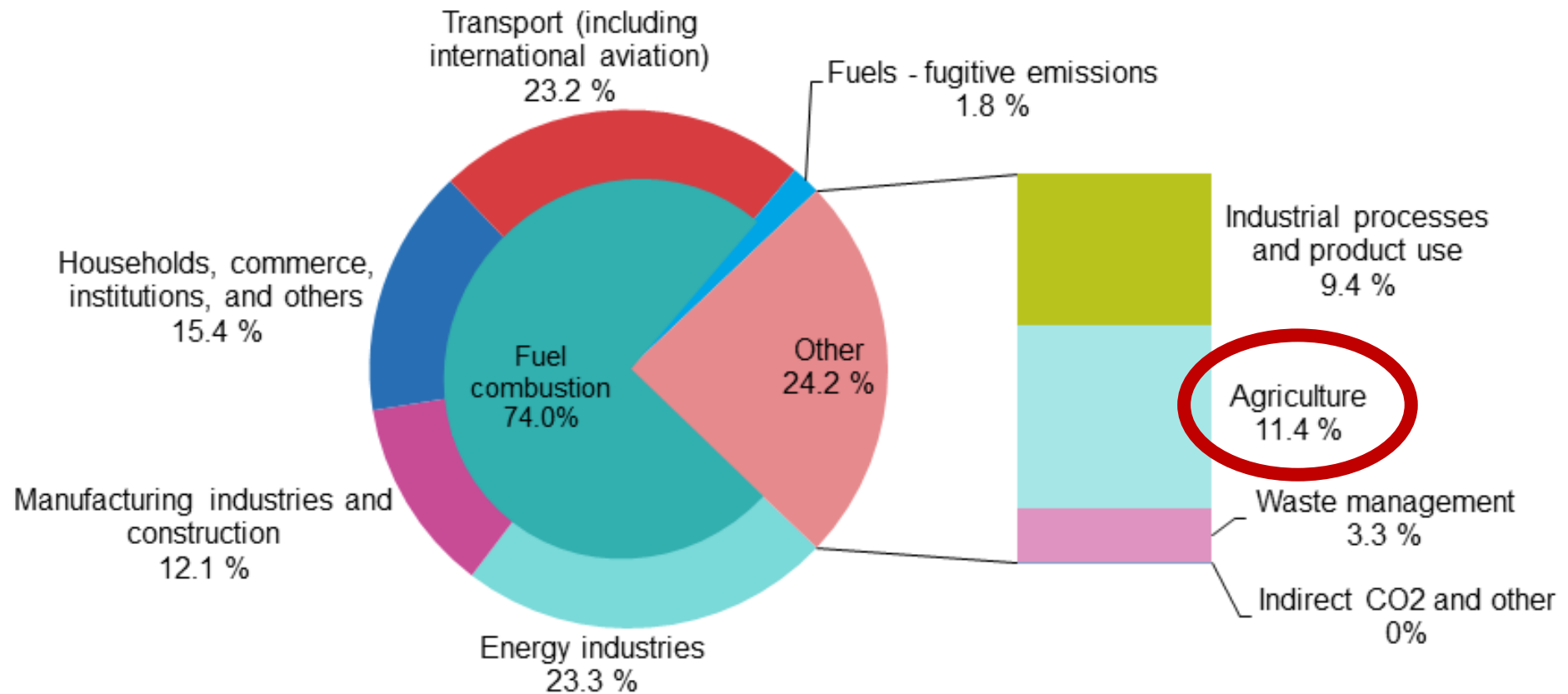
**ANTHROPOGENIC
CLIMATE
CHANGE IS HERE!**

Northern hemisphere. Departures in temperature (C) from the 1961 to 1990 average

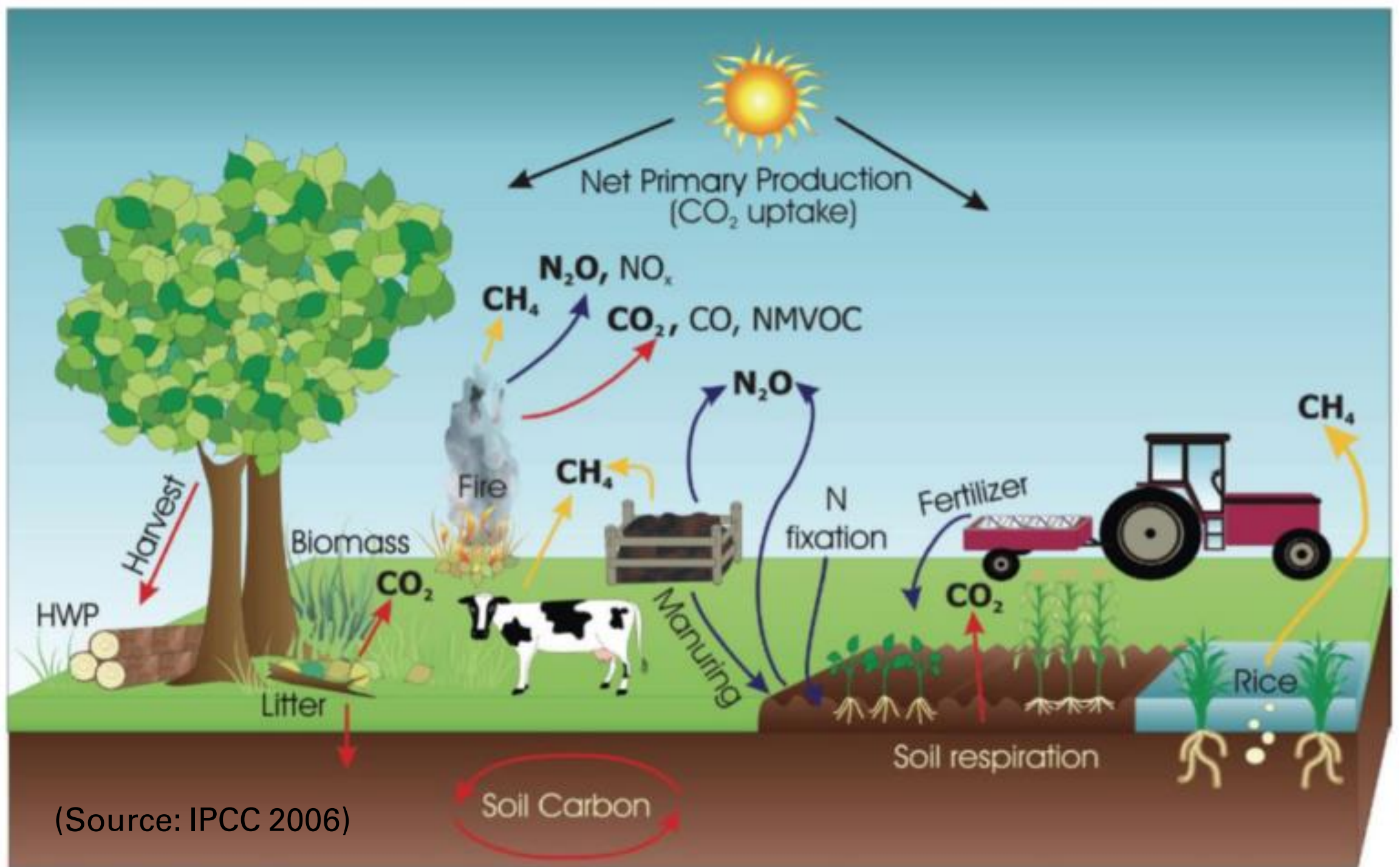


EU's Agriculture & CC

Greenhouse gas emissions by source sector, EU, 2020



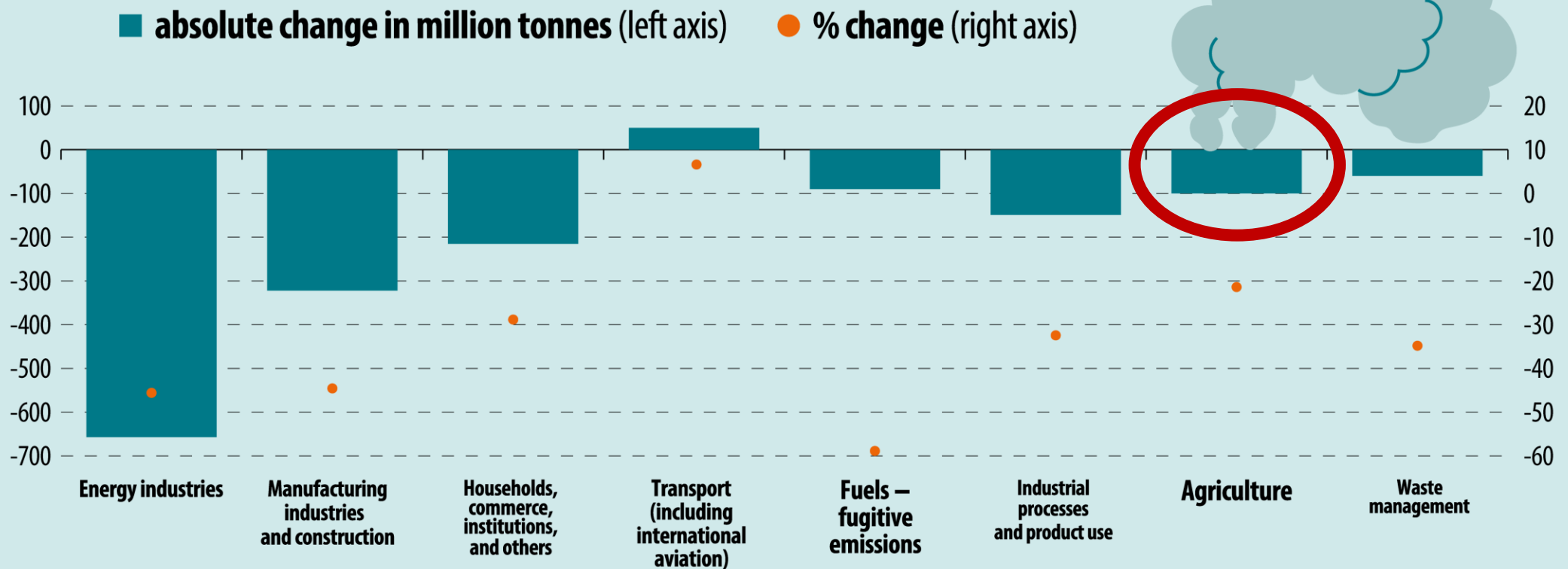
Source: EEA, republished by Eurostat (online data code: env_air_gge)



(Source: IPCC 2006)

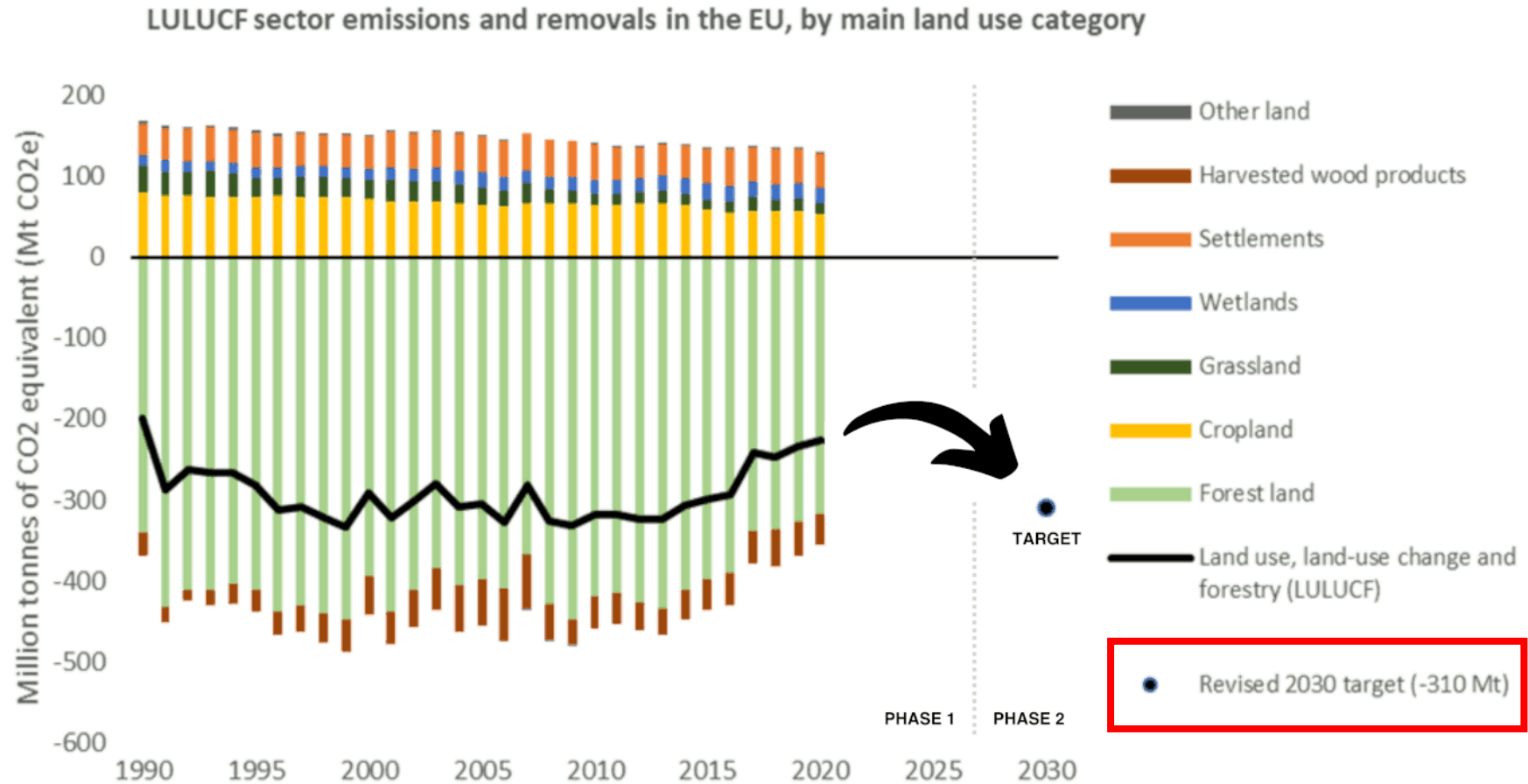
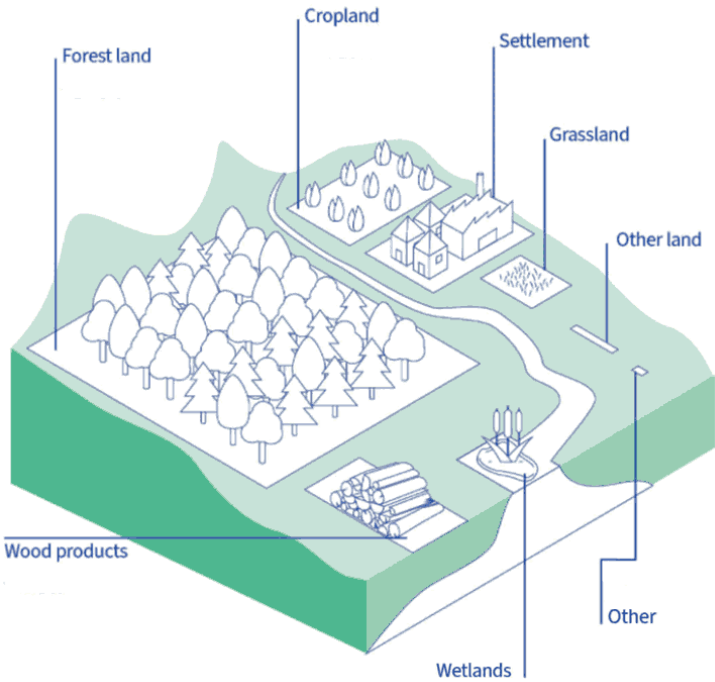
Agriculture's GHGs reduction lag

Greenhouse gas emissions by source sector, EU, change from 1990 to 2020 (million tonnes of CO₂ equivalent and % change)



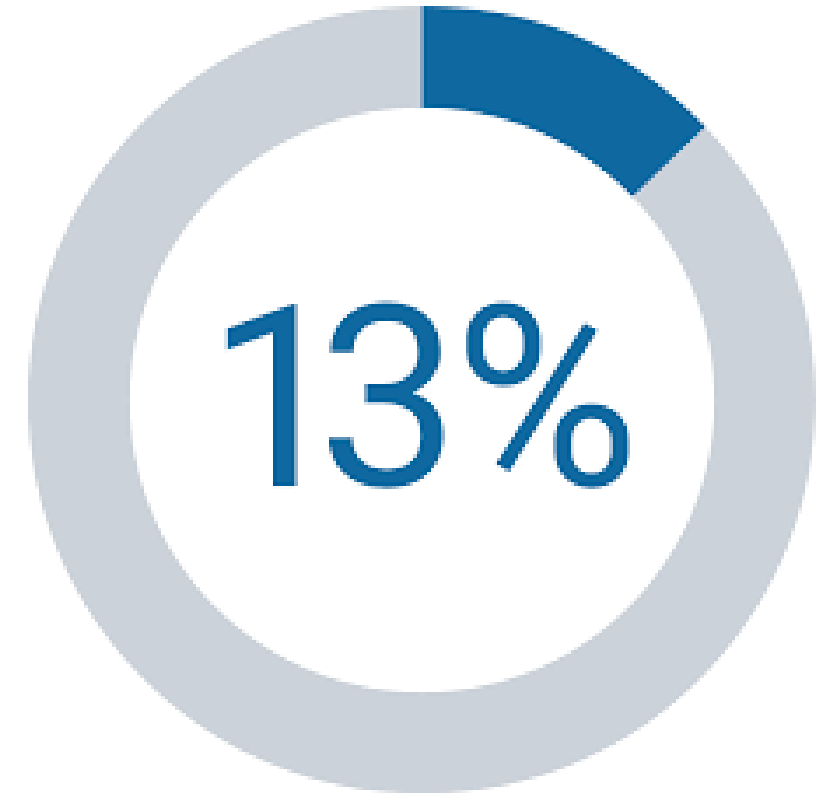
Note: Source sectors as defined in greenhouse gas emission inventories
Source: European Environment Agency (EEA) republished by Eurostat

EU Regulation on land, land use change and forestry (LULUCF)



“Carbon Farming” and LULUCF CC mitigation

“**Carbon farming** initiatives **should contribute** to the increase by **42 Mt CO₂eq** of the land sink that is required to meet the objective of 310 Mt CO₂eq **net removals by 2030.**” (EU Commission 2021)





WHAT IS CARBON FARMING?

«**Carbon farming** refers to the management of carbon pools, flows and GHG fluxes at farm level, with the purpose of mitigating climate change. This involves the management of both land and livestock, all pools of carbon in soils, materials and vegetation, plus fluxes of carbon dioxide (CO₂) and methane (CH₄), as well as nitrous oxide (N₂O)»

Carbon farming examples



Afforestation and reforestation
according to ecological principles



Targeted conversion of **cropland to fallow**, or of set-aside areas to **permanent grassland**



Use of **conservation tillage, catch crops, cover crops** and increasing **landscape features**



Agroforestry
and other forms of mixed farming

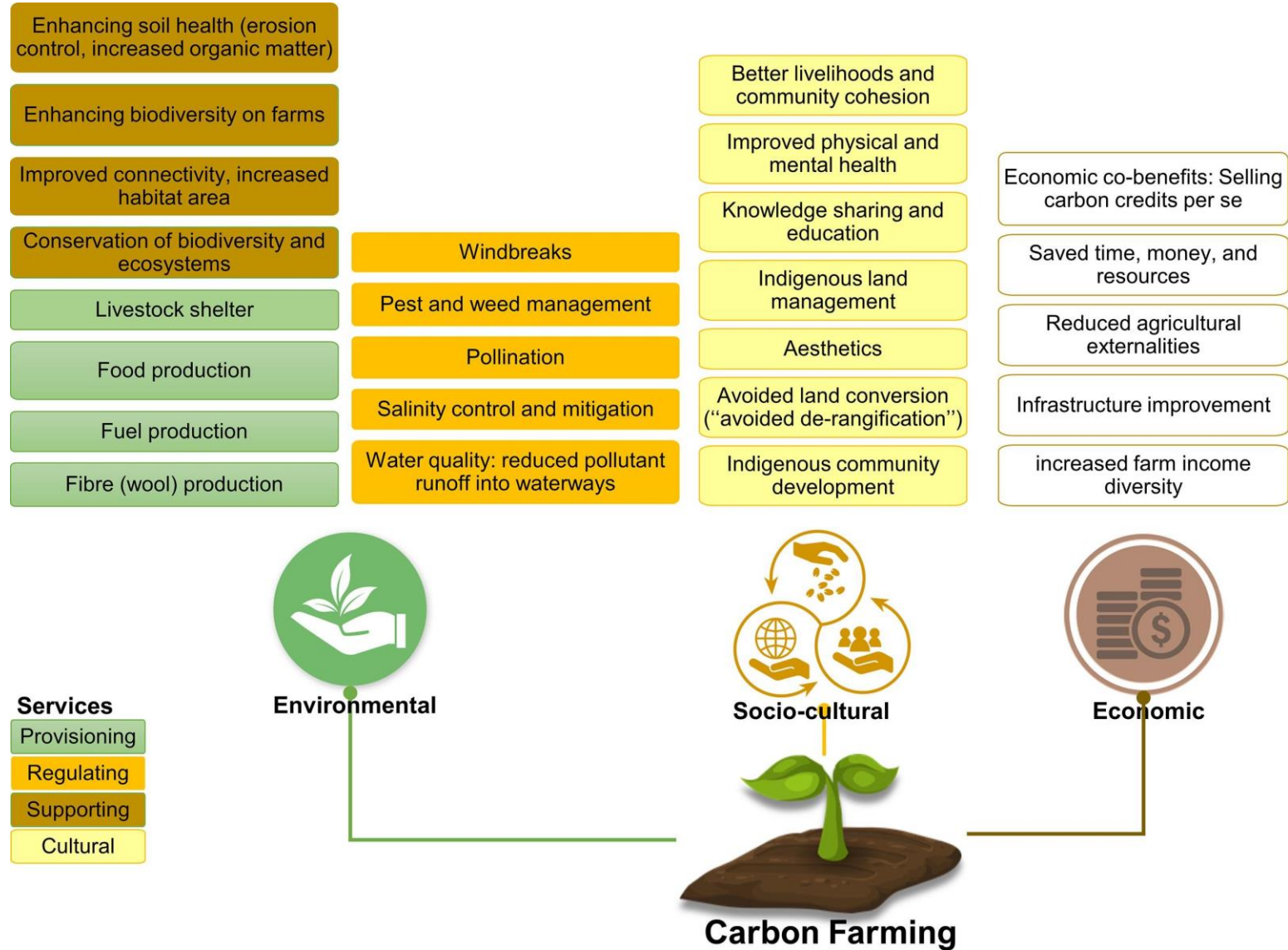


Restoration, rewetting and conservation of **peatlands and wetlands**



Blue carbon: coastal wetlands, regenerative aquaculture, marine permaculture

Potential co-benefits of carbon farming in addition to climate regulation (Baumber et al. 2019)



Carbon Farming Project Inventory



Cropland
management

More



Grassland, livestock
and manure
management

More



Peatland
management

More



Agroforestry

More



Agroforestry projects



LIFT Low-Input Farming and Territories – Integrating knowledge for improving ecosystem-based farming

Agroforestry, Cropland management, Grassland, livestock and manure management

SURFOLY

SURFOLY: Sustainable Ruminants Feed with Olive pomace and polyphenols enriched charred olive stone

Agroforestry, Cropland management, Grassland, livestock and manure management



REFOREST – Agroforestry at the forefront of farming sustainability in multifunctional landscapes in Europe

Agroforestry



AF4EU – Agroforestry business model innovation network

Agroforestry



AgroSatAdapt

Agroforestry, Cropland management



DIGITAF – DIGital Tools to help AgroForestry meet climate, biodiversity and farming sustainability goals: linking field and cloud

Agroforestry

Peatland management projects



FarmPEAT (Farm Payments for Ecological and Agricultural Transitions)

Peatland management



QuantiFarm – Assessing the impact of digital technology solutions in agriculture in real-life conditions

Cropland management, Grassland, livestock and manure management, Peatland management



AGRICORE – Agent-based support tool for the development of agriculture policies

Cropland management, Grassland, livestock and manure management, Peatland management

The Devil
is in the
Detail

The problem of measurement (McDonald et al. 2021)

- Different ways exist for determining Soil Organic Carbon (SOC)
- 3 to 5 years may pass before noting an increase

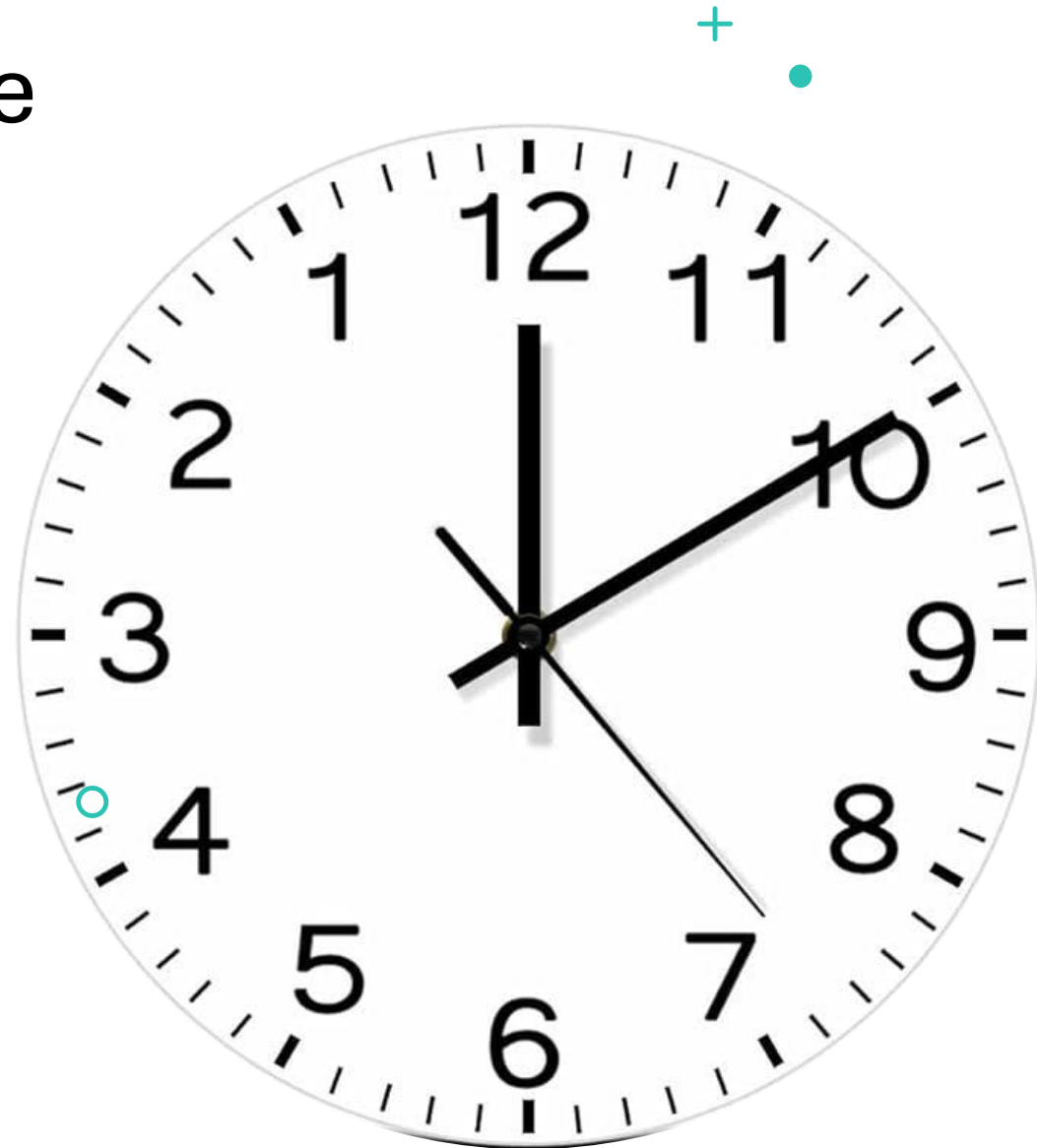
Assessment criterion	Managing peatlands	Agroforestry	Maintain and enhance SOC on mineral soils	Livestock and manure management	Nutrient management on croplands and grasslands
Carbon farming actions	Peatland rewetting / maintenance / management	Creation, restoration, and management of woody features in the landscape	Cropland and grassland management	Technologies to reduce enteric methane, manure management, increased herd and feed efficiency	Improved nutrient planning, timing and application of fertilisers; reduction in fertilisers
Total EU mitigation potential (Mt CO ₂ -e/yr)	51 - 54 Mt CO ₂ -e/yr	8 - 235 Mt CO ₂ -e/yr	9 - 70 Mt CO ₂ -e/yr	14 - 66 Mt CO ₂ -e/yr	19 Mt CO ₂ -e/yr
Per hectare mitigation potential (t CO ₂ -e/ha/yr)	3.5 - 29	0.03 - 27	0.5 - 7	Not available	Not available
Mitigation mechanism	Avoided emissions	Removal	Removal and avoided emissions	Reduced emissions	Reduced emissions
Type of change	Land use	Management	Management and land use	Management	Management
Co-benefits for farmers	Potential for paludiculture (productive use of wet peatlands)	Diversification of outputs protects against single crop failure	Improved water holding capacity and workability of soils, productivity	Lower input costs (feed, fertiliser, energy), soil health, productivity	Lower input costs
Societal co-benefits	Biodiversity, flood regulation, water quality	Improved water retention, microclimate, soil health, biodiversity	Improved water retention, soil health, biodiversity	Decreased nutrient runoff; decreased ammonia emissions	Decreased nutrient runoff; decreased ammonia emissions
Risks	CH ₄ emissions (although net GHG benefit), decrease in production	Non-native species' impact on biodiversity	Biochar and off-farm compost impacting soil health/biodiversity	Animal welfare; water quality impacts of feed additives	Water quality impacts of nitrification inhibitors

Measurement, Reporting, Verification

Carbon farming sub-category	MRV		
	Type of monitoring	Uncertainty	Costs
Managing peatlands	Modelling	Medium	Medium
	Measurement	Low-medium	Very high
Soil carbon on mineral soils	Modelling	High	Medium
	Measurement	Medium	Very high
Agroforestry	Combined (modelling + measurement)	High	High
Livestock + manure management	Modelling	Medium	Low-Medium

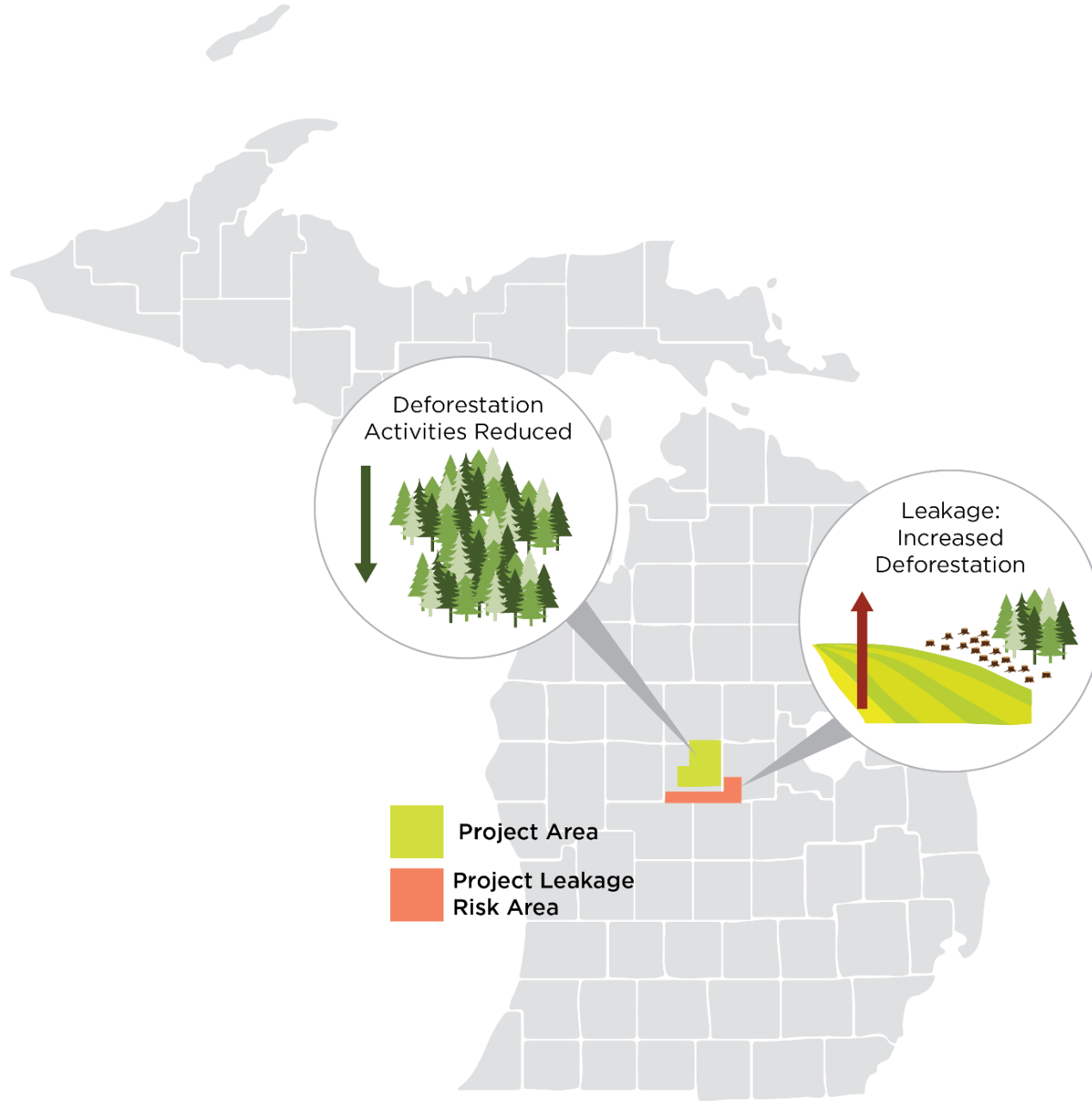
The temporal dimension

- Carbon farming benefits may be easily reversed
- Penalties on back-stepping are still unclear



Potential Negative side-effects (McDonald et al. 2021)

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The issue of 'leakage'

Diminishing returns



The problem of 'Carbon Offsetting'

USE OF CARBON REMOVAL CERTIFICATES

A wide variety of business models reward carbon removals. Thanks to the EU certification framework, more businesses, farmers, foresters and other stakeholders can access these new opportunities, as they will be able to apply for harmonised and reliable certification.

- **Public funding** – e.g. Common Agricultural Policy, State Aid schemes, or the Innovation Fund
- **Private funding** – e.g. food companies which reward farmers for additional carbon removals and enhance their carbon accounting
- **Labels for sustainable building materials** e.g. construction companies or property owners investing in sustainable building materials, and labelling programmes
- **Impact finance** e.g. new income opportunities for industries deploying carbon removal technologies or developing long-lasting carbon storage products
- **Voluntary carbon markets** to raise financing for high-quality carbon removals






Carbon farming and the Common Agricultural Policy

A short history of Carbon farming in the EU


Dec. 2021: European Commission releases its “Communication on Sustainable Carbon Cycles” on developing **carbon farming**



Fund carbon farming practices under national and EU programmes (Common Agricultural Policy (CAP), LIFE and Horizon Europe)



Standardize the monitoring, reporting and verification methodologies



Provide improved knowledge and tailored advisory services to land managers.

Carbon farming regulation in the EU

Nov. 2022: European Commission releases its proposal for a voluntary Carbon Removals Certification (CRC) framework

CRITERIA FOR A ROBUST EU CERTIFICATION SYSTEM

The EU certification framework can **only be used to certify carbon removals that meet the following QU.A.L.I.TY criteria:**



Quantification

Carbon removal activities are measured accurately and deliver unambiguous benefits for the climate



Additionality

Carbon removal activities go beyond standard practices and what is legally required



Long-term storage

Certificates clearly account for the duration of carbon storage and distinguish permanent storage from temporary storage



Sustainabil-ITY

Carbon removal activities must support sustainability objectives such as climate change mitigation and adaptation, biodiversity, circular economy, water and marine resources

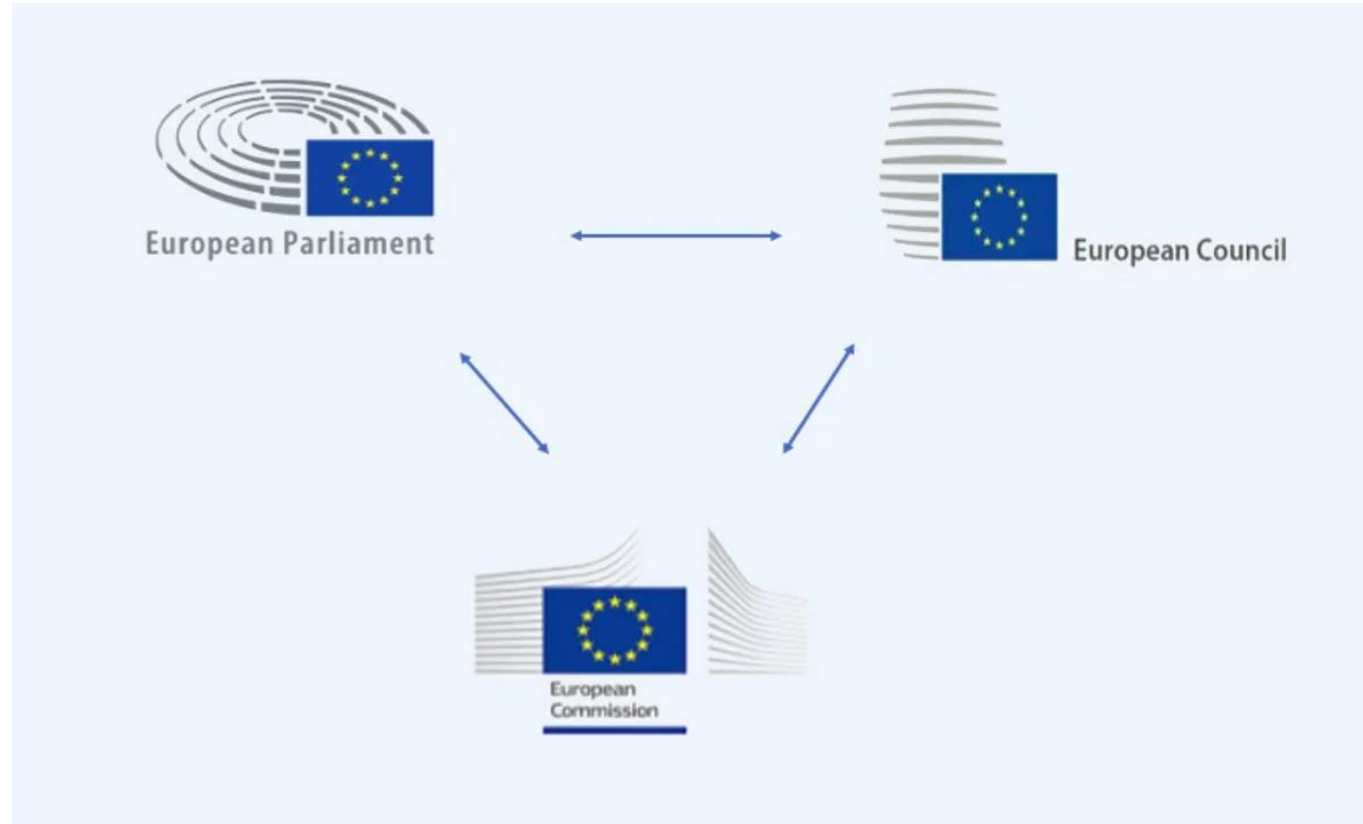
The envisaged framework

HOW DOES IT WORK?



All the relevant information on the certified removals will be publicly accessible preventing the risk of double-counting and fraud, and help the providers of carbon removals to access different types of financing opportunities.

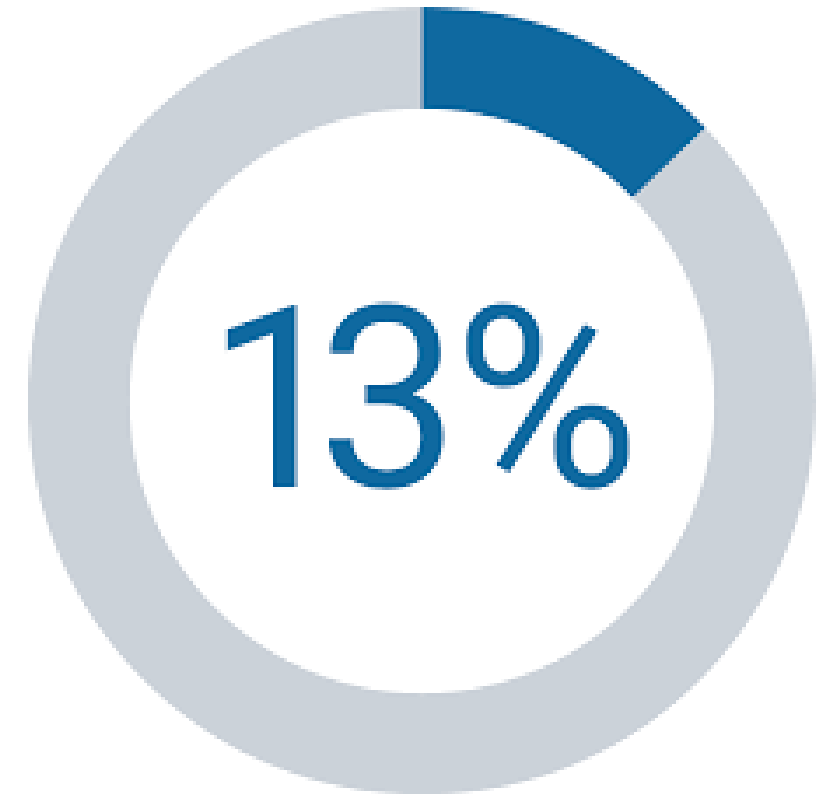
Nov. 2023: EU Parliament adopts draft Legislation



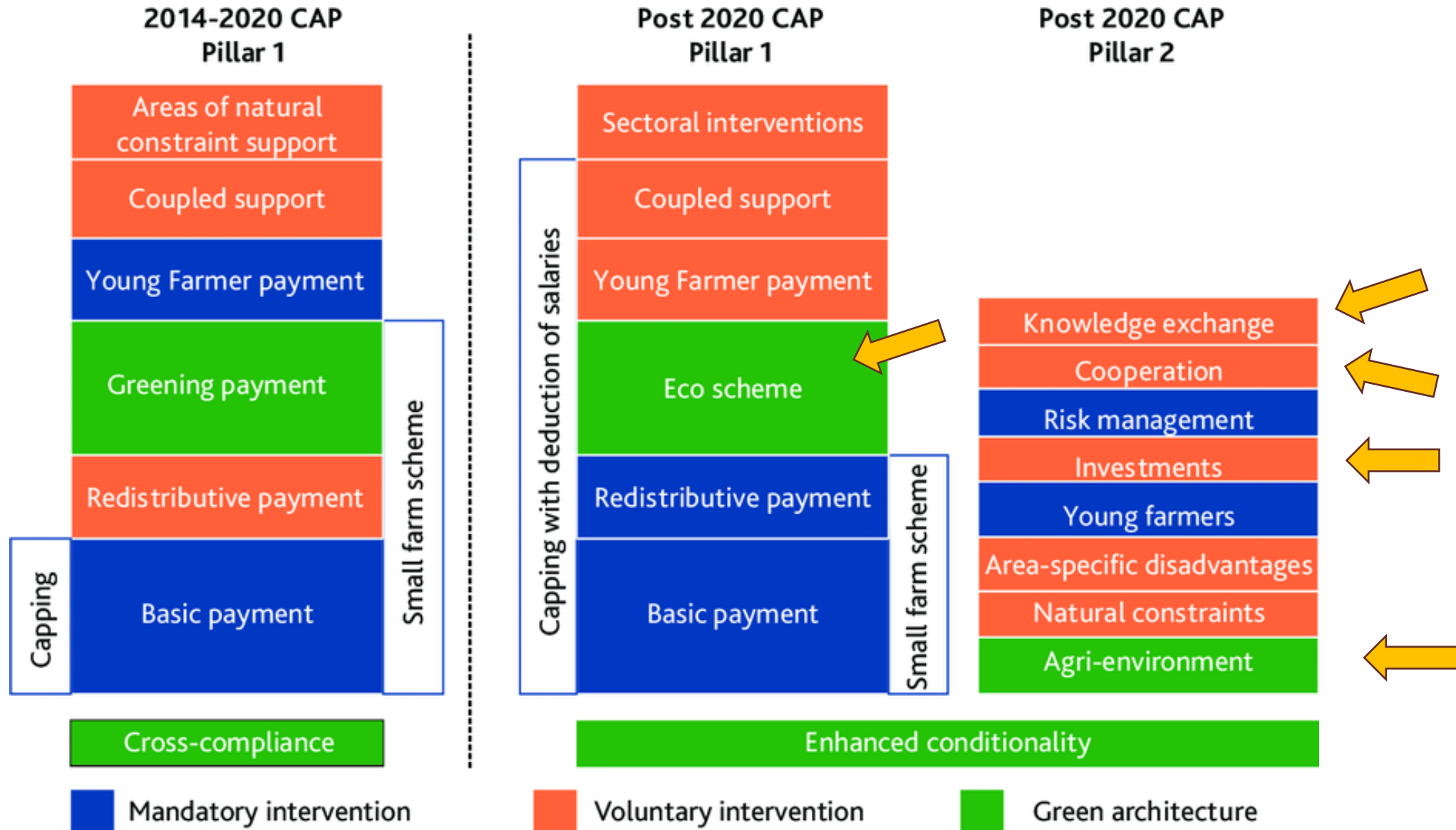
March 2024: Agreement to be reached

REMINDER! Land Use, Land Use Change (LULUC) CC mitigation

“**Carbon farming** initiatives **should contribute** to the increase by **42 Mt CO₂eq** of the land sink that is required to meet the objective of 310 Mt CO₂eq **net removals by 2030.**” (EU Commission 2021)



CAP and Carbon Farming (Matthews 2018)



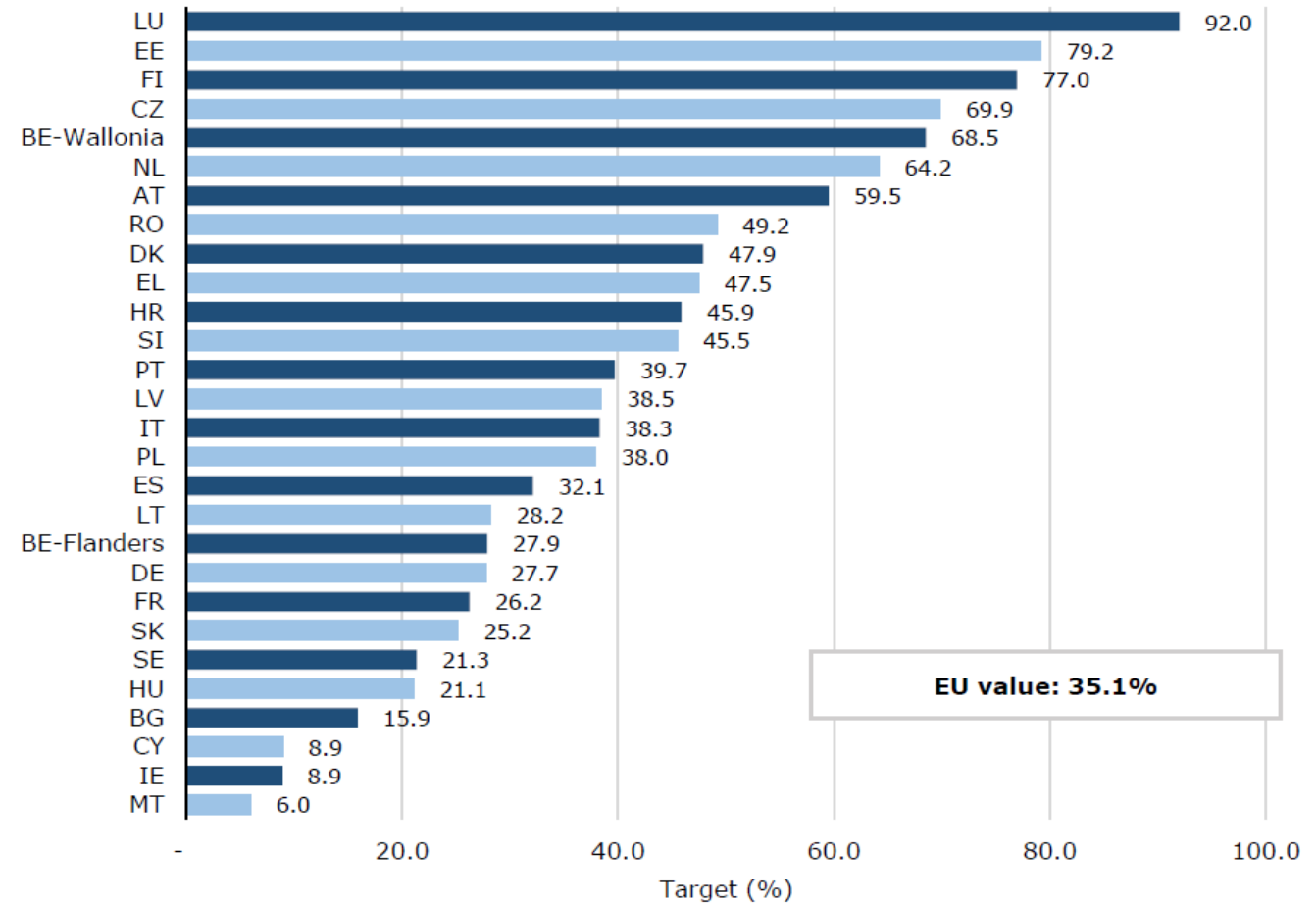
Carbon Farming in National CAP Strategic Plans

CAP Specific Objective (SO4),

(Related result indicator) RES.14

- Share of utilised agricultural area (UAA) under supported commitments to reduce emissions or to maintain or enhance carbon storage (including permanent grassland, permanent crops with permanent green cover (agricultural land with wetland and peatland))

Figure 281 Targets for R.14 Carbon storage in soils and biomass





2021 - 2027



LIFE Carbon Farming

GOAL : To reduce by 15% the carbon footprint of mixed crop livestock farms thanks to a reward result-based system



700
Demonstration farms



Sustainable environmental tools



3.5M€
Total projected income for all farms



Co-funded by the European Union



@LCarbonFarming
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@LIFEprogramme

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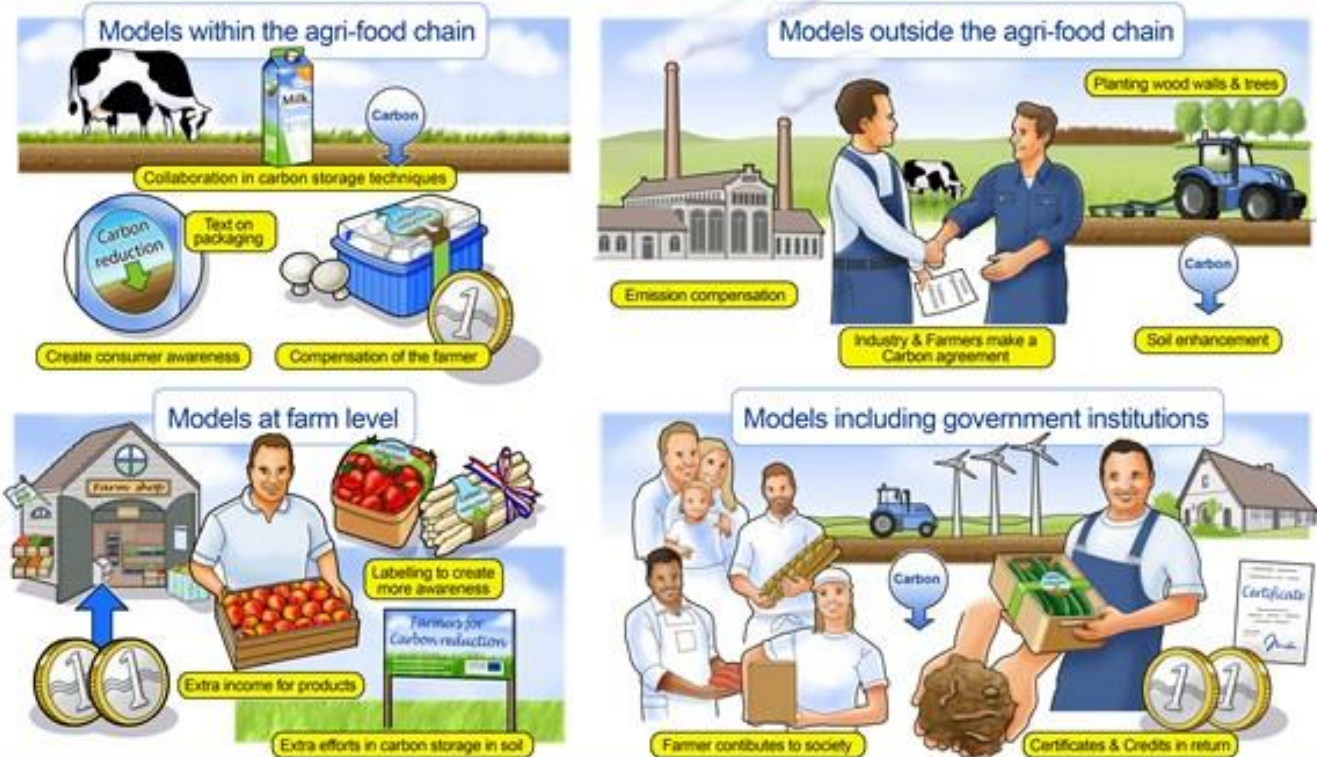


SCAN ME

- Stimulate farmers to adopt Carbon Storage (CS) techniques
- Stimulate collaboration on CS between farmers and partners in or outside the agri-food chain
- Showcase practical examples of CS business models

Business models for Carbon Farming

Reduce or compensate for CO₂ emissions by storing carbon in the soil by applying soil management techniques at farmer's level



Interreg



EUROPEAN UNION

North-West Europe

Carbon Connects

European Regional Development Fund

THEMATIC PRIORITY:



PROJECT AREA



Project objectives: Reduce the high footprint of degraded peatlands in North-West Europe by introducing innovative business models based on sustainable land management practices

Total budget received from Interreg North-West Europe (2018-2023):

€3.2 million of ERDF

Total project budget:
€5.3 million

www.nweurope.eu

“Carbon Connects aims to reduce by 50% the unnecessarily high CO2 emissions caused by traditional practices on agricultural peatlands in Northwest Europe by introducing new bio-based business models developed for sustainable land management practices.”

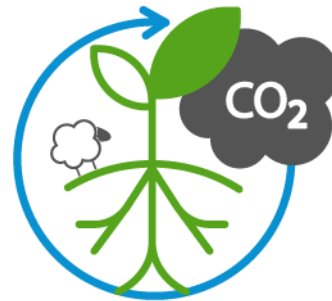
Thank you for your attention!

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CARBON
Farming HUB



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