LIFE 20 PRE IT/017

C·FARMs
CARBON FARMING CERTIFICATION SYSTEM

C-FARMs
Carbon Farming Certification system

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CMCC

C-FARMs at a glance

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C·FARMs
CARBON FARMING CERTIFICATION SYSTEM

▸ **Coordinator:**
Federlegno arredo

FEDERLEGNOARREDO

▸ **TITLE**

C-FARMs
Carbon Farming Certification System

▸ **DURATION**

01.12.2021 – 30.05.2023 (18 Months+3?)

▸ **COUNTRY / REGION**

Italy / Lombardy

WEBSITE

www.c-farms.eu

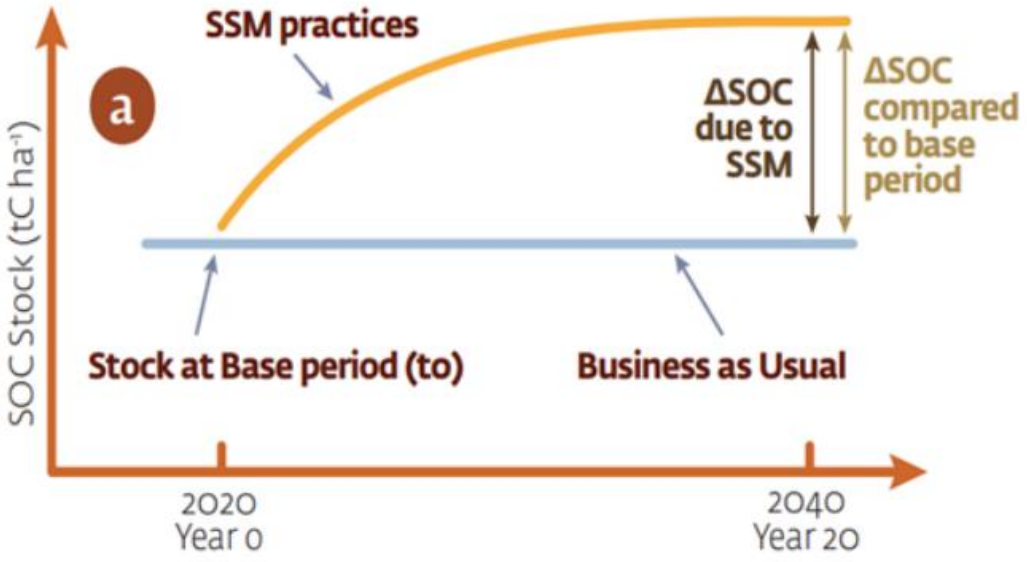
FEDERLEGNOARREDO PEFC crea Confagricoltura rete clima UNIVERSITÀ TUSCIA TERRASYSTEM s.r.l. cmcc Euro-Mediterranean Center on Climate Change

Objectives of the Project

- **Systematizing existing knowledge and data**
- Creating **high-resolution demonstrative geospatial information system (GIS-FARMs)**
- Supporting the **development of a regulatory framework** for a carbon certification
- Exploring **common methods and/or reference data and/or data sets in combination with GHG reporting institution**

Carbon farming practices: Cropland

Selections of the carbon farming practices suitable in the Lombardy context

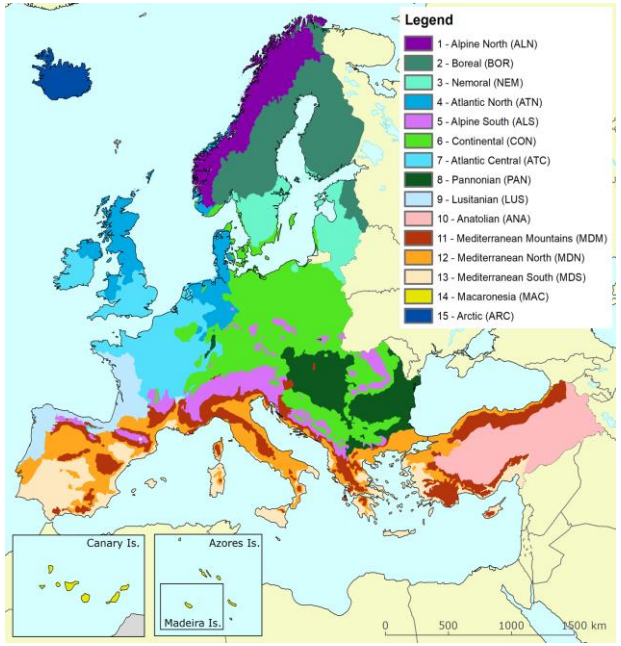


SINK

572 data entries (44 practices)

-70%

143 data entries

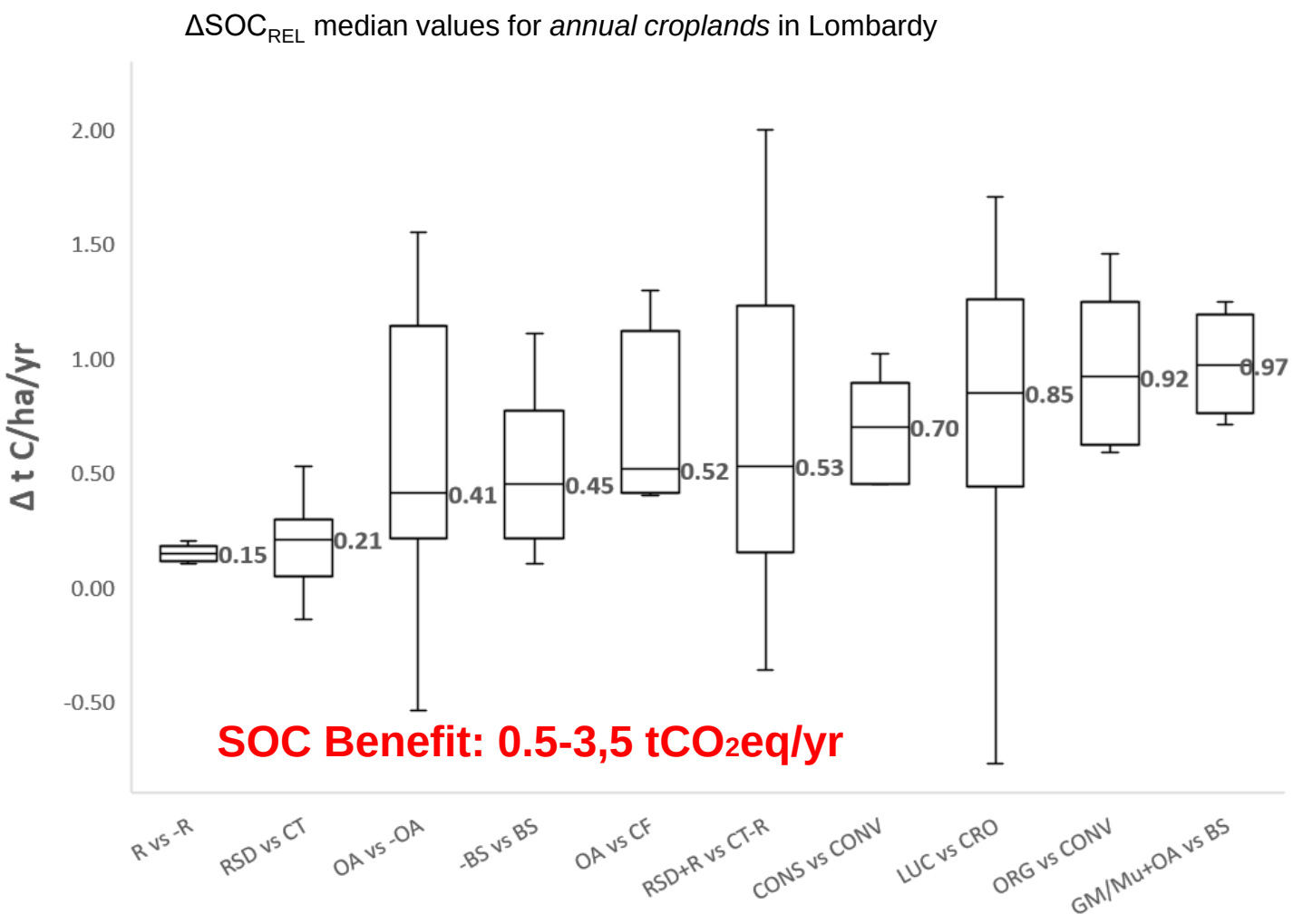


- 15 carbon-farming practices annual crops
- 3 practices for perennial crops

CARBON FARMING IN AGRICULTRUAL LAND

- **Agroforestry practices**
- **Cover Crops**
- **Reduced soil disturbance**
- **Agronomic management** (Intercropping; Improved crop rotations; Conservation agriculture; Organic agriculture; Crop residues, Grassland or pasture)
- **Conversion from annual crop to woody perennial plantation** (Agroforestry, orchards, plantation for timber production, including HWP)
- **Use of organic amendment** (local production and equivalent N content)

3.Carbon-farming practices for annual crops



Legend

R vs **-R:** crops residue maintenance vs residues removal

RDS vs **CT:** Reduced soil disturbance vs conventional till

OA vs -OA: organic amendment vs unfertilized

-BS vs BS: avoiding bare fallow with cover crops vs bare fallow

OA vs CF: organic amendment vs chemical fertilizer

RDS+R vs **CT-R**: Reduced soil disturbance + crop residues vs conventional till and residues removal

CONS vs CONV: Conservation agriculture vs conventional

LUC vs CRO: Land-use-change of annual cropland vs annual cropland

GM / Mu + OA vs **BS**: Cover crops as green manure or mulch, and application of organic amendment

BIOMASS POTENTIALS

BEST PRACTICE	*Mean ΔCO_2 in woody biomass (tCO2/ha/yr)*	*SD*
POPLAR	**9.5**	3.1
VINEYARDS	**1.8**	0.3
ORCHARD	**2.6**	0.8
OLIVE	**2.2**	0.5
HEDGEROWS*	**4**	2
SILVOARABLE*	**4.2**	2.2
SILVOPASTORAL*	**11.1**	5.8

CO2 removals from above ground and below ground woody biomass from orchards and short-rotation forestry derived from scientific literature (*IPCC 2019 values)

INPUT DATA

- Climate
- Texture
- Land Use
- Initial Soil Carbon Content (SOC) from the FAO GSOC Map

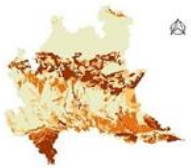
STRATIFICATION (Section 1)

Intersecting Climate, Texture and Land Use

(Map of 53 unique strata homogenous for climate, texture and land use)

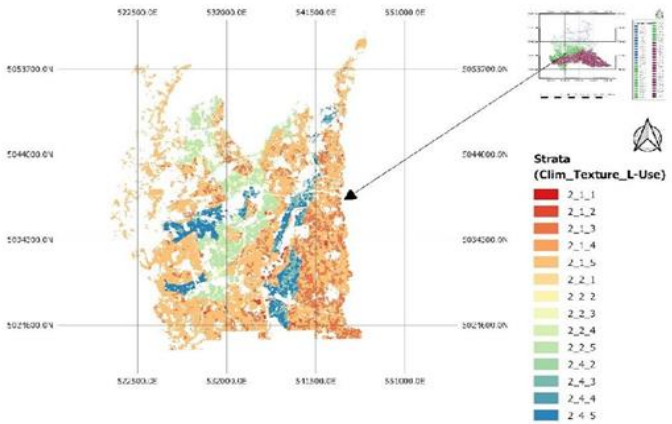
Climate

Texture



Land Use

Extract from the map of the Strata

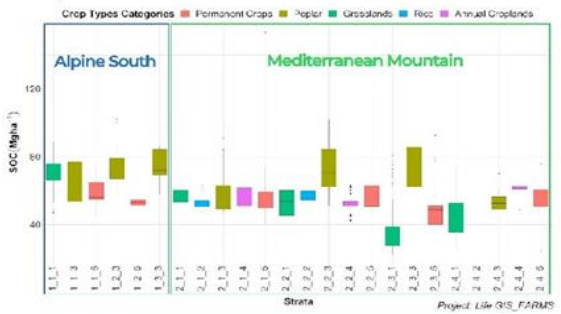


CHARACTERIZATION OF SOC CONTENT OF THE STRATA (Section 2)

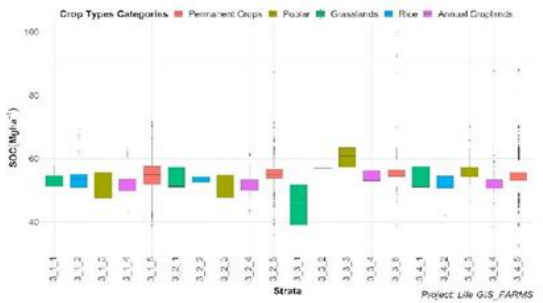
GSOC map vectorization for Lombardy region

Extraction of SOC Statistics for Strata

Alpine South & Mediterranean Mountain



Mediterranean North



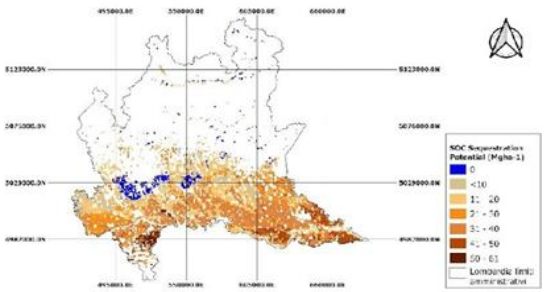
SOC SEQUESTRATION POTENTIAL (SOC_{SP}) (Section 3)

Descriptive Statistics on SOC for Strata homogenous for climate and texture (11 Strata)

Derivation of SOC Saturation level for the 11 strata (SOC_{SAT})

SOC SEQUESTRATION POTENTIAL

$SOC_{SP} = SOC_{SAT} - SOC$



SHAPEFILE GIS-FARMS

Strata_Section_1

SOC_Sequestration_Potential_Map

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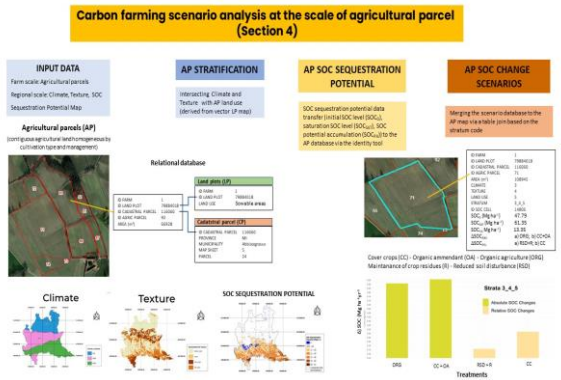
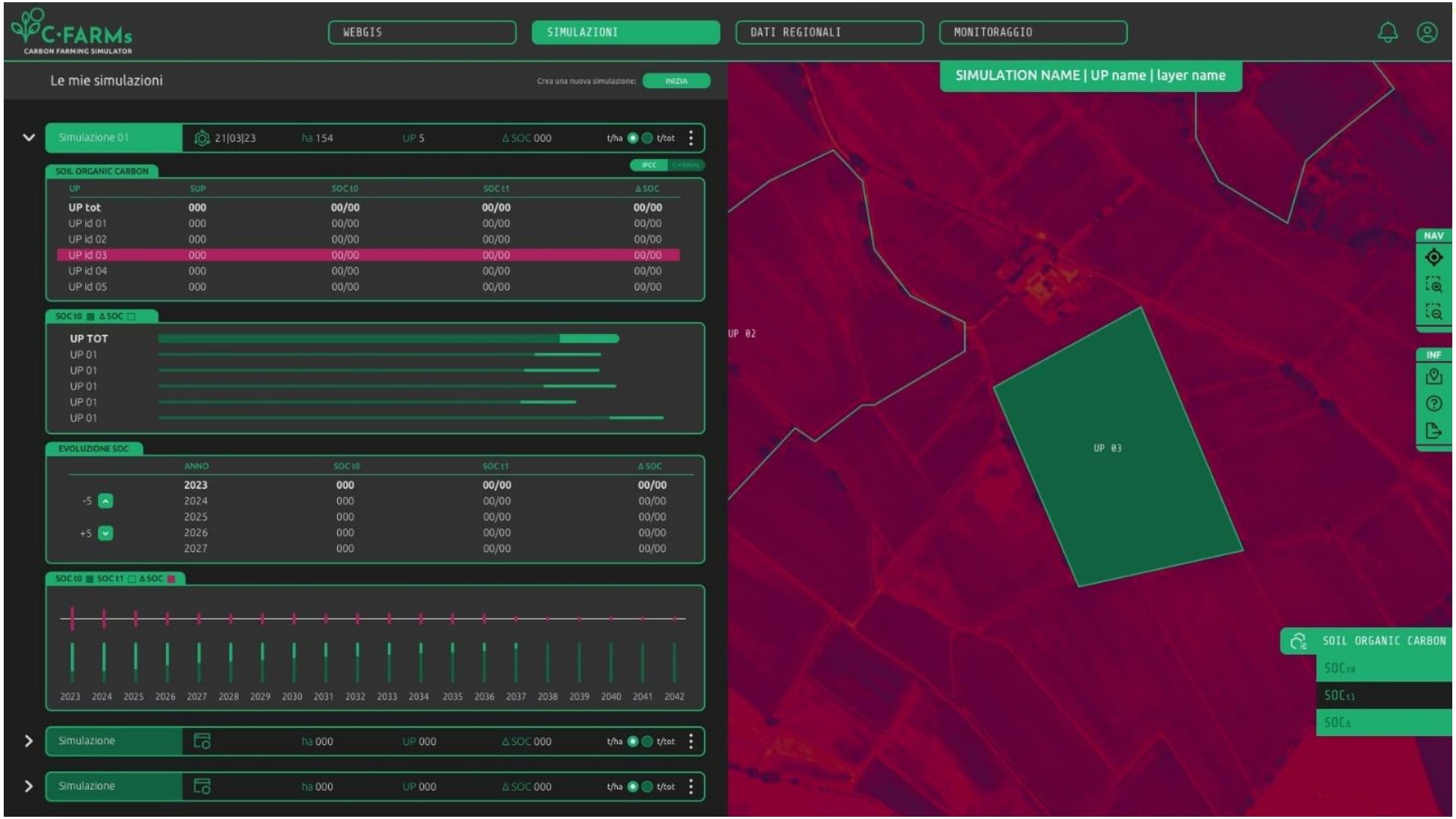
GIS FARMs



- **Decision support system (DSS)**
- **Repository of monitoring information**
- **Knowledge hub**
- **Registry/verification tool**

Functions	*End users*
Selection and simulation of the effects of the CF practices at farm level	
Upload monitoring and measurement data	*Farmers*
Validation, storage, registry, link with LPIS system, **Link with GHG inventory agency**	*Scheme owner/payment operators*
Selection and simulation of the effects of the CF practices at landscape level	*Policy makers*

C-Farms web application



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Regulatory framework and certification system

PEFC Italy

Proposed approach

- **Leakage** → all farm need to be monitored
- **Baseline** → Equal to zero if annual crops conventional agriculture is considered as BAU
- Permanence
  - 10 yrs guaranteed and re-emissions of credits if not monitored
  - Risk of reversals→Buffer system (liability system to be established)
- **Buffer** for covering underperformances due to interannual variability and disturbances – Natural disturbances
- **Monitoring timing**→ every 2 years for activity, every 10 yrs measurements
- **Payments**→ex ante payments on the basis of conservative estimates

Methological approach

Net carbon removal benefit = $CR_{baseline}$ – CR_{total} – $GHG_{increase}$

where:

$CR_{baseline}$ is the carbon removals under the **baseline** **= 0** (conventional is a net emission)

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$$\Delta C = (C_{t1} - C_{t0}) / t_1 - t_0$$

(LB, SOC, HWP) measurement every 5/10 yrs

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(LB, SOC, HWP) measurement every 5/10 yrs

$GHG_{increase}$ is the increase in direct and indirect greenhouse gas emissions

$GHG_{increase}$=GHG_{cf}-GHG_{bsl}= zero under conservation agriculutre and INF replace by OA& Nfix cover crops

Otherwise: GHG_{bsl} = $GHG_{(INF)}$ + $GHG_{(FUEL)}$ + $GHG_{(OA/CC)}$ Average over past 5 yrs

Open issues

- **Baseline→** carbon removal performance that would occur in similar environmental conditions in absence of carbon farming practices→ BAU? No legal requirements unless under certain sustainable practices. How to define the BAU at regional level?
- **Minimum combination of CF practices?** (link with additionality/Baseline)
- **Monitoring timing→** what is the best timing for capturing the effects at a reasonable cost? (annual/5?/10?)
- **Payments→** every year on the basis of ex ante estimates→ what if underperform?
- **Certification costs?**
- **Credibility vs feasibility**
- **Technical support**


CO2
removals
Quality
Additionality
Credibility
COST
Tech support

Contacts

The "Carbon Farming Certification System" (C-FARMs) LIFE project is coordinated by FederlegnoArredo with CREA, Confagricoltura, University of Tuscia, PEFC Italy, Reteclima, CMCC and Terrasystem

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https://www.facebook.com/LIFECFARMs

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